Economic Impact Analysis
of the National High Magnetic Field Laboratory – Final Report

Prepared for:
The National High Magnetic Field Laboratory ("MagLab")

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Executive Summary

The MagLab requested that an economic impact study be conducted in 2025, as it marks the thirtieth year of the opening of the MagLab's scientific user program. The economic research project undertaken by FSU CEFA involved data compilation and economic impact analysis of the MagLab annually and projected over the next twenty years (to year 2044) on the Tallahassee metropolitan statistical area (MSA), the state of Florida, and the United States.

Economic impacts are results of economic activity in a given area. They may be expressed in terms of: 1) business output (or sales volume), 2) value added (or gross regional product), 3) wealth (including property values), 4) personal income (including wages), or 5) jobs. Any of these measures can be an indicator of improvement in the economic well-being of area residents. Net economic impact is viewed as the expansion (or contraction) of an area's economy resulting from changes in a facility or project, or in assessing the economic impact of an already existing facility or project. The following economic impact analysis report provides a summary of the local, state, and national area economic impacts associated with the MagLab.

In order to obtain estimates of the different types of macroeconomic effects of the MagLab on the Florida economy annually, the project team applied a well-established analytical tool known as the IMPLAN model. The IMPLAN Model (using latest 2024 data), an economic input-output model, was used to perform the economic modeling analyses. Historical data (for years 1990-2023) was provided by the MagLab finance and budget staff and included capital outlay, equipment, salaries/wages, among other data. For example, about 809 MagLab researchers reside in the Tallahassee area, paying property taxes totaling approximately $1.77 million in 2024[1]. More than 1,826 research facility users travel annually to the MagLab from around the world to perform research activities using its unique facilities and scientific capabilities. Over 11,700 visitors came to experience the

[1]Source: Florida Property Tax Calculator (https://smartasset.com/taxes/florida-property-tax-calculator#florida)

drama, comedy, and mystery of science at the MagLab's world-class research laboratory during Open House in February 2023.

This economic impact analysis study provides a short-term perspective and its associated economic impacts on the Tallahassee, state, and national economies. The economic impact model, an input-output model, includes cross-linkages between every sector of the economy within these geographic areas. The effects of expenditures external to the Tallahassee, state and nation (termed leakages) are not included in the economic impact estimates. However, as the regional level covers a larger economic area than the county level, a greater portion of direct expenditures are captured, resulting in less leakage at the regional level.

The following table(s) present the total economic impacts, and the direct, indirect, and induced economic impact results, respectively, in current dollars. The impacts are measured with respect to output (or sales/revenues), employment (or jobs), and income (or wages). The output generated represents the value of final goods and services produced across the Tallahassee, state and national area economies, respectively, as a result of the expenditures generated by MagLab activities. The direct impacts measure the immediate effects as a result of the MagLab-related expenditure generated activities in the Tallahassee area; e.g., in employment and income. Indirect impacts are those that include changes to production, employment, income, etc., that occur as a result of the direct effects. Induced impacts are those further impacts of spending derived from direct and indirect activities – i.e., MagLab related household purchases of consumer goods and services.

Annual Benefits to the City of Tallahassee, State of Florida, and the Nation

Regarding the economic impact analysis results, the project research team found that in the Tallahassee MSA area the MagLab annually generates:

- $ 174 million in economic output;
- $ 77 million in income;
- while generating 1,266 jobs.

In the Florida area, the MagLab annually generates:

- $232 million in economic output;
- $ 96 million in income;
- more than 1,652 jobs.

Nationwide, the MagLab annually generates:

- $ 297 million in economic output;
- $ 124 million in income;
- more than 1,603 jobs.

The project research team found that (based on average annual expenditures) the MagLab annually generates for the Tallahassee MSA, State, and Nation, respectively:

Average Annual Economic Impacts			
Economic Impacts of the MagLab	**Output**	**Employment**	**Income**
Economic Impact on Local Economy	$174,118,270	1,266	$77,130,416
Economic Impact on State Economy	$231,689,303	1,652	$95,478,842
Economic Impact on National Economy	$296,519,758	1,603	$124,278,139

In 2026 $

In addition, the annual economic impacts of visitors to the MagLab facilities are:

Average Annual Economic Impacts			
Economic Impacts of Visitors to the MagLab	**Output**	**Employment**	**Income**
Visitor Impact on Local Economy	$5,934,070	30	$1,541,743
Visitor Impact on State Economy	$8,280,687	39	$2,694,196
Visitor Impact on National Economy	$11,566,426	47	$3,747,431

In 2026 $

The economic impact of visitors to the MagLab is sizeable. Nationally, the visitor impacts are $11.6 million and $3.8 million, in output (sales/revenues) and income (wages/salaries) respectively, while generating an additional 47 jobs.

In summary, it should be noted that since 2020, the COVID-19 pandemic has disrupted global supply chains, causing widespread production shortages, higher costs, and economic contraction across most industries. The time period of this current MagLab study (2019-2023) was during the height of the pandemic, and likely further dampened potential greater economic impacts associated with the MagLab's economic activities. However, the results of the following economic analysis indicate that the MagLab performs a significant role in the local Tallahassee MSA, the state of Florida, and the national economies. The economic benefits include large additions to employment, economic output, personal income, and tax revenues.

Annual Return on Investment to State of Florida

The annual benefits within the Florida economy are defined as the economic impacts resulting from the annual state investment in the MagLab, and the economic activity brought into Florida (via contracts and grants, government and private sponsors, auxiliary fees/services, and other external sources), resulting in the following return on investment (ROI) ratios:

Annual Average Economic Impact for Years 2024-2044			
	Output	**Employment**	**Income**
State of Florida Investment	$37,704,933	256	$15,472,535
Economic Impact of MagLab Spending in FL	**Output**	**Employment**	**Income**
MagLab Expenditures	$231,689,303	1,652	$95,478,842
Benefit to Cost Ratio	6.15	6.45	6.17

In 2026 $

The results of the economic analysis indicate that the MagLab provides a substantive rate of return on the investments made by the state of Florida. The economic benefits include large additions to employment, economic output, personal income, and tax revenues.

- Benefit to the state = $231.7 million
- Cost of the state investment = $37.7 million
- Thus, for every dollar of state money invested in the MagLab, $6.15 is generated by the MagLab in economic activity for the State of Florida.

I - Introduction and Overview of the National High Magnetic Field Lab

In August 1990, following a stringent peer-review competition carried out by the National Science Foundation, the National High Magnetic Field Lab (NHMFL; aka the "Magnet Lab" or "MagLab") was awarded to Florida State University in Tallahassee. The MagLab, headquartered near Florida State University, is a cooperative operation with the Los Alamos National Laboratory in New Mexico and the University of Florida in Gainesville. At each location, high-powered super magnets are used to research topics such as quantum technologies, high magnetic fields, solutions to climate change, and machines that protect human health.[2] These facilities, due to their high degree of specialization, attract and employ top scientists from around the world. Such an agglomeration of experts and technology has a positive impact on the local and state economies. Previous economic impact assessments have estimated that annually, the MagLab creates $221 million in output in the city of Tallahassee.[3] For the state of Florida, $1 invested in the MagLab generates $6.44 in economic activity.

In 2023, the MagLab had 1,826 research users from 338 universities, government labs, and private companies worldwide.[4] The research users varied greatly by career level, as shown by Figure 1. The largest share of research users were senior personnel at 46%. Along with senior personnel, 37% of research users were students, 14% were postdocs, and 2% were technicians. Additionally, 34% of student research users were female and 35% of postdoc research users were female. In total, the research done by MagLab users resulted in more than 400 scientific publications, 158 talks, lectures, and presentations. In addition to varying by career level, research users also differed by facility type. The MagLab is home to seven distinct user facilities that offer researchers a wide variety of research capabilities: DC Field (Steady, continuous magnetic fields up to 45 T), Pulsed Field (Short, ultra-

[2] MagLab makes magic with magnets, from: https://new.nsf.gov/science-matters/maglab-makes-magic-magnets
[3] National MagLab Economic Impact, from: https://nationalmagLab.org/media/focn2lt3/economic_impact_report.pdf
[4] National MagLab At A Glance 2023, from: https://nationalmaglab.org/media/ulcmsqs1/areport-2023-ataglance.pdf

powerful magnetic fields up to 100 T), High B/T (Magnetic fields up to 15 T combined with ultra-cold temperatures of 0.4 mK), Electron Magnetic Resonance (EMR; Magnetic resonance techniques associated with the electron), Nuclear Magnetic Resonance (NMR; Solid & solution state NMR & animal imaging), Advanced Magnetic Resonance Imaging and Spectroscopy (AMRIS; High-resolution solution and solid-state NMR, animal imaging & human imaging), and Ion Cyclotron Resonance (ICR; Ultra-high resolution and high mass accuracy Fourier transform ion cyclotron resonance mass spectrometry). Figure 2 breaks down research users by facility type. The DC Field facility had the greatest percentage of research users at 35%, followed by the NMR facility at 19%. For the rest of the facilities, the percentage of research users ranged from 1% (High B/T) to 14% (AMRIS).

Along with research users, the MagLab employs a diverse workforce of scientists, machinists, engineers, administrators, writers, and artists. In 2023, the MagLab employed 809 staff members across these categories. Figure 3 breaks down total MagLab employment by category. Similarly to research users, the largest employment category was senior personnel at 29%. Nineteen percent of employees were graduate students, 17% were technical staff, 12% were other professionals, 12% were undergraduate students, 8% were postdoctoral, and 2% were admin staff. Of Maglab student staff, 43% were female.

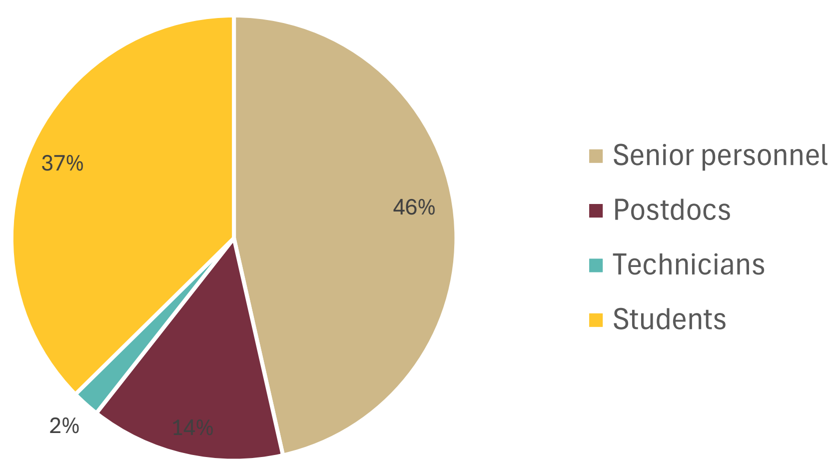

Figure 1. MagLab Research Users by Career Level

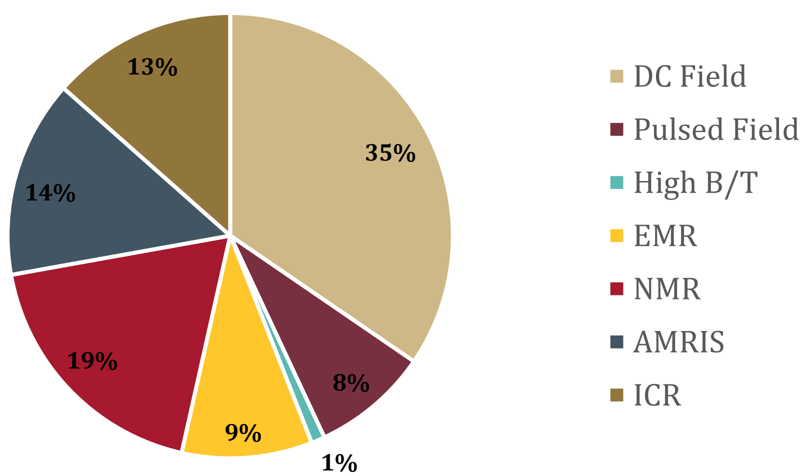

Figure 2. MagLab Research Users by Facility Type

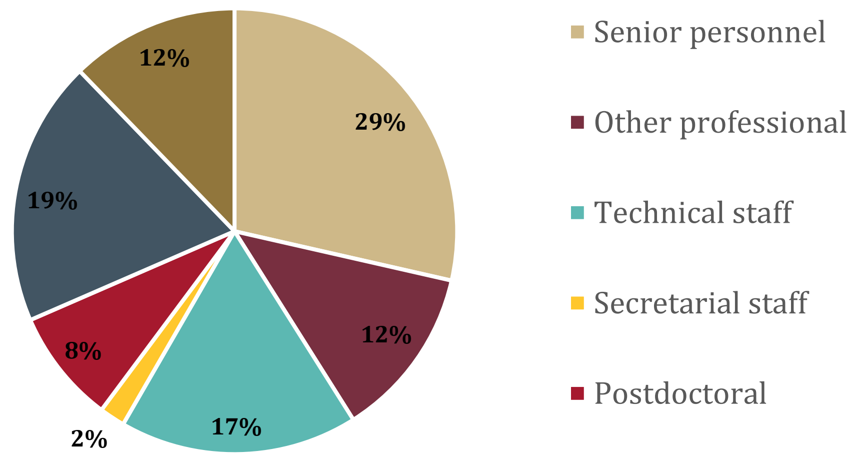

Figure 3. MagLab Employment by Category

Additionally, the MagLab is committed to sharing their passion for science, growing the next generation of scientists, and inspiring individuals about the magic of discovery in high magnetic fields. In 2023, over 1,400 K-12 students participated in classroom outreach or a field trip. There were also more than 11,700 visitors of all ages during the annual 5-hour open house event. Online, the MagLab had 3.4 million website interactions and 26,000 hours of video content watched on YouTube.

Interdisciplinary and Advanced Magnet Research

The interdisciplinary environment of the MagLab brings together scientists who research a broad range of topics, such as materials, energy, and health. Each year, their findings result in more than 400 scientific publications in leading academic journals – including: *IEEE Transactions on Applied Superconductivity, Journal of Magnetic Resonance, Nature, Nature Partner Journals Quantum Materials, Nature Communications, Analytical Chemistry, Applied Physics Letters, Biochemistry, Biophysical Journal, Chemistry of Materials, Cryogenics, Science, Journal of American Chemistry Society, Inorganic Chemistry, and Transactions on Applied*

Superconductivity – among many others. Over the past few years, scientists at the MagLab have made many new discoveries in a number of fields.

In the field of materials, scientists have used superpowered magnets to explore superconducting materials, nano-level electronics, and topological matters. The resources of the MagLab have also proven useful when it comes to building better batteries, breaking the barrier between oil and water in emulsions, and yielding safer lithium-ion batteries. Some of the most important research MagLab scientists have done recently involves human health. For example, in 2022, researchers at the Advanced Magnetic Resonance Imaging and Spectroscopy Facility used the 17.6-tesla magnet to better understand what is going on under the human skull.[5] More specifically, the researchers created 3D maps of the brain to figure out what fluids were being transported and in what direction of the brain. Such research shed light on an important anatomical process that may play a role in diseases like Alzheimer's and Type 2 diabetes. In addition to this, MagLab researchers have also tested new MRI techniques that can deliver images of the lungs like never before.[6] These new MRI techniques have the potential to transform treatment for asthma, chronic obstructive pulmonary disease, cystic fibrosis, pulmonary disease, hypertension, and many other lung diseases.

None of this cutting-edge research would be possible without the world-renowned resources of the MagLab. The MagLab holds a number of world records in categories involving field magnets, superconducting magnets, and restive magnets, among others. Most recently, the MagLab set the world record for the highest field for a continuous field magnet (test magnet)[7]. The record magnetic field was created using a novel magnet that was half the size of a spent toilet issue roll. The success of the small magnet was driven by a promising, new type of conductor and design. The conductor was made up of a newer

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[5] Mapping the Brain's Weird Web of Waste, from: https://nationalmaglab.org/news-events/feature-stories/mapping-the-brain-s-weird-web-of-waste/
[6] MagLab Tests a New Way to Look at the Lungs, from: https://nationalmaglab.org/news-events/feature-stories/maglab-tests-a-new-way-to-look-at-the-lungs/
[7] With mini magnet, National MagLab creates world-record magnetic field, from: https://nationalmaglab.org/news-events/news/lbc-project-world-record-magnetic-field/

compound called REBCO (rare earth barium copper oxide). REBCO is unique in that it can carry more than twice as much current as similar sized niobium-based superconductors. Using REBCO coils and no insulation, MagLab scientists were able to create three powerful prototype magnets, known as the Little Big Coil (LBC) series. The LBC series, combined with a more powerful restive magnet, was able to generate 14.4-teslas of the total 45.5-teslas, a world record. While technically the result was a world record, the scientists were interested in figuring out why the magnet stopped at 45.5-teslas. To answer this question, the LBC series was completely disassembled and a battery of tests were run. The scientists found that the issue was the slides of the REBCO tapes. Going forward, the MagLab is hopeful that the LBC design, once modified, can be used in a potentially record-busting superconducting magnet that is currently in the research and development phase.

II - Literature Review

Historically, researchers have utilized numerous methodologies to estimate the economic impact of research institutions. Each methodology has enabled researchers to identify a specific aspect of the economic impact, while failing to capture all the potential benefits. To better understand the economic impact of research institutions, this literature review discusses the various approaches and their respective findings. Topics covered include economic impact assessments, research institutions such as innovation-incubators, externality effects, and scientific collaboration effects.

Economic Impact Assessments

The direct benefits to the economy can be measured through economic impact and benefit-cost assessment. This methodology is useful for estimating the economic impact generated by operational expenditures and funding resources. The economic impact generated by these categories can be assessed in terms of job creation, value added, and taxes generated. The following are a collection of economic impact assessments for research institutions, conducted from operational expenditures and funding resources. These research institutions include the MagLab, technology parks, universities, and laboratories.

MagLab

The Center for Economic Forecasting and Analysis (CEFA) has estimated the economic impact of the MagLab over the last two decades using research expenditures and funding resources as inputs. In 2003, CEFA evaluated how the MagLab impacted the Florida economy (Lynch and Harrington, 2003). Expenditures on salaries, capital, and direct and indirect expenses for the MagLab were utilized as inputs in the REMI model. The economic impact of the MagLab was measured using gross regional product, value of wages, value of taxes, and number of jobs. From 2000-2005, the economic impact was over $400 million in gross regional product, $315 million in wages, $96 million in taxes, and 4,630 jobs. The return on investment for the state of Florida was estimated to be $3.50 for each dollar invested into the MagLab. A similar study was carried out in 2005 using the same inputs and methodology (CEFA, 2005). From 2005-2015, the MagLab was responsible for $136 million in output, 1,424 jobs, and $60 million in income.

In 2009, CEFA forecasted the economic impact of the MagLab on the Florida economy (Harrington et al., 2009). MagLab expenditures on salaries, capital, direct, and indirect expenses were used as inputs. For the years 2006-2016, the MagLab's annual stimulus in terms of output exceeded $150 million dollars. In addition, the MagLab generated an average of 1,414 annual jobs and $62.5 million in income. Additional studies were conducted in 2014 and 2019. The 2014 study estimated the economic impact of the MagLab annually with a projection over the next twenty years (Harrington et al., 2014). The study area was the Tallahassee metropolitan statistical area (MSA), the state of Florida, and the United States. Similarly to the 2009 study, research expenditures such as capital outlay, equipment, salaries/wages, and other funding categories were used as inputs in the IMPLAN model. In the Tallahassee MSA, the MagLab annually generated $90 million in economic output, $34 million in income, and 1,150 jobs. Statewide, $121 million in economic output, $51 million in income, and more than 1,200 jobs were generated. Nationally, $182 million in economic output, $73 million in income, and more than 1,500 jobs were generated. From 2014-2033, the MagLab was projected to generate billions in economic output, hundreds of millions in income, and tens of thousands of jobs. In addition, the economic impact of annual visitors and the annual return on investment for Florida was calculated. Annual visitors had an economic impact of more than $2 million in output, more than 15 jobs, and more than $500,000 in income. Annually, every dollar of state money invested into the MagLab generated $6.57 in economic activity for the state of Florida. Building on the 2014 study, the 2019 study quantified the economic impact of the MagLab annually and projected over twenty years, using the same expenditure/funding categories and study area (Harrington et al., 2019). In the Tallahassee MSA, $221 million in economic output, $94 million in income, and 2,176 jobs were generated annually. In the Florida area, $325 million in economic output, $132 million in income, and more than 2,680 jobs were generated. Nationwide, $709 million in economic output, $275 million in income, and more than 4,550 jobs were generated. The projected impact from 2019-2038 was estimated to be billions in economic output, billions in income, and tens of thousands of jobs. The projected economic impact was largest at the national level. Similar to the 2014 study, the economic impact of annual visitors and the return on investment was quantified. Annual visitors generated more than $4 million in output, more than 50 jobs, and more than $1.5 million in income. For every dollar of state money invested in the MagLab, $6.44 was generated in economic activity for the state of Florida.

In addition to the MagLab, the economic impact of numerous other research institutions has been estimated recently using operational expenditures and funding resources. These research institutions include the University of Arizona Tech Park, the University of South Florida, the University of California system, the State University system of Florida, the Lawrence Berkeley National Laboratory, and the Research Triangle Park.

University of Arizona Tech Park

In 2019, the economic impact of the University of Arizona Tech Park was estimated (Rounds Consulting Group, 2019). The tech park is a premier research park that facilitates collaboration between innovators, business leaders, emerging companies, and technology giants in the Tucson suburbs. Over 100 companies, representing 15 industries, are present in the tech park at any given time. These industries include aerospace, advanced manufacturing, bioscience research, among others. Overall, the tech park was responsible for $2 billion in induced economic activity, 12,025 jobs, and $686.5 million in wages. It was also estimated that over a 30-year period, the tech park will produce an economic impact of $108 billion.

University of South Florida

Researchers at the Muma College of Business conducted an economic impact analysis of the University of South Florida (University of South Florida, 2020). The University of South Florida is a public urban research university located throughout the Tampa Bay region and the state of Florida. The university serves more than 50,000 students and contains additional research institutions, such as the USF Research Park and academic medical center. To assess the economic impact of the university, five categories of expenditures were considered: construction expenditures, operational expenditures, research expenditures, student expenditures, and sporting event expenditures. The economic impacts associated with these expenditures was estimated to be $6.02 billion. In addition, over 68,000 jobs were supported by the expenditure. The university also produced additional economic impacts from state funding. For every $1 in state funding, $14.07 in economic output was produced. For non-state government sources, the impact was $3.33. Revenue wise, the university generated more than $600 million in federal, state, and local tax revenue.

University of California System

In 2021, an economic impact analysis of the University of California System was carried out (Beacon Economics, 2021). The University of California System (UC) is an educational, research, and public institution comprised of 10 universities in the state of California. In addition to the universities, UC operates six academic health systems, three national laboratories, and a statewide agricultural/natural resources program. To estimate the economic impact of UC, three expenditure categories were used: construction expenditures, operational expenditures, and student expenditures. UC-related expenditures supported 529,119 jobs and generated $37.6 billion in labor income, $55.8 billion in value added, and $82.1 billion in economic output in California.

Lawrence Berkeley National Laboratory

In 2021, the economic impact of the Lawrence Berkeley National Laboratory was quantified (Economic and Planning Systems, 2021). The laboratory, located in Berkeley, California, is a Department of Energy national institution dedicated to addressing critical national mission needs in fields such as discovery science, energy security, environmental sustainability, and international innovation competitiveness. To quantify the economic impact of the laboratory, expenditures on payroll, contracting, and procurement were used as model inputs. It was estimated that the laboratory is responsible for 20,000 jobs nationwide and generates a significant return on federal investment. For every $100,000 in federal dollars invested, the laboratory generated two jobs, $102,000 in worker compensation, and $276,000 in total output.

Research Triangle Park

In 2024, an economic impact analysis of the Research Triangle Park was conducted (Research Triangle Park, 2024). The Research Triangle Park is a collaborative effort between industries, academic institutions, and the larger workforce of North Carolina.

Located in two counties (Durham and Wake), the research park takes advantage of the geographical proximity of UNC Chapel Hill, Duke University, and NC State University. To estimate the economic impact, expenditures on construction and annual ongoing operations were utilized. The construction expenditures were responsible for 29,630 jobs, $1.9 million in labor income, and $1.7 billion in value added in North Carolina. Expenditures on annual ongoing operations generated 142,000 jobs, $25.1 billion in economic value, and $638.2 million in fiscal impacts in North Carolina. It was noted that the primary impact generator of the research park was employees working in the park.

Research Institutions as Innovation-Incubators

Not all the economic impacts of research institutions are captured by operational expenditures and funding resources. Research institutions also impact the economy by acting as "innovation-incubators". Innovation-incubators transfer technologies, ideas, innovations, and resources to the rest of society. To measure the economic impact of such transfers, researchers have utilized surveys, case studies, and quantitative methods.[8]

One commonly discussed research institution that acts as an innovation-incubator is the university. Over the past few decades, the economic impact of the university has been transformed by the idea of the "entrepreneurial university". The entrepreneurial university refers to a university model where there are increasing connections between universities and industry, resulting in transfers of academic knowledge and tangible outcomes (Seggie, 2021). Such a model has enabled universities to create economic and social opportunities beyond the boundaries of academia. Researchers have focused on identifying the mechanisms by which entrepreneurial universities impact local/regional economies. Bramwell and Wolfe (2008) conducted a case study of the University of Waterloo in Ontario, Canada, to identify such mechanisms. The University of Waterloo was chosen for the case study because of its progressive Coop, entrepreneurial education programs, and innovative intellectual property policy. It was found that the university contributed to the

[8] See: Major research milestones (e.g., publications, patents, etc.) are highlighted at the following: link

region's economic development by generating commercializable knowledge, qualified research scientists, and talent for the local economy. In addition, collaboration between industry and the university in the form of technical support also generated economic benefits. Veugelers et al. (2012) focused specifically on one mechanism: universities' presence and impact in technological landscapes. To measure this, patent information from the period 1980-2000 was used to understand where university technologies were created, and where industries were using such technologies. The notable finding was that industries used university technologies mainly at the local and national level, suggesting a localized and nationalized economic impact. Urbano and Guerrero (2013) explored the socioeconomic impacts of entrepreneurial universities in Catalonia, Spain. To better understand such impacts, institutional economics, resource-based views, and endogenous growth approaches were adopted. The Catalonia University System was found to be useful when it came to improving the determinants of the production function (human knowledge, social, and entrepreneurship capital) in the region. Guerrero et al. (2015) conducted an exploratory study into the economic impact of entrepreneurial universities' activities in the United Kingdom. The activities of interest were teaching, researching, and entrepreneurial in nature. To identify the mechanisms for the economic impact, an endogenous growth model was developed using two years of regional university data. The activities of interest generated significant positive economic impacts through entrepreneurial spin-offs and knowledge transfers. Guerro et al. (2016) analyzed the impact of universities' entrepreneurial activities on regional competitiveness in Europe. Using structural equation modeling and data from 102 universities in Europe, it was found that universities positively contributed to regional competitiveness via talent/human capital development.

In addition to teaching, researching, and entrepreneurial activities, researchers have also highlighted the economic impact of university procurement. University procurement positively impacts local economies in two ways: Proximity and innovation. Spending on research inputs is more likely with businesses that are physically close to universities. Along with this, firms that supply projects for universities are more likely to later open additional establishments near such universities (Goldschlag et al., 2018). Universities develop agglomeration economies due to the demand for research inputs. Such demand enables universities to transfer resources to local industry, positively impacting the economy. In terms of innovation, university suppliers have a higher propensity to introduce more radical product innovations (Bianchini et al., 2019). This is due to the interplay between such suppliers and academic scientists. Academic scientists bring insights to firms that are not yet common in the marketplace. Innovation effects were stronger for suppliers located near universities. Additional research has also highlighted university procurement-led innovation (Patsali, 2024). This type of innovation involves joint partnerships between universities and their procurement suppliers.

Publicly funded and academic research has acted as a base for research and development in industry. This research has played a crucial role in developing new private sector innovations, such as patents, drugs, and start-ups (Peeters et al., 2020; Ardito and Svensson, 2024). Additionally, publicly funded and academic research has been shown to raise local productivity and real wages (Saha et al., 2017). While there are no exact estimates of the total economic impact generated by innovation-incubators annually, one can derive some insight into the matter using the Licensing Survey from the Association of University Technology Managers (AUTM). The AUTM Licensing Survey quantifies licensing activities at U.S and Canadian universities, hospitals, and research institutions (AUTM, 2022). Some highlights from the U.S. AUTM 2022 Licensing Activity Survey include:

- Total research expenditure topped $91 billion.
- Startup companies created to commercialize technologies developed at universities and other research institutions were robust in 2022. The number of startups increased by 8%.
- Technologies developed by universities and research institutions were responsible for 850 new commercial products.

Externality Effects

Researchers have also developed methods to measure the externality effects of research institutions. Externality effects refer to the socioeconomic benefits generated by research that are not directly measurable in dollars (non-market). Some common types of externality effects include improvements in quality of life, health and human services, environmental quality, and public knowledge. Since it can be difficult to identify all the channels for which research institutions generate externality effects, researchers have historically utilized case studies for a particular program. The case study methodology enables researchers to quantify the benefits of research through improvements made to society.

Health research has been shown to impact a number of non-market, health outcomes, such as health care productivity, morbidity, mortality, hospital length of stay, and medical policy. Moscone et al. (2013) investigated the impact of scientific research on health care productivity in a sample of OECD nations. To measure the impact, OECD health data and data on published papers were matched. Medical research played an important role in explaining health care productivity throughout the OECD nations. Additionally, nations that absorbed more scientific research also bore higher health costs. Greenhalgh and Fahy (2015) conducted a content analysis of 162 health science case studies. Research was found to have improved morbidity in 44 case studies, and reduced mortality in 25. García-Romero et al. (2017) estimated the impact of health research on length of stay in Spanish public hospitals. The research of interest was clinical research and basic research. Using fixed effects econometric modelling and hospital healthcare outcome panel data, it was found that increases in the quantity of research contributed significantly to the reduction of hospital length of stay. In addition, the importance of clinical trials for impacting policy and health outcomes positively has been highlighted in the literature (Hanna et al., 2020; Hanna et al., 2021).

Environment-related research and development (R&D) has been shown to generate numerous non-market, environmental benefits. Adedoyin et al. (2020) assessed the role of R&D in environmental sustainability throughout the European Union. The relationship between ecological footprint and R&D expenditure was estimated using modified and dynamic ordinary least squares models. In the long run, as a countries' R&D expenditure increased, the ecological footprint decreased. Utilizing a similar methodology, Shao et al. (2021) investigated how environmental R&D impacted carbon neutrality targets in the United States. Environmental R&D positively contributed to carbon neutrality target achievements by reducing atmospheric carbon dioxide emissions. Hailemariam et al. (2022) focused on the environmental impacts of R&D in renewable energy technologies. Environmental impacts were estimated using an interactive-fixed effects model. R&D investment in renewable technologies had a positive impact on environmental quality by reducing a number of pollutants, including carbon dioxide and methane. Additional studies have identified the positive, non-market, impacts of environmental research programs like EnvoTech and the Framework Programmes (Shu et al., 2023; Fabrizi et al., 2024). Another non-market, societal benefit obtained from research is the supply of knowledge to the public. Research has contributed to a number of public goods, such as national statistics, censuses, and economic models (Martin and Tang, 2006). Additionally, open access to research has helped strengthen the relationship between the general public and scientific communities (ElSabry, 2017).

Scientific Collaboration Effects

The past few decades have been characterized by an increase in collaboration between researchers and research institutions around the world. As research collaboration has shifted from local institutions to global networks, there has been an effort to measure the benefits generated. Frenken et al. (2010) examined the citation impact of research collaboration in science-based industries. For eight science-based industries, the citation impact of research collaboration was higher for international collaboration than for national and regional. Guerrero Bote et al. (2013) analyzed the scientific impact derived from international collaboration. The scientific impact depended heavily on the number and type of countries involved. Broadly, the more countries involved in the collaboration, the greater the gain in terms of scientific impact. The notable exceptions were Iran and the United States. Collaboration with Iran generated null benefits, while collaboration with the United States generated only small impacts. A recent development that has further enabled international collaboration between researchers is the widespread use of open access. Open access refers to the practice of allowing free and unrestricted access to scholarly literature and other resources. As a result of open access, researchers have been able to make advancements in data mining, cancer research, public administration, and poverty-related disease prevention (Tennant et al., 2016; Breugelmans et al., 2018). Additionally, international collaboration has been shown to affect scientific productivity and the performance of research institutions. According to Mirnezami and Beaudry (2022), international research collaboration has a positive and lasting effect on scientific productivity (research impact). International collaboration has also been shown to promote the performance of research organizations around the world (Geng et al., 2022).

III - MagLab Funding Sources

The research contracts and grant awards generated by the MagLab's seven different user facilities stem from a variety of sources - many from locations across the nation, and even the world. For analyses purposes, this funding is separated into three categories: funds from the state of Florida, funds through the NSF Core Grant (or Core Award), and funds that are non-state, non-NSF Core Grants, which includes any private or non-NSF Core federal funding sources. The NSF Core Grant defines the central mission of the MagLab i.e. to maintain and operate a world-class infrastructure for magnet researchers. For the purpose of this report, any funding that is not from the state of Florida, or from the NSF Core Award, is labeled as "Other Grants". As a consequence, non-state funds comprise around 71 percent of the total MagLab funding – of which a large portion is coming from the National Science Foundation. The large amount of other grant funding comes from numerous federal and private sources (as stated). Figure 4 depicts total MagLab funding by source over the years 1990–2023.

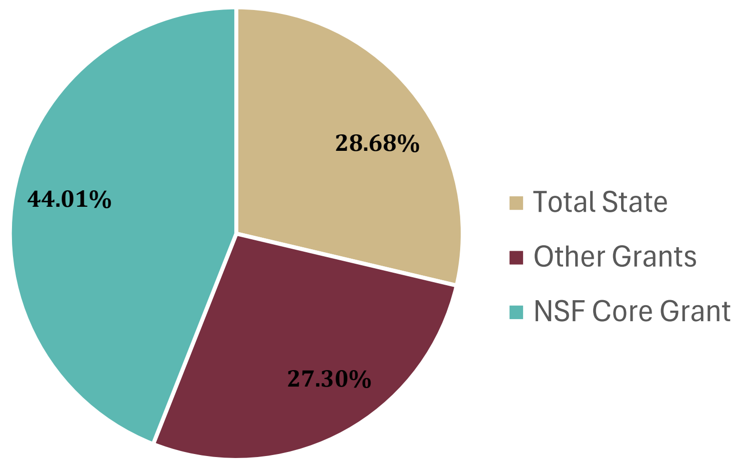

Figure 4. Sources of MagLab Funding (from Years 1990–2023)

Research from high magnetic fields can be used to further develop, analyze, and improve materials and technologies. In this report, the FSU CEFA research team focuses on the economic impacts, employment, output, and income, generated by, and due to, MagLab activities over time.

Figure 4 depicts the total amount of annual funding received in years 1990–2023, broken down by each source of funding. Conditional on the NSF awarding of the MagLab to Florida State University, the state agreed to pay for the initial building construction and the capital equipment necessary to get the facility up and running. The continued investment by the state has also helped to leverage the successes of the MagLab. After the initial investment by the state, the NSF has provided the majority of MagLab funding in the form of five-year renewable awards. In addition to this NSF core award, the growing amount of funding from other grants has become a larger component of overall MagLab funding.

As Figure 5 below shows, the contribution of state money significantly dropped after the completion of the MagLab facility construction, from 1991–1992; however, state funds remain steadily increasing through FSU and UF State Operating funds and the Board of Governors utility funding. In 2005, a large, single year infrastructure grant was received from the state, and in 2013, the level of state funding received an annual increase from the state. Over the past ten years, from 2013–2023, the grant received from the state maintains a growth rate, on average, that has remained relatively the same. Figure 5 also highlights a sharp increase in other grant funding during 2021–2022, followed by a return to typical funding levels in 2023.

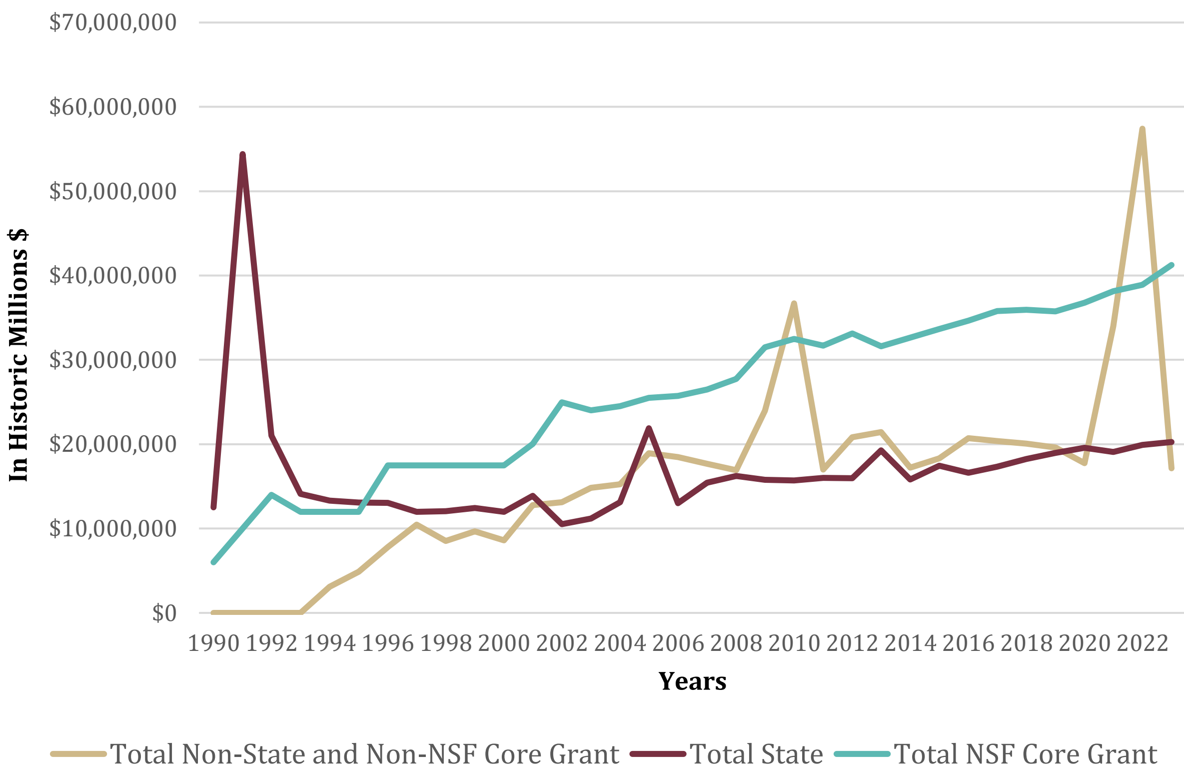

Figure 5. Comparison of Historic MagLab Funding by Source (Years 1990-2023) in Dollars

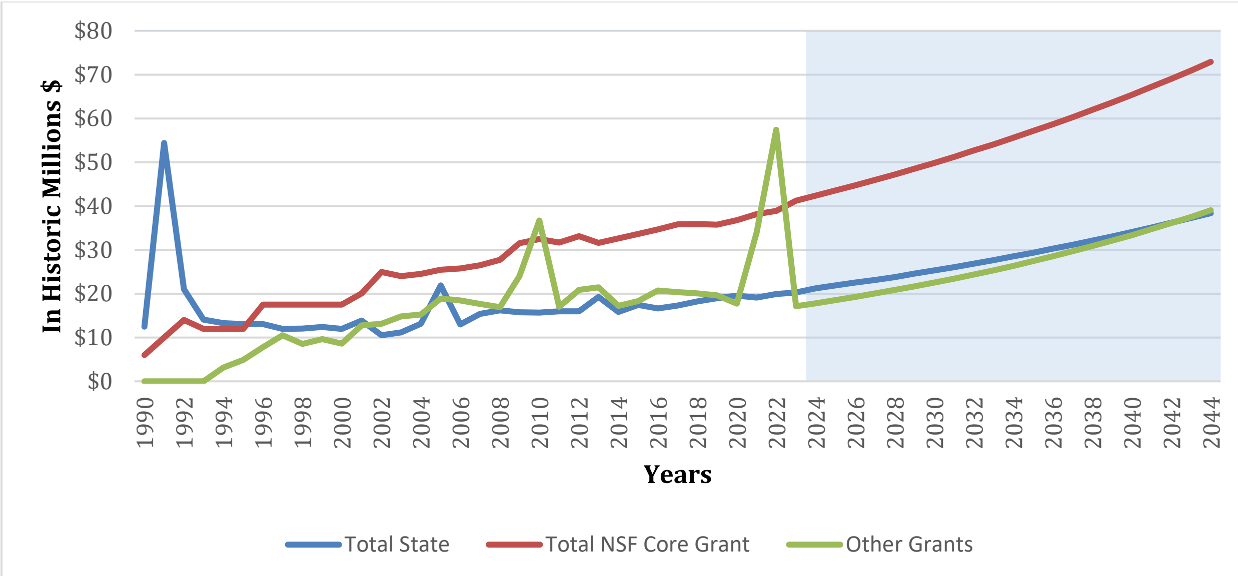

Figure 6. Comparison of Historic and Forecasted MagLab Funding by Source (Years 1990–2044) in Dollars

Figure 6 depicts a comparison among the different sources of funding for the MagLab. The shaded area represents CEFA's projected funding to Year 2044 by source, for the MagLab. For purposes of the economic projections, existing trends are extrapolated such that funding from other grants is projected to increase in the future with relatively little growth in state funding projected. On the other hand, the state comprises a significant portion of MagLab funding. Between the years 2019–2023, state funding totaled to about $97.7 million dollars, NSF Core Grant funding totaled to about $190.8 million dollars, and other grants totaling to about $100.7 million dollars.

Revenues

A detailed breakdown of the MagLab's funding since its inception in 1990 is shown in Figure 7 and Table 1. The NSF Core Grant is the largest funding source, accounting for 52.45% of total revenue in 2023. State Operating funds from FSU represent the second-largest share at approximately 20%. The "Other Sources" category, which includes non-state, non-NSF Core grants and Principal Investigator (PI) awards, makes up around 11% of the total. The UF category shown in Figure 7 includes UF State Operating funds, NSF Core funding, and other grant support specific to the UF site.

Table 1. Breakdown of MagLab Funding by Source (Year 2023 and Years 1990–2023) in Dollars and Shares

MagLab Funding Source	2023		1990-2023	
	Amount	% of Total	Amount	% of Total
NSF Core Grant	$41,247,762	52.45%	$876,445,031	44.01%
State Operating FSU	$15,544,075	19.76%	$359,793,238	18.07%
State Capital / Facility	$382,931	0.49%	$138,550,926	6.96%
UF	$8,672,920	11.03%	$210,099,477	10.55%
LANL Contribution	$4,029,264	5.12%	$83,511,177	4.19%
Other Sources	$8,767,697	11.15%	$322,899,410	16.22%
	$78,644,649	100.00%	$1,991,299,259	100.00%

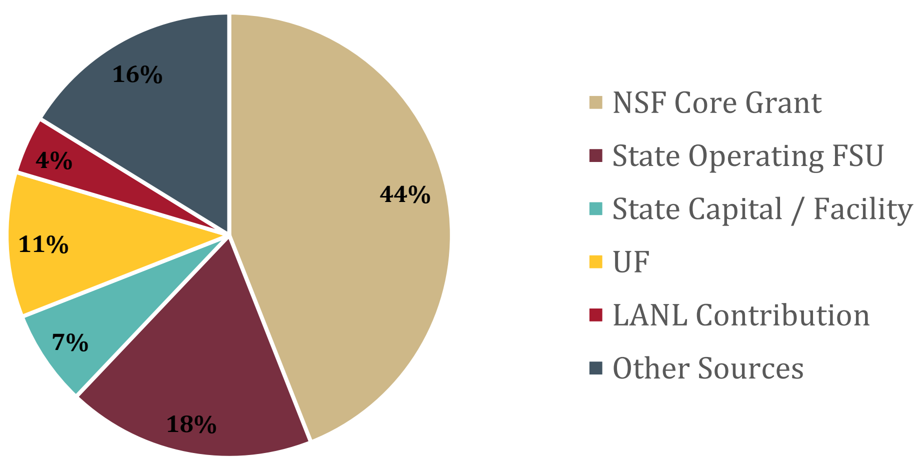

Figure 7. Percentage of MagLab Funding by Source (Years 1990–2023)

Figure 8 depicts MagLab funding items broken into five-year intervals to reflect relative changes in different types of funding over time. This gives a clearer picture of the trends with respect to the MagLab's various funding types. In the early 1990s, State Operating

Funds from FSU accounted for approximately 66% of total funding, reflecting the state's significant initial investment in building and launching the MagLab. Since then, the state's share has steadily declined, stabilizing at just under 30% in recent periods.

The NSF Core Grant, by contrast, has increased its relative share since the lab's early years. After a sharp rise post-construction, NSF funding leveled off at around 45% of total funding and currently represents approximately 44% for the 2019–2023 period. "Other Sources" funding has grown over time. Rather than declining since the mid-2000s, this category has remained relatively stable, contributing a consistent share of around 15–20% since 2005. LANL contributions represent a smaller but steady portion of overall funding, typically between 4% and 6%. The polynomial trend lines illustrate the movement of each major funding source over time.

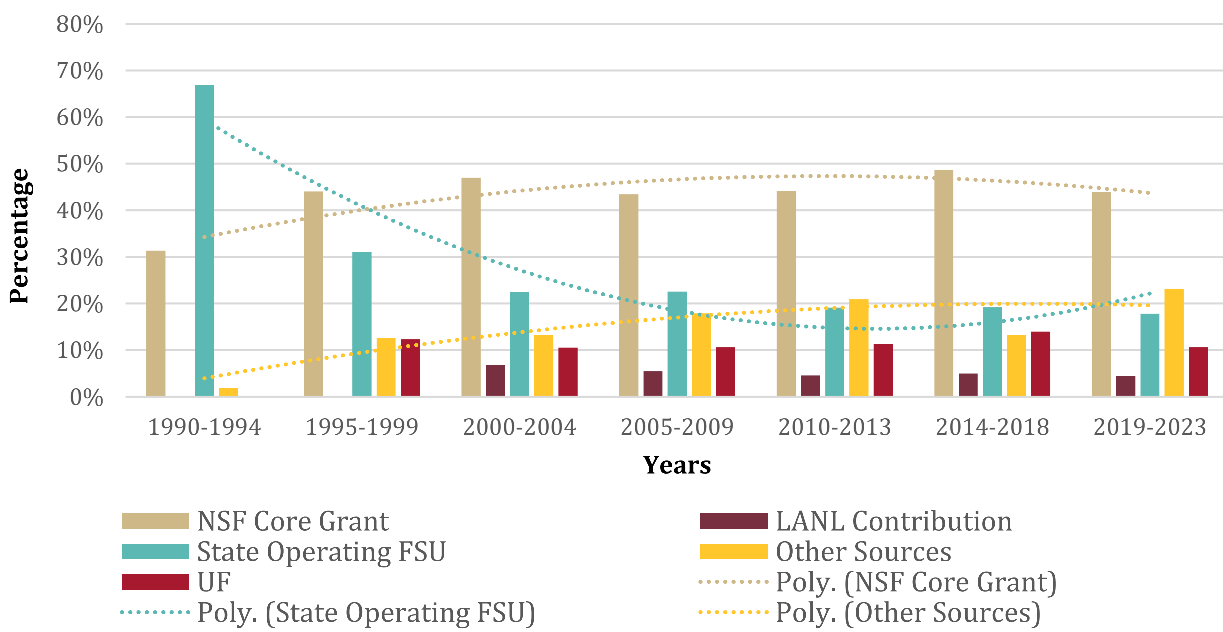

Figure 8. MagLab Funding by Detailed Source, Percent of Total Five-Year Intervals (Years 1990–2023)

Similar to Figure 8, Figure 9 shows the total MagLab funding stream over time by percentage of sources, grouped into three categories: state funding, the NSF Core Grant, and other grants. Each is shown as a share of total funding. The graph highlights the state's large initial investment, followed by a steady decline that has since plateaued. NSF Core Grant funding has remained relatively stable, while Non-State and Non-NSF Core Grant funding has gradually increased, with a slight dip during the 2014–2018 period.

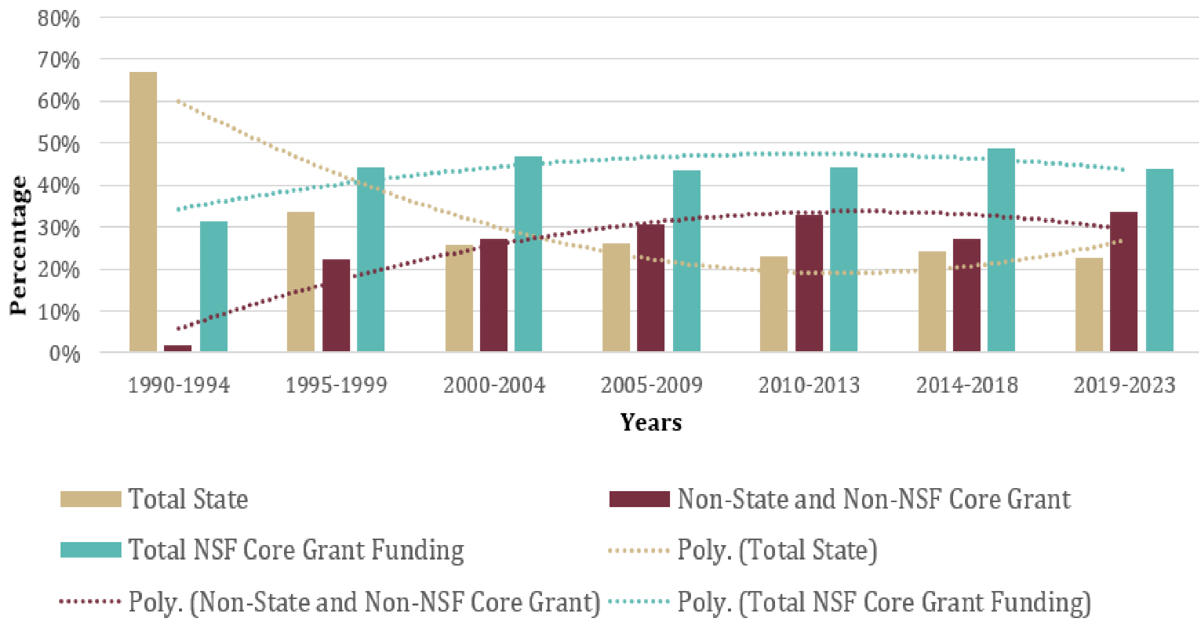

Figure 9. MagLab Funding by Aggregated Source, Percent of Total Five-Year Intervals (Years 1990–2023)

State Funding

Historically speaking, for years 1990–1993, the total amount of money the state provided for the MagLab facility construction was $76 million. Adjusting for inflation, this is equivalent to about $169 million (in 2025 dollars). This initial investment by the state was for the startup construction of the Tallahassee facility, as well as initial equipment purchases necessary to get the facility operational. Although those initial years assumed a large component of the state's funding to the MagLab over time, the state of Florida continues to be an important source of ongoing funding for the MagLab. In 2005, there was an injection of $10 million dollars in State Capital funding allotted for needed infrastructure upgrades at the FSU and UF branches. At the conclusion of Florida's 2012 Legislative Session, $3.3 million annual recurring funds were signed into the State Operating budget. State spending is projected to remain stable at around $28.9 million until 2044 except for an occasional small increase in wages and increases in money received from Sponsored Research and Development (SRAD) distribution. Table 2 provides the total amount of state of Florida funding the MagLab has received, by source, for year 2023, and for years 1990–2023. Over 1990–2023, around 63 percent of the state funding is for operating FSU. The accumulative total state funding is about $571 million.

Table 2. Breakdown of State Funding (Years 2023, and 1990–2023) in Dollars and Shares

State Funding Source	2023		1990-2023	
	Amount	% of Total	Amount	% of Total
State Operating FSU	$15,544,075	76.70%	$359,793,238	62.99%
State Capital/Facility	$382,931	1.89%	$138,550,926	24.26%
UF State Operating	$4,338,623	21.41%	$72,831,645	12.75%
Total State Funding	$20,265,629	100.00%	$571,175,809	100.00%

Non-State Funding

After the initial construction of the MagLab was completed in 1993, the NSF Core Grant began leveraging additional sources of funding to support and sustain non-operational growth at the facility. Table 3 provides a breakdown of total non-state funding for the year 2023 and cumulatively from 1990 to 2023. In 2023, the NSF Core Grant accounted for 70.66% of non-state funding. The other major source was FSU Other Sources/Grant Support and Contribution, which comprised 15.02% of the total. Additional contributions came from UF (7.42%) and LANL (6.90%).

Table 3. Breakdown of Non-State Funding (Years 2023, and 1990–2023) in Dollars and Shares

Non-State Funding Sources	2023		1990-2023	
	Amount	% of Total	Amount	% of Total
NSF Core Grant	$41,247,762	70.66%	$876,445,031	61.72%
FSU Other Sources/Grant Support and Contribution	$8,767,697	15.02%	$322,899,410	22.74%
UF Grant Support and Contribution	$4,334,297	7.42%	$137,267,833	9.67%
LANL Contribution	$4,029,264	6.90%	$83,511,177	5.88%
Total by Year	**$58,379,020**	**100.00%**	**$1,420,123,451**	**100.00%**

The amount of non-state funding has continued to grow incrementally. These funds have been an important economic stimulus over the years. Figure 10 shows the total cumulative funding forecast of both state and non-state funding to Year 2044, with non-state funding separated into the NSF Core Grant and other grant sources. Using the forecasted amounts, state spending is estimated to comprise 27 percent of total funding by Year 2044.

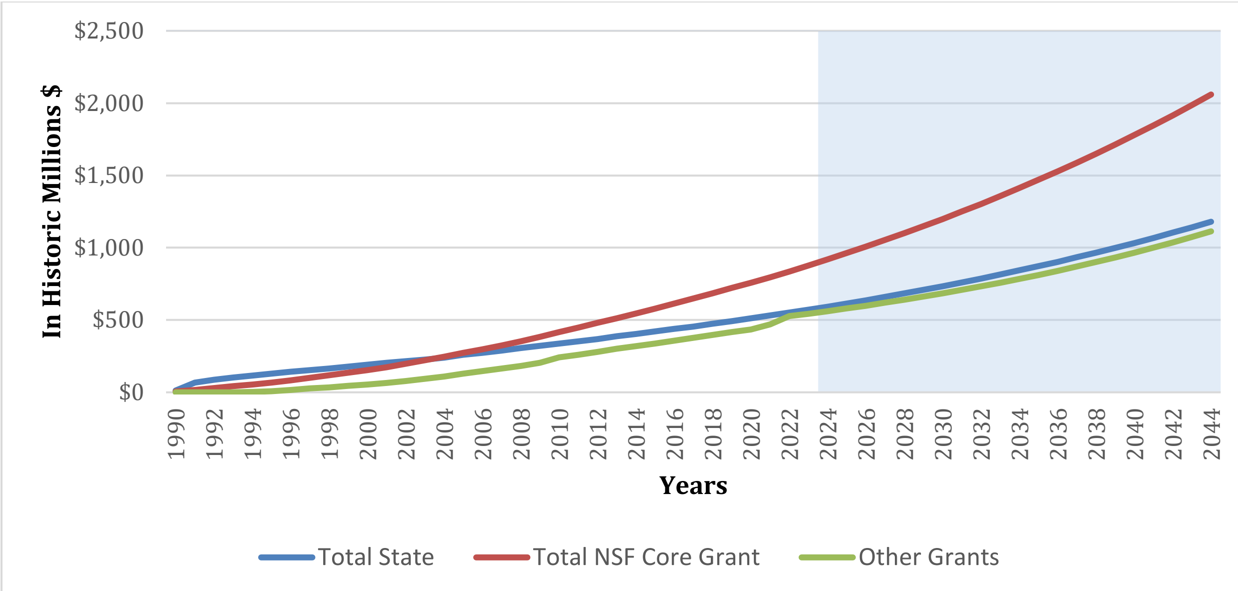

Figure 10. Comparison of Historic and Forecasted MagLab Cumulative Funding by Source (Years 1990–2044) in Current Dollars

National Science Foundation (NSF) Funding

The National Science Foundation has provided the MagLab with five-year awards since the initial establishment of the Tallahassee MagLab headquarters. These awards continue to support the partnership of the FSU, UF, and LANL locations, and to maintain the lab's headquarters in Tallahassee. In the economic impact model, calculations are made under the assumption that the MagLab will continue to receive financial support through the NSF Core Award through Year 2044.

Other Sources of MagLab Funding

In recent years the MagLab has been acquiring an increasing amount of other non-NSF non NSF Core, non-state funding – which are included in the figures as "Other Grants and Contracts". This includes any grant money brought to the MagLab by staff, royalties, magnet construction for other laboratories, and other federal grants. The MagLab is becoming more specialized in the construction of unique magnets for others, utilizing the skills of MagLab's engineers and promoting magnet research on a global level. Since this contributes to revenues for Florida State University and the MagLab, it is included in the economic impact model and assumed that in the future the MagLab will continue to produce high quality magnets for patrons. There are a large number of MagLab staff members who bring in projects from various departments to conduct magnet research. To examine the breadth of research associated with the MagLab, grant awards obtained by MagLab faculty are compared with the project departments associated with each grant award or contract. Table 4 shows the total percentage breakout by the project grant award departments. There are seven project departments, with the highest percentage share of 58.2 percent for "National High Magnetic Field Lab", and the lowest percentage shares of 2.6 percent and 2.6 percent for "Applied Superconductivity Center" and "Industrial & Manufacturing Engineering", respectively.

Table 4. Breakdown of Grant Funding by Project Department (Years 2019 – 2023) in Dollars and Shares

Project Department	Sum of Payout	% of Total
Natl High Magnetic Field Lab	$263,515,260	58.2%
Applied Superconductivity Center	$11,673,574	2.6%
Chemistry & Biochemistry	$37,714,203	8.3%
Physics Sponsored Projects	$29,540,816	6.5%
Center for Advanced Power Systems	$65,405,564	14.4%
Earth, Ocean & Atmospheric Science	$33,565,407	7.4%
Industrial & Manufacturing Engineering	$11,565,154	2.6%
Grand Total	**$452,979,977**	**100.00%**

Source: Data provided by Esther Wheeler, FSU Data Manager III.

IV - MagLab Expenditures

The MagLab finance and budget staff provided financial data to the CEFA research team including: total expenditures on salaries, capital, direct and indirect expenses for the MagLab, for the years 1990–2023. Table 5 provides a breakdown of the MagLab's historical total spending by category. The largest share, 40.7%, was spent on salaries, wages, and benefits, followed by other direct expenses (20%) and capital equipment (15%). Indirect expenses and LANL operations accounted for 15% and 9%, respectively.

Table 5. Allocation of MagLab Historic Budget Numbers (Years 1990–2023) in Dollars and Shares

Expenditure Category	Amount	% of Total
Salaries, Wages, & Benefits	$809,656,638	40.69%
Capital Equipment	$299,530,329	15.05%
LANL	$186,845,863	9.39%
Indirect Expenses	$296,009,855	14.88%
Other Direct Expenses	$397,743,532	19.99%
Total	**$1,989,786,217**	**100.00%**

Individual line-item expenditures were grouped into categories that represented the data inputs for the economic impact model. MagLab-generated expenditures result in additional spending activity throughout the economy. These "multiplier" effects are included, or captured, in the economic impact model. Table 6 is a brief overview of how each expenditure category is defined. For the economic impact of the MagLab, variables representing spending are chosen within the model that corresponds with each MagLab's expenditure within the area economy. It should be noted that for the purposes of this study, SRAD (as previously described) was excluded from the economic analysis. The state must authorize, not appropriate, the expenditure of these funds by the Office of Vice President of Research (OVPR). OVPR has total discretion over the allocation of these funds. Also, the indirect cost on sub awards is charged only on the first $25,000 for the term of the award.

Table 6. Overview of the MagLab Expenditure Categories

Expenditure Category	Description
Salaries, Wages, & Benefits	Includes any money allocated towards staff that maintains MagLab operations: such as researchers, administration, office management, clerical workers, technicians, and other research staff.
Capital Equipment	Includes any purchases made to build up MagLab's physical infrastructure: such as any facility add-ons, building improvements, scientific instruments, or anything else that can be considered an owned property item.
Indirect Expenses	Costs related to expenses incurred in conducting or supporting research or other externally-funded activities but not directly attributable to a specific project. General categories of indirect costs include general administration (accounting, payroll, purchasing, etc.), sponsored project administration, plant operation and maintenance, library expenses, departmental administration expenses, depreciation or use allowance for buildings and equipment, and student administration and services.
Other Direct Expenses	Includes any expendable materials and supplies, publication costs, sub-awards and consulting services (for rare situations), graduate student tuition remission, as well as any costs for computer or technical services (magnet and supercomputer usage costs, scientific information services, etc.) and sub awards.

V - Economic Impact Assumptions and Methodology

In order to forecast the economic impact of the MagLab to year 2044, the CEFA research team had to estimate the levels of funding the MagLab expects to receive in future years. The forecast for the MagLab funding was based on previous trends and current obtained information concerning future MagLab funding. The forecast was presented earlier in the report, in Figures 6 and 10. Using these revenue projections, the research team determined the dollar value that likely would be spent by the MagLab within each expenditure category. Expenditure category percentages over the most recent year 2019–2023 timeframe were used in order to reduce the variability associated with single year values.

The CEFA research team assumed that the MagLab will continue to receive annual support from NSF, and that it will continue to increase at an annual rate of approximately 2.75 percent. After the level of NSF funding was determined, it was separated further into expenditure categories. Figure 11 shows the percentage breakdown of the NSF award, for the years 2019–2023, by various expenditure categories, including the LANL sub-award. The research team assumed that the percentages from the NSF core grant would remain fairly consistent in the future.

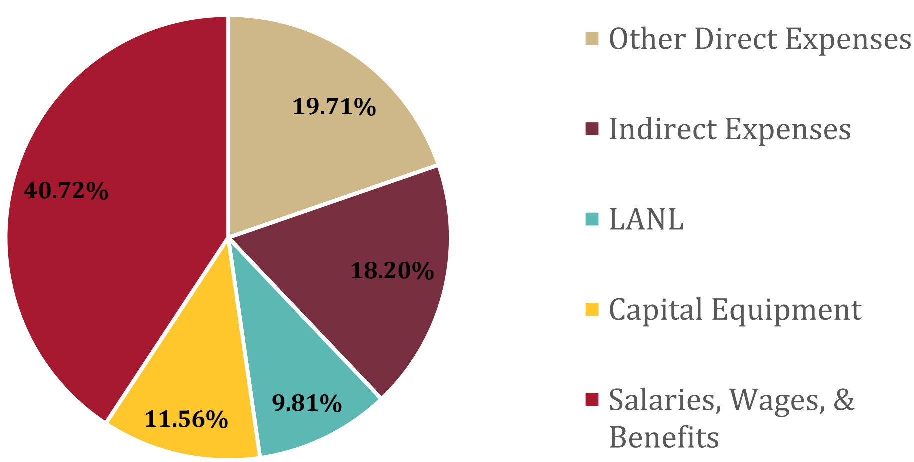

Figure 11. Allocation of NSF Award Funding (Years 2019–2023)

The CEFA research team staff used a similar forecasting methodology pertaining to projected levels of state funding sources. FSU state operating expenses include faculty and professors' salaries – which are estimated to remain fairly level with an increase of about 2.86 percent.

UF state operating expenses (faculty) are estimated to increase by the same percentage annually. Both state operating funding sources are Education & General (E&G) funding provided by the state, which are primarily spent on salaries, wages, & benefits for the MagLab. The remainder is for general expenses and travel, with little spent on equipment. In addition to State Operating sources, SRAD and SRAD Infrastructure represent the dispersed money through the respective university department(s) which returns back to the MagLab. The regular SRAD funding distribution is spent at approximately 40 percent on salaries, wages and benefits, 20 percent on general expenses, 20 percent on travel, and 20 percent on equipment. Virtually the entire infrastructure SRAD is spent on equipment and infrastructure enhancements.

The growth of these SRAD amounts has followed the growth of indirect or overhead costs, as by definition they are the dollar amounts returned from the overhead costs paid to institutions. The state facility grant, through the Board of Governors, is based on the square footage of the facility and is assumed to remain constant. State capital funding was state money used in the past to fund the MagLab's infrastructure, with 2023 being the most recent infusion year. The state provided infrastructure grants, however, future funding under state capital grants is not assumed since these cannot be anticipated. Figure 12 shows the percentage breakdown of state funding ranging from years 2019–2023. These percentages are expected to change only slightly over time. However, since each funding item contributes directly to each expenditure category, those that are salary amounts, and those that are used for capital equipment, purchases are included in the appropriate expenditure category.

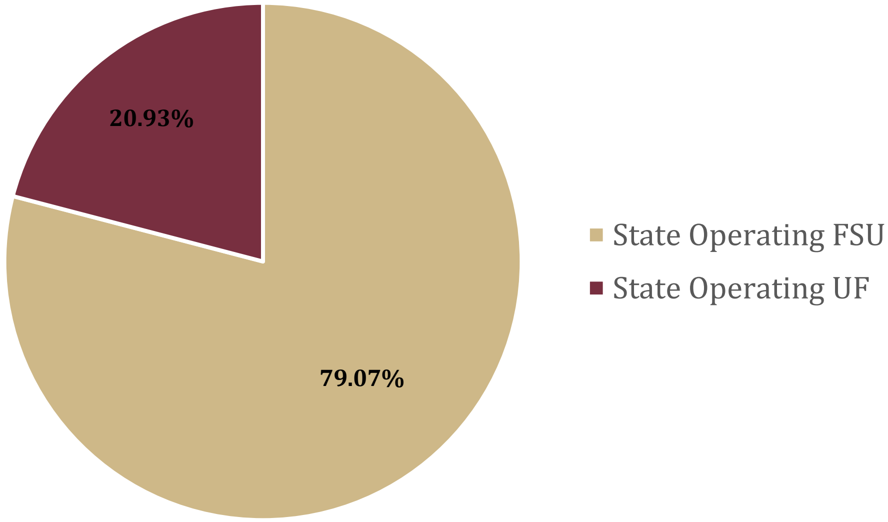

Figure 12. Percentage of State Funding by Funding Source (Years 2019–2023)

"Other grants" funding has played an increasingly prominent role in MagLab funding. The CEFA research team expects a four percent annual growth trend in other grants funding, which is based on the average growth of federally-funded research conducted at universities and colleges for the last five years (provided by the National Science Board's Science and Engineering Indicators). Figure 13 shows the further breakdown of other grant sources (i.e., 69 percent) for years 2019–2023. Regarding the projections of each input variable, it is assumed that the percentages for all funding from other grants will remain fairly consistent in the future.

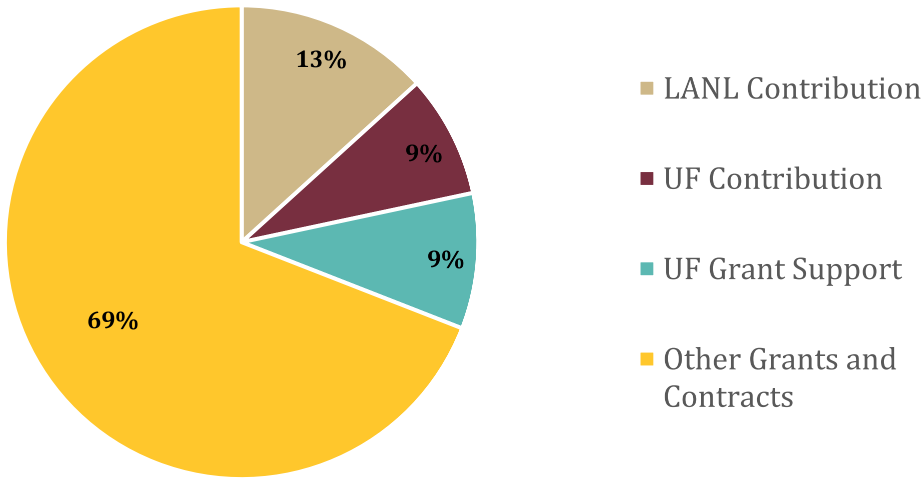

Figure 13. Percentage of Other Grants by Source (Years 2019–2023)

Figure 14 shows the average breakdown of total MagLab expenditures for years 2019–2023, excluding the LANL sub-award. In the forecasting of the expenditure categories, it is assumed that all unspecified funding line items (such as any future "other grants") will correspond to similar general expense, or spending, percentages.

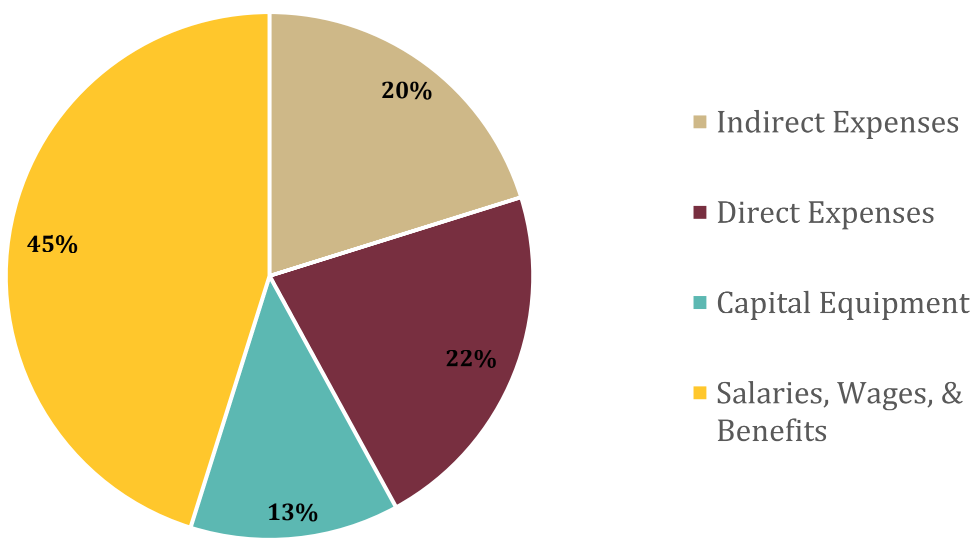

Figure 14. Allocation of Total MagLab Expenditures, Excluding LANL Sub-award (Years 2014–2018)

For the LANL sub-award, the research team obtained projected funding amounts for the fiscal years 2019–2023, to give an approximation of how sub-award funding at the LANL is spent. The LANL facility has different spending patterns, so the funding was broken out by how it would be spent based on LANL budget amounts. Figure 15 shows the breakout of LANL facility spending of the sub-award (part of the NSF Core Grant). The CEFA research team assumed this breakout for the sub-award to remain relatively stable over time for the LANL facility.

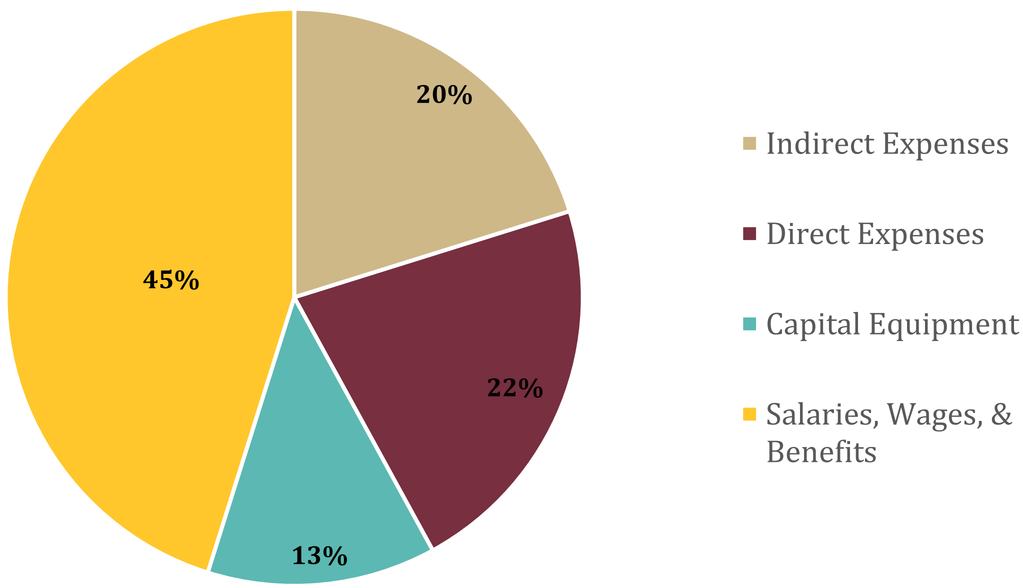

Figure 15. Allocation of the LANL Sub-award (Based on FY 2019–2023)

VI - The Economic Impacts of the MagLab

Economic Impacts on the Tallahassee MSA, or Local Economy

After the CEFA research team examined the MagLab's previous expenditures, based on historical data, the projected spending by category was estimated. Similarly, the expenditure categories of each MagLab funding source that will occur within the

Tallahassee Metropolitan Statistical Area (i.e., Leon, Gadsden, Wakulla, and Jefferson counties). Figure 16 shows a visual representation of expected MagLab spending over time. This forecast of the various expenditure categories represent items that would likely be spent in the Tallahassee MSA, excluding any funds allocated to UF or LANL facilities.

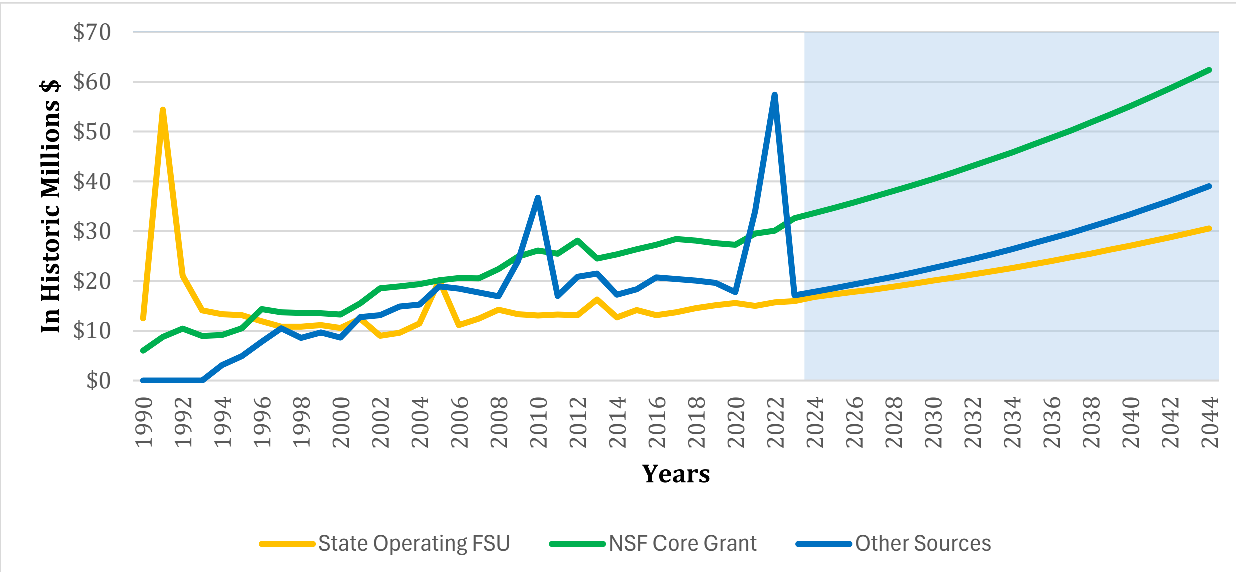

Figure 16. MagLab Spending in the Tallahassee MSA by Category (Years 1990–2044) in Dollars

These expenditure categories were used as inputs to the economic impact model for the local Tallahassee MSA economy. The economic impact model variables were then matched with the MagLab input data/expenditure categories in order to perform the economic impact modeling analyses.

Table 7 corresponds with the average annual amount of funding expected to be spent within the Tallahassee local economy during the years 2024–2044. This was then compared with the Tallahassee MSA local economy to examine only the effects of the MagLab's expenditures in the local area. The economic impact analysis shows that the average annual state projected expenditures of $23 million in the local economy would generate about $174 million in output, 1,266 jobs, and $77 million in income across the Tallahassee MSA.

Table 7. Average Annual Economic Impact in the Tallahassee MSA (Years 2023–2044) in Current Dollars

Annual Average Economic Impact for Years 2024-2044			
	Output	Employment	Income
MagLab Expenditures (Tallahassee)	$174,118,270	1,266	$77,130,416

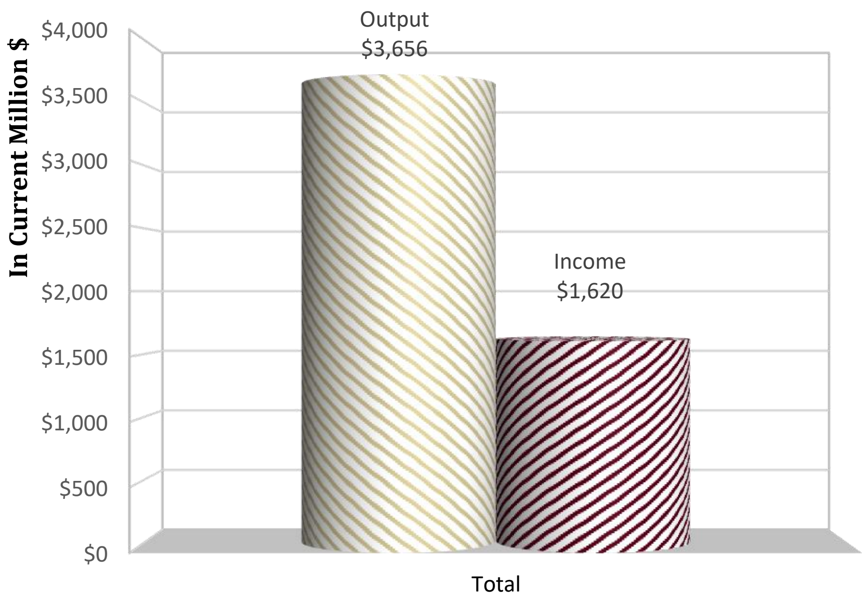

Figure 17. Cumulative Economic Impact of Total MagLab Funding in the Tallahassee MSA (Years 2024–2044) in Current Dollars

Figure 17 shows the MagLab's projected total economic impact for years 2024–2044, within the Tallahassee MSA. The total investment across the Tallahassee area over the next 20 years will cumulatively generate about $3.7 billion in local output and $1.6 billion in income.

Economic Impact on the State of Florida Economy

After computing the amount of funds spent within the local Tallahassee MSA, CEFA researchers also ran a statewide economic impact model using funds that would likely be spent within the state of Florida. As the UF facility is located in Gainesville, Florida, expenditure categories were recalculated as shown in Figure 18 to include all provided UF funding sources.

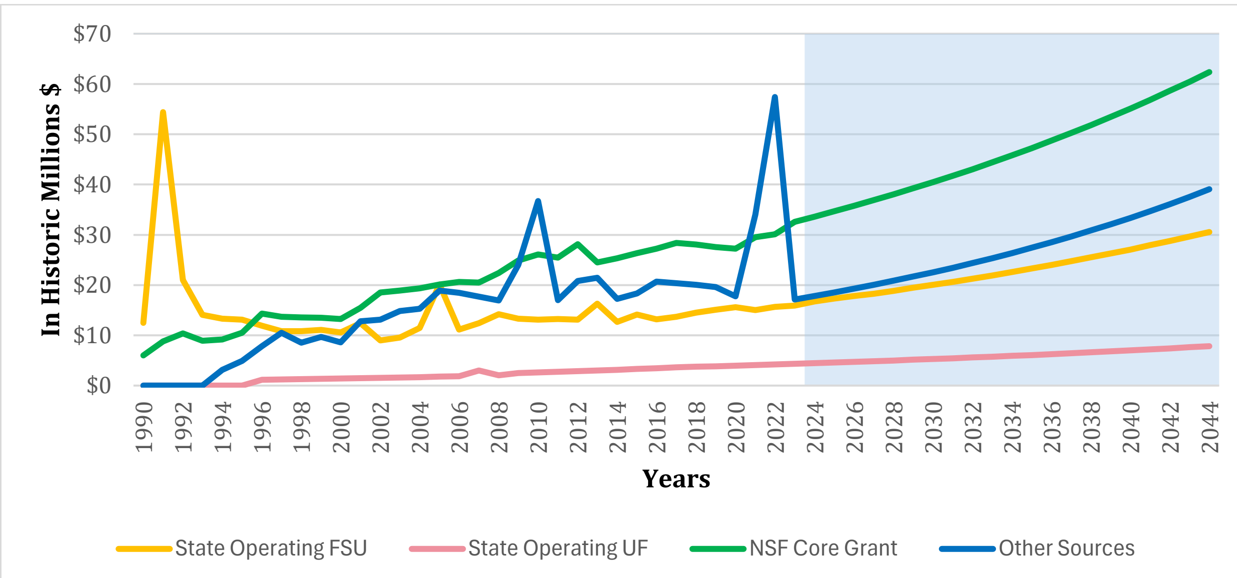

Figure 18. MagLab Spending in the State of Florida by Category (Years 1990–2044) in Dollars

After these policy variables were determined, the IMPLAN model was used to determine the economic impact of the MagLab on the statewide economy. The top row of Table 8 summarizes the average annual projected state investment for the MagLab, including projected annual income and employment. The bottom rows of the table indicates that the state funding will attract an annual average economic stimulus to the Florida economy over six times the state investment, based on the MagLab expenditures (or spending). This table shows both the economic impacts on output, employment, and labor income.

Table 8. Average Annual Economic Impact in the State of Florida (Years 2024–2044) in Current Dollars

Annual Average Economic Impact for Years 2024-2044			
	Output	**Employment**	**Income**
State of Florida Investment	$37,704,933	256	$15,472,535
Economic Impact of MagLab Spending in FL	**Output**	**Employment**	**Income**
MagLab Expenditures	$231,689,303	1,652	$95,478,842
Benefit to Cost Ratio	6.15	6.45	6.17

In 2026 $

The MagLab's annual stimulus in terms of output to the State of Florida will be about $232 million dollars. This represents the value of final goods and services produced across the Florida economy as a result of state and non-state spending at the MagLab. The annual average value of income generated by MagLab spending over the years 2024–2044 is about $96 million across the state. Finally, the MagLab, on average, generates 1,652 jobs across the Florida economy annually – including jobs that are directly and indirectly created by the total spending projected over that period.[9]

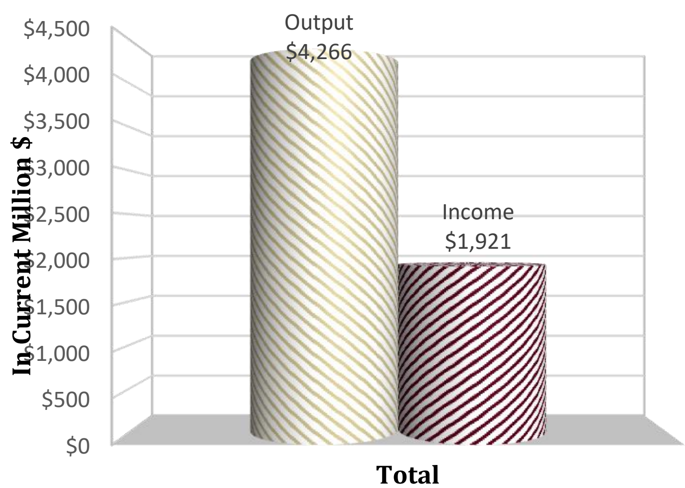

Figure 19. The Cumulative Economic Impact on the Florida Economy of the State's Investment and Total MagLab Spending (Years 2024–2044)

[9] It should be noted that the average annual state investment was modeled as an "opportunity cost". In other words, the MagLab-directed state investment (i.e., the denominator for the B/C ratio) was assumed reinvested in another area of "higher education" and including some "equipment" purchases.

Figure 19 shows the total economic impact for years 2024–2044 for both the projected MagLab spending and the state investment. The total investment across Florida over the next 20 years will cumulatively generate about $4.3 billion in state of Florida output, and $1.9 billion in wages for state of Florida workers.

Economic Impact on the National Economy

For the total economic impact of the MagLab on the national economy, the CEFA research team included expenditures for all three facilities that would be infused into the national economy. Figure 20 shows the historic and projected expenditures for the entire MagLab including the LANL sub-award.

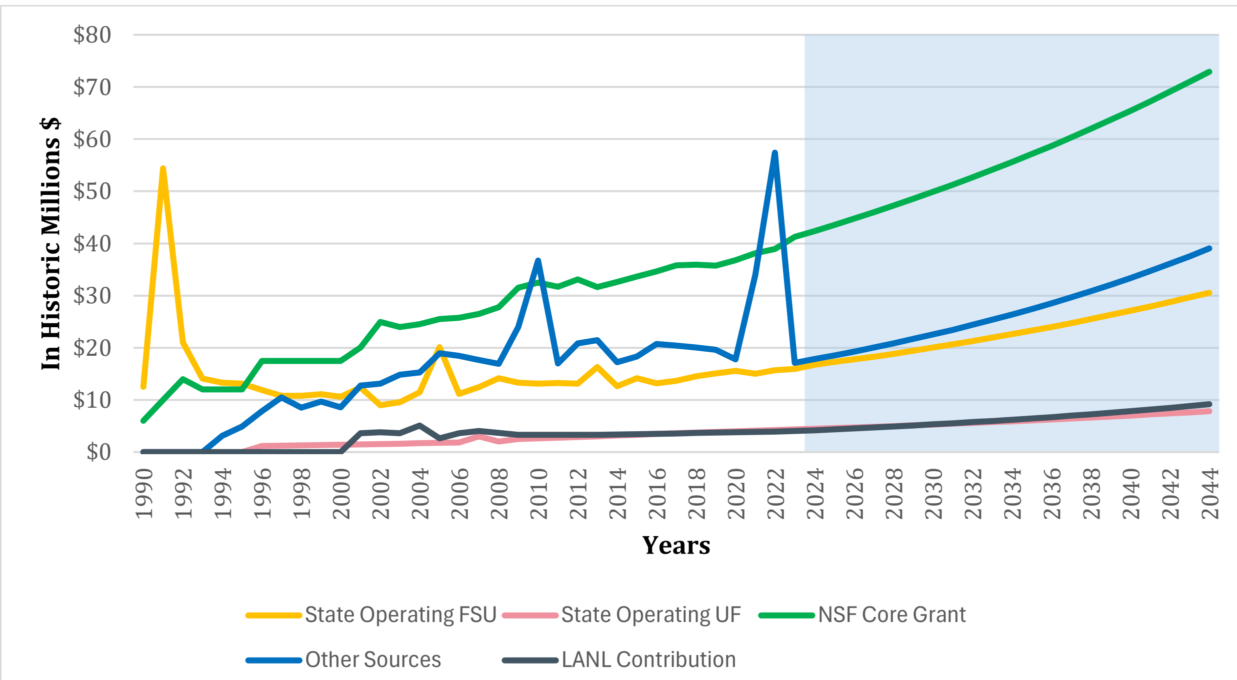

Figure 20. National MagLab Spending by Category (Years 1990–2044) in Dollars

These expenditure categories are used as inputs for the national economic impact model and include all expenditures for the MagLab within the national economy. This includes expenditures for all three of the MagLab facilities. Although the MagLab's headquarters and UF facilities are based in Florida, it operates nationally, with an additional site at Los

Alamos National Laboratory and researchers from across the country and around the world utilizing all three locations. With data provided by the MagLab, the CEFA research team assessed the total value of grants and other funding brought in by the MagLab that had an impact on a national level. The research team assumed that the LANL sub-award would be spent similar to the previous breakout for the LANL projected budget (see previous Figure 15) in order to calculate future spending on the national level. Table 9 shows the average annual economic impact of total MagLab funding compared to the baseline U.S. economic forecast. All expenditures by the MagLab generate jobs through operational spending, employment, and labor income. The MagLab's annual stimulus in terms of output to the National economy will exceed $262 million dollars. This represents the value of final goods and services produced across the Florida economy as a result of state and non-state spending at the MagLab. The annual average value of income generated by MagLab spending over the years 2024–2044 is about $116 million across the state. In addition, the MagLab, on average, generates 1,809 jobs across the National economy annually – including jobs that are directly and indirectly created by the total spending projected over that period.

Table 9. Average Annual Economic Impact of the MagLab on the National Economy (Years 2024–2044) in Dollars

Annual Average Economic Impact for Years 2024-2044			
MagLab Total Spending National Economic Impacts	**Output**	**Employment**	**Income**
MagLab Expenditures (Tallahassee, UF, & LANL)	$262,713,447	1,809	$116,429,312

In 2026 $

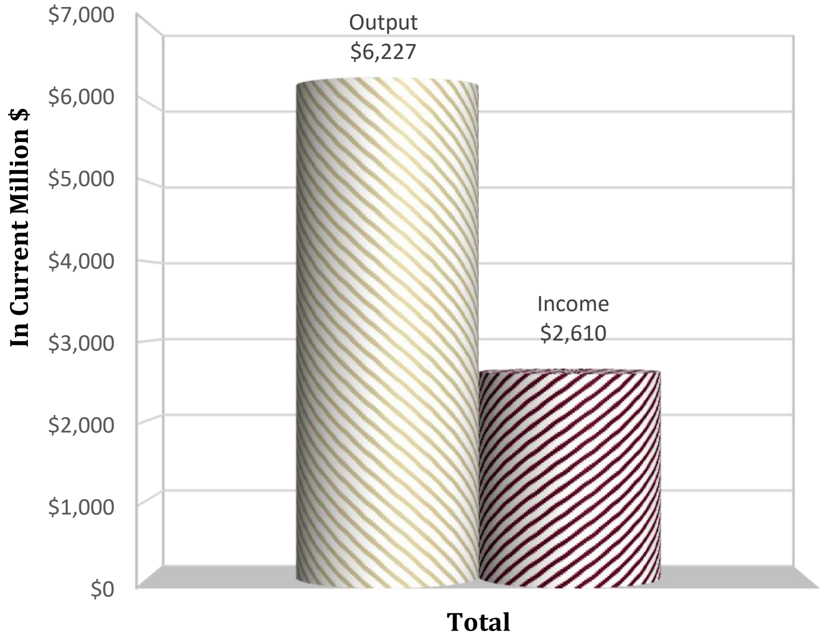

Figure 21. The Cumulative Economic Impact of the Total MagLab Funding on the National Economy (Years 2024–2044) in Dollars

Figure 21 shows the cumulative economic impact of all projected MagLab funding on the national economy over the next 20 years. This includes all direct, indirect, and induced amounts for output, employment, and labor income. As a result of the projected 20-year investment of total MagLab funding, there is expected to cumulatively be about $6.2 billion in national output, and $2.6 billion in income for those workers.

Economic Impact Model Input Data Based on Visitors

The FSU CEFA research team performed an economic impact analysis of the visitors to the MagLab (including UF and LANL), using year 2023 data. Further economic assumptions were developed in order to estimate any missing travel or visitor cost information. This section of the report provides a description of the financial, or input, data used for the visitor economic impact model developed by the CEFA research team. According to Visit Florida, in the year 2023 Florida had about 142 million visitors globally. This is a 1.6 percent increase from 2022, and an 8.4 percent increase since 2019 prior economic impact assessment of the MagLab (VISIT FLORIDA).

As shown in Table 10, the MagLab hosted an estimated 887 visitors in 2023 across various programs and events. The majority participated in the User Program, with additional attendance from the Physics School and committee meetings throughout the year. As shown in Table 11, MagLab sites hosted approximately 3,988 visitors in 2023, totaling 32,051 visitor nights. The main Tallahassee facility saw the highest volume of visitors, while UF High B/T had the longest average stay per visitor at 122 nights.

The CEFA research team estimated total visitor travel costs for 2023 using inflation-adjusted averages for lodging, food, transportation, and other daily expenses. These are summarized in Table 12. Visitors were estimated to spend an average of $833.76 per day on activities such as hotel lodging, Food and Beverage, Transportation, retail shopping, recreation, airfare, and other misc. Total visitor spending across all MagLab sites, including Tallahassee, UF High B/T, UF AMRIS, and LANL, amounted to approximately $5.27 million.

Table 10. Estimated Annual Number of Visitor Nights by Event to the MagLab, for Year 2023

Month	User Program	Visiting Scientists	Physics School	External Advisory Meeting	User Committee	NSF Site Visit Committee	Total Visitors
Jan	64	9	48	0	0	0	**121**
Feb	64	9	0	0	0	0	**73**
Mar	64	9	0	0	0	0	**73**
Apr	64	9	0	0	0	0	**73**
May	64	9	0	0	0	0	**73**
Jun	64	9	0	0	0	0	**73**
Jul	64	9	0	0	0	0	**73**
Aug	64	9	0	45	0	0	**118**
Sep	63	9	0	0	30	0	**102**
Oct	63	9	0	0	0	0	**72**
Nov	63	9	0	0	0	0	**72**
Dec	63	9	0	0	0	0	**72**
Total	**764**	**9***	**48**	**45**	**30**	**0**	**887**

each staying for a year

Table 11. Estimated Average Visitor Nights and Visitors by Site, for Year 2023

Site	Average Nights per Visitor	Total Nights	Estimated Visitors
MagLab	6	20,633	3,268
UF High BT	122	3,785	31
UF AMRIS	23	3,925	168
LANL	7	3,708	521
Total	**158**	**32,051**	**3,988**

Table 12. Estimated Total Visitor Travel Costs for Year 2023

Est. Travel Cost/Item	Visitors for 2023	Total
Assumptions for Average Daily Spending		$834
MagLab	4,518	$3,766,928
UF High BT	836	$697,023
UF AMRIS	368	$306,824
LANL	603	$502,757
Total	**6,325**	**$5,273,532**

Table 13. Estimated Local, State and National Economic Impacts of Visitors to the MagLab for Year 2023

Average Annual Economic Impacts			
Economic Impacts of Visitors to the MagLab	**Output**	**Employment**	**Income**
Visitor Impact on Local Economy	$5,934,070	30	$1,541,743
Visitor Impact on State Economy	$8,280,687	39	$2,694,196
Visitor Impact on National Economy	$11,566,426	47	$3,747,431

In 2026 $

Additional Value Added Associated with MagLab Operations -

The MagLab has a profound impact on science and technology, as evidenced by the numerous publications resulting from its experiments. Beyond research, the MagLab enhances STEM education, contributes significantly to the local economy, and engages nearby communities. It hosts a distinguished team of scientists and engineers whose work is recognized both nationally and internationally. Since 1988, 73 MagLab scientists and engineers have been honored as fellows of prestigious societies, including the American Association for the Advancement of Science and the Royal Academy of Engineering (National High Magnetic Field Laboratory, 2024a).

In 2023 alone, the MagLab and its scientists produced a total of 305 publications with placements in highly respected journals such as *Nature Communications*, *Physical Review Letters*, and *Scientific Reports* (National High Magnetic Field Laboratory, 2024d). These publications, with contributions spanning over 2,000 authors and 121 journals, highlight the quality of the research conducted at the MagLab which encompasses diverse fields like physics, chemistry, biology, and materials science (National High Magnetic Field Laboratory, 2024d). This wide-reaching collaboration includes partnerships with universities worldwide, reflecting a growing network of academic engagement. Figure 22 below highlights the increasing number of universities represented at the MagLab between 2019–2023.

Year	Universities Represented	Change from Previous Year
2019	298	—
2020	272	-8.7%
2021	279	+2.6%
2022	327	+17.2%
2023	338	+3.4%

Table 14. Number of Universities Represented at the MagLab (2019–2023)

Advancements in Scientific Discoveries

In recent years, the MagLab has driven numerous groundbreaking discoveries in the fields of materials science, energy, and life sciences. In materials science, scientists use the lab's powerful magnets to investigate semiconductors, crystals, and atomically thin materials. This research reveals the fundamental properties of materials, paving the way for innovative technologies. In the field of energy, researchers optimize petroleum refining processes, develop potential biofuels such as pine needles and algae, and revolutionize energy storage and delivery by creating more efficient batteries. Meanwhile, in life sciences, MagLab scientists delve into the fundamental science of proteins and disease molecules that underpin cellular functions. Their work holds promise for advancing treatments for diseases such as AIDS, cancer, Alzheimer's, and other critical health challenges.

In September 2017, the MagLab received a $5.8 million grant from the National Institutes of Health (NIH) to establish a Biomedical Technology Resource Center, positioning its scientists at the forefront of developing instrumentation for biomedical research using high magnetic fields (Dobson, 2017). This work focuses on combating chronic diseases such as Alzheimer's and tuberculosis. Building on this foundation, the NIH awarded the MagLab an additional $5.3 million in 2023 to further advance its biomedical research initiatives (Haughney, 2023). These grants support the development of cutting-edge technologies that leverage high magnetic fields to study complex biological systems, enhance drug development, and improve disease modeling. The NIH's ongoing support underscores the MagLab's pivotal role at the intersection of physics and biology, driving innovation to address some of the most pressing challenges in modern medicine.

In addition, the MagLab holds numerous world records for high magnetic fields and other key measures of the power and utility of the instruments at the facility. Since 1999, it has been home to the world's strongest working magnet, the 45-tesla (45-T) hybrid magnet, which continues to attract researchers from around the globe to Florida's capital. More recently, one of the MagLab's most notable achievements was for the worlds "world's strongest magnetic field", a fascinating magnet about half the size of a cardboard toilet tissue roll (Haughney, 2019). While the MagLab still holds the world record for the world's strongest "working" magnet, the 45-T, former MagLab engineer Seungyong Hahn and his team in 2019 created a magnet generating a 45.5 tesla (45.5-T) magnetic field (Haughney, 2019).

Most astonishing, the 45.5-T magnet comes in at less than a pound in weight, utilizing an "exceptionally high-field magnet into a coil you could pack in a purse" (Haughney, 2019). This engineering marvel, published in the journal *Nature*, has paved the road for the building and utilization of smaller, more powerful, and more dynamic magnets the world has ever seen. MagLab Director Emeritus, Dr. Greg Boebinger, expressed that this new record is "indeed a miniaturization milestone that could potentially do for magnets what silicon has done for electronics," leading "small magnets that do big tasks in places like particle detectors, nuclear fusion reactors and diagnostic tools in medicine" (Haughney, 2019).

The key to both the 45-T and 45.5-T magnets is their use of superconductors, enabling these magnets "the ability to carry electricity with perfect efficiency" (Haughney, 2019). The 45-T uses a niobium-based alloy superconductor, while the 45.5-T gains efficiency by utilizing a newer compound called REBCO (rare earth barium copper oxide) which carries more than double the current as a same sized niobium-based superconductor (Haughney, 2019). This innovative approach led to the creation of several cutting-edge magnets dubbed the Little Big Coil series; state-of-the-art magnets that significantly enhance global access to high magnetic fields, marking a groundbreaking achievement in magnet technology.

The MagLab continues to advance magnet science through projects like the Platypus project, which focuses on improving superconducting technology by developing zero-resistance joints for REBCO, the material used in the groundbreaking 45.5-T magnet. The design of the joint uses two Bi-2212 round wires, a high-temperature superconducting material notable for its ability to carry large currents in compact, round-wire form. The two

Bi-2212 wires then create a seamless connection with near-zero resistance, utilizing standard manufacturing processes. This innovation holds great promise for applications in nuclear magnetic resonance and particle accelerator magnets.

The MagLab's operations require substantial utility resources, with electricity being only one component of its expenses. Previously, the MagLab spent approximately $1 million annually on helium (equivalent to about $1.25 million in July 2025 dollars), which its cryogenics lab converted into liquid helium to maintain the ultra-low temperatures necessary for magnet operation (Schultz, 2024). However, the implementation of a helium recovery project has significantly reduced helium waste by capturing and reusing it. This innovation not only cuts helium costs to a fraction of previous expenditures, but also conserves a vital non-renewable resource enabling the lab to reuse 85 – 95% of its helium, underscoring the MagLab's commitment to sustainability and cost efficiency (Schultz, 2024).

MagLab's Collaborative Impact

MagLab researchers and staff develop partnerships and collaborations with private sector industries, federal agencies, institutions and international organizations. These partnerships advance magnet-related technologies and help bring new technologies closer to the marketplace. Since its inception, the MagLab has helped produce over 100 patents and other products from the on-site research. Various spin-off companies have begun to form in surrounding areas of the MagLab, bringing in resources and national interest to Tallahassee as well as Innovation Park, the home of the MagLab.

Several different facilities of Florida State University were created in part due to the MagLab. For example, the Future Fuels Institute benefits from sponsoring companies interested in analyzing the composition of oil, with MagLab research driving advancements in chemical analysis techniques and training. Similarly, the Center for Advanced Power Systems (CAPS), a MagLab spin-off, focuses on developing future power systems for U.S. Navy ships, advanced materials applications, and power systems management. These initiatives demonstrate the MagLab's role as a catalyst for innovation, fostering cutting-edge research and interdisciplinary collaboration.

Danfoss Turbocor Inc., a neighboring company of the MagLab, specializes in oil-free compressors for the heating, ventilation, air conditioning, and refrigeration industries. These advanced compressors require high-performance magnet materials. In collaboration with the MagLab, Danfoss initiated a project to select, characterize, and develop permanent magnet materials for eco-friendly, energy-efficient compressors (National High Magnetic Field Laboratory, 2024c). Strengthening its industrial connections, the MagLab also entered a five-year agreement with MagCorp to enhance collaborations with private-sector companies, advancing magnet technologies and accelerating their commercialization (*New Agreement to Bolster Industry Partnerships*, 2021).

In 2006, the Applied Superconductivity Center (ASC) transitioned from the University of Wisconsin to the MagLab, becoming an integral part of its operations. The ASC collaborates globally to advance high-temperature superconductor technologies (National High Magnetic Field Laboratory, 2024c). Partnerships with institutions like Advanced Conductor Technologies in Colorado focus on Coated Conductor Stranded Cables, achieving groundbreaking measurements under extreme conditions (National High Magnetic Field Laboratory, 2024c). Cross-Atlantic partnership with Callaghan Innovations in New Zealand explores Roebel-style cables for high-field magnets. Similarly, work with Lawrence Berkeley Laboratory in California involves testing advanced high-temperature superconductor cables, driving innovations in superconducting materials and magnet design (National High Magnetic Field Laboratory, 2024c).

The MagLab also maintains active collaborations with several institutions in China to advance materials research for high-field magnets. At the Faculty of Material Science and Engineering at Kunming University, work focuses on the effects of magnetic fields on phase transformations in steels (National High Magnetic Field Laboratory, 2024c). The Institute of Metal Research in Shenyang investigates structural materials like stainless steel and maraging steels (National High Magnetic Field Laboratory, 2024c). At Northeastern

University, efforts are directed toward high-strength conductors, while the University of Science and Technology Beijing focuses on thermodynamic calculations for multiphase systems in steels (National High Magnetic Field Laboratory, 2024c). These collaborations exemplify global innovation in material science fostered by the MagLab.

Jumping into the field of medicine, Mevion Medical Systems is revolutionizing cancer treatment with its pioneering proton radiation therapy systems. These systems utilize proton accelerators based on low-temperature superconductors. The MagLab provides engineering support by conducting qualification testing on full-scale high-current superconductors under low temperatures and background magnetic fields. These tests are performed using the MagLab's unique facility, featuring a 12-T split solenoid superconducting magnet system (National High Magnetic Field Laboratory, 2024c).

Beyond its contributions to the private sector, the MagLab supports nonprofit initiatives through Florida State University Magnet Research and Development (FSUMRD). Established in 2017, FSUMRD focuses on magnet design, development, and testing (National High Magnetic Field Laboratory, 2024c). Its groundbreaking projects include building a 26-T hybrid magnet for neutron scattering in Berlin and creating a superconducting outsert for a 45-T hybrid magnet in Nijmegen (National High Magnetic Field Laboratory, 2024c). FSUMRD also collaborates with Oxford Instruments NanoScience to develop high-field magnets using Bi-2212 superconductors, advancing nuclear magnetic resonance applications (National High Magnetic Field Laboratory, 2024c). Faculty, staff, and students play a critical role in these initiatives, which are funded through contracts and grants, further enhancing the MagLab's educational and research impact (National High Magnetic Field Laboratory, 2024c).

The local Office of Economic Vitality (OEV) collaborates with key partners like Florida State University and Florida A&M University to build a magnetic technologies cluster centered on the MagLab, aimed at attracting industry and talent. To advance this vision, OEV established the Magnetic Technologies Task Force in 2017, which focuses on leveraging existing technology assets, identifying growth gaps, and providing strategic guidance. More recently, the OEV has achieved a significant milestone by securing the 2025 Motor & Drive Systems and Magnetics (MDSM) Conference, which will be held in Tallahassee in February. Hosting this prestigious conference will bring industry leaders, researchers, and innovators to the area, further fostering the magnetic technologies ecosystem (Wynn, 2025). These efforts align with promoting Tallahassee as the "Magnetic Capital of the World," fostering a robust ecosystem for research and business in magnetic technologies (Office of Economic Vitality, 2022).

MagLab's Community Engagement

While a powerhouse in collaboration and scientific innovation, the MagLab also supports and engages with the Tallahassee community at large through several educational initiatives. For the K-5 age groups, the grassroots of educational institutions, the MagLab provides several opportunities for students to explore and get excited about science. One of the MagLab's most popular educational initiatives for the youth is their monthly held Science Night. Exploring science through hands-on experiments, demonstrations, and interactive questions, Science Nights 45-minute-long events are free of charge to attendees and inspire countless students on a monthly basis (link).

The MagLab has also created the Magnet Academy, a free online resource that enables students to do a plethora of science-based activities from the comfort of their home. Features of the Magnet Academy include seeing science at play through the use of interactive tutorials and games, reading science stories and history through comics, and trying at-home experiments to see science in actions (link). Furthermore, the Magnet Academy has a list of ten science experiments designed for teachers to bring to their own classroom, all to the benefit of the student with no charge to the teacher.

For the students in grades 6–8, the MagLab supports a series of camps such as the SciGirls Summer Camps and the MagLab Camp Tesla. Both Camp TESLA and SciGirls camps are one-week long hands-on summer camps designed for students interested in pursuing careers in science. For the students in high school, grades 9–12, the MagLab provides a unique mentorship initiative through the High School Externship program. This 9-month program is a professional working alliance where students get the ability to work together to develop and grow professionally through the "provision of career and psychosocial support" (link).

Furthermore, the MagLab leads several professional development opportunities for K – 12 STEM teachers and teaching influencers across the country. One of the main programs, Research Experience for Teachers (RET), is a summer program opportunity to integrate material science, chemistry, and physics research into practical lesson plans (link). Further initiatives include the teacher workshops designed to equip teachers strategies to teach topics such as magnetism, electricity, and electromagnetism in the alignment with the MagLab's research (link). Both programs aim to provide teachers with real-world scientific experiences, professional development, and resources for classroom use.

Continuing to the undergraduate, graduate, and postdoc level, the MagLab provides an array of workforce development needs for students and professionals. The Research Experiences for Undergraduates (REU) program gives students interested in pursuing a career in science the opportunity to work alongside the scientists of the MagLab on an in-depth research project. Students not only get to pursue research in a variety of fields such as geochemistry and magnet science and engineering, but also participate in weekly seminars designed to broaden their knowledge and spark interest in future careers (link).

For more advanced graduate students and postdocs, the MagLab holds the User Summer School, a weeklong opportunity focused on measurement techniques, practical exercises, and talks held by experts. Individuals within the User Summer School have the opportunity to learn about noise theory to magnetometry and cryogenic techniques (link). One of the most academically collaborative events the MagLab holds is its Theory Winter School. With the most recent Theory Winter School in 2025, the MagLab pursued the theme of "exploring strongly correlated physics across newly accessible length and energy scales", an event geared at communicating new and exciting ideas in the world of matter physics to diverse audiences (link).

As part of its commitment to academic collaboration, the MagLab invites a variety of academics from well-established institutions such as Cornell and Princeton University to participate in its Theory Winter School. Beyond this event, the spirit of intellectual curiosity permeates the MagLab and its users, as the institution continuously invites leading academics and world-renowned experts to give seminars to its staff and users. Most recently, in 2025, the MagLab hosted Dr. Subir Sachdev, the Herchel Smith Professor of Physics at Harvard University. Dr. Sachdev is renowned for his work in condensed matter physics, with his research leading to significant advancements in the understanding of quantum criticality and entanglement (link).

In addition to offering numerous educational opportunities through formal outreach programs, the MagLab actively engages with Tallahassee's community through various initiatives. For example, the MagLab hosts monthly guided tours during working hours, featuring an overview of the facility, the different types of magnets, and the groundbreaking research conducted within its laboratories. As part of its 30th anniversary celebration in 2025, the MagLab is embracing a more interdisciplinary approach by incorporating the arts into its festivities. To mark this milestone, the MagLab will host a special evening of performances, featuring students from the Dance, English, and Music departments, in celebration of three decades of scientific innovation and academic excellence (create citation).

Every year, the MagLab hosts its highly anticipated Open House, a signature event designed to ignite public interest in science and engage the local community. As one of the largest free STEM events in Florida, the 2025 Open House was especially momentous, coinciding with the lab's 30th anniversary. This milestone celebration will feature expanded activities and interdisciplinary collaborations to honor three decades of groundbreaking scientific research and innovation. Visitors of all ages will have the opportunity to explore the lab's world-class magnet technology, learn about pioneering research in areas such as condensed matter physics and biomedical sciences, and witness captivating experiments that showcase the power of magnetism. Hands-on demonstrations will highlight the

MagLab's cutting-edge advancements, including live plasma physics experiments, superconductivity showcases, and interactive cryogenic displays that stimulate the extreme conditions used in high-field- research (Open House Link).

The 2025 Open House also marked an important transition in leadership, as newly appointed director Dr. Kathleen Amm reflects on the MagLab's remarkable evolution over the years. From its early days of pioneering high-field magnet technology to its current status as a global leader in interdisciplinary research, the MagLab has consistently pushed the boundaries of scientific discovery. Beyond its own contributions, the event will feature a vast network of partners, including the National Weather Service, the FAMU-FSU College of Engineering, and other institutions dedicated to advancing STEM education. These collaboration demonstrate the MagLab's commitment to fostering knowledge exchange and building a strong scientific community (Open House Link).

For those unable to attend in person, the MagLab Open House offers 20 free virtual events, including video demonstrations of flagship experiments, web-based games, and immersive 360-degree video tours of restricted facilities such as the helium recycling system and the MagLab plant. Popular virtual demonstrations, like the "Shrinking Quarter Machine," "Potato Launcher," and "Junkyard Magnet," highlight the fascinating applications of science, making STEM concepts accessible and engaging for all audiences (Open House Link). To further enhance the family-friendly experience, the event will also feature a selection of food trucks, allowing visitors to enjoy local cuisine while connecting with the world of science.

MagLab's Digital Presence and Online Growth

Beyond its physical presence in Tallahassee, the MagLab has also been accumulating its digital footprint which has been steadily growing each year. In 2023, famous science-based YouTuber *Veritasium* visited the MagLab showcasing its powerful magnets and fascinating operations. With over 17 million subscribers, *Veritasium* posted the video titled, *World's Strongest Magnet!*, which accumulated over 14 million views (Veritasium, 2023). This impressive viewer count demonstrates a strong public demand for science-based content, positioning the MagLab as a key provider of engaging and educational material. It also underscores the significant value that can be unlocked by integrating the MagLab's groundbreaking research with digital media platforms.

The MagLab's own YouTube channel, *National MagLab*, further amplifies its digital presence with more than 400 videos and over 158K subscribers (MagLab, n.d.). The channel features educational videos about magnet science and technology, research highlights, facility tours, and outreach programs. The content often explains complex scientific concepts, showcases the MagLab's cutting-edge research, and highlights its impact on education and innovation. In the year 2023 alone, over twenty-six thousand hours of MagLab video content was watched on YouTube (National High Magnetic Field Laboratory, 2023). Figure 23 below displays the subscriber count of the National MagLab YouTube channel, highlighting its growth over the last four years.

Year	YouTube Subscribers	Change from Previous Year
2020	119,000	—
2021	137,000	+15.1%
2022	144,000	+5.1%
2023	152,000	+5.6%
2024	158,000	+3.9%

Table 15. MagLab YouTube Subscriber Growth (2020–2024)

In addition to video content, the MagLab has built a strong social media presence, including over 2,000 followers on Instagram and nearly 4,000 followers on X (formerly Twitter) (National High Magnetic Field Laboratory, 2020 & National High Magnetic Field Laboratory, n.d.). The MagLab's X account showcases highlights of its groundbreaking research, scientific advancements, and educational outreach. Posts include updates on advancements in fields like physics, chemistry, and materials science, as well as collaborations in clean energy, quantum materials, and medicine. Additionally, the page emphasizes public engagement by celebrating milestones and experiments, reinforcing its reputation as a leader in magnet-related innovation.

At the core of the MagLab's operations is its official website, serving as a vital hub for accessing information on the newest magnets, world records, job opportunities, and mentorship programs. The site emphasizes its status as the world's most powerful magnet lab, offering insights into its facilities, research, educational programs, and partnerships. It provides resources for researchers, students, and educators while showcasing global collaborations, public events, and scientific highlights. As shown in Figure 24, website interactions have seen significant growth from 2019–2023, reflecting increased engagement and outreach.

Year	Interactions/Pageviews (Millions)	Change from Previous Year
2019	1.4	—
2020	1.59	+13.6%
2021	1.64	+3.1%
2022	1.38	-15.90%
2023	3.4	+146.4%

Table 16. MagLab Website Interactions / Pageviews (2019–2023)

The Benefits of the Magnet Lab to the City of Tallahassee

Tallahassee - being the home of the MagLab headquarters - supplies the electricity for the lab through the city's power grid. With around 67 percent of the total electricity bill for the MagLab coming from the operation of magnets alone, the MagLab may consume 56 megawatts of electricity at the Tallahassee site at any one moment (National High Magnetic Field Laboratory, 2024b). While the local grid has a winter net peak generating capability of 795 MW, the MagLab is able to consume about seven percent of that (City of Tallahassee, 2024). It is also worth noting that the City of Tallahassee power grid is comprised almost entirely of natural gas.

During 2024, the electricity bill for the MagLab headquarters in Tallahassee was $4.01 million. This level of consumption makes the MagLab the seventh-largest single electricity user in Tallahassee, just behind the Leon County School Board account.

Given the facility is state-owned, it is not taxed. MagLab employees, however, pay local property taxes. Estimated 2024 property tax payments total about $1.77 million. The City also collects roughly $2.01 million in residential utilities from MagLab employees, split between $1.26 million for electricity and $0.75 million for other utilities. An additional $0.99 million is collected in sales tax on electricity, water, and sewer charges. Figure 22 shows an estimate of taxes and fees collected by the City of Tallahassee from total MagLab affiliated employees and utilities from the MagLab.[10]

[10] See: Address lookup for utilities http://www.talgov.com/, City of Tallahassee's Annual Report to Bondholders, March 2024, Florida Property Tax Calculator, Residential Utility Rates from http://www.talgov.com/, Florida Department of Revenue for sales tax data

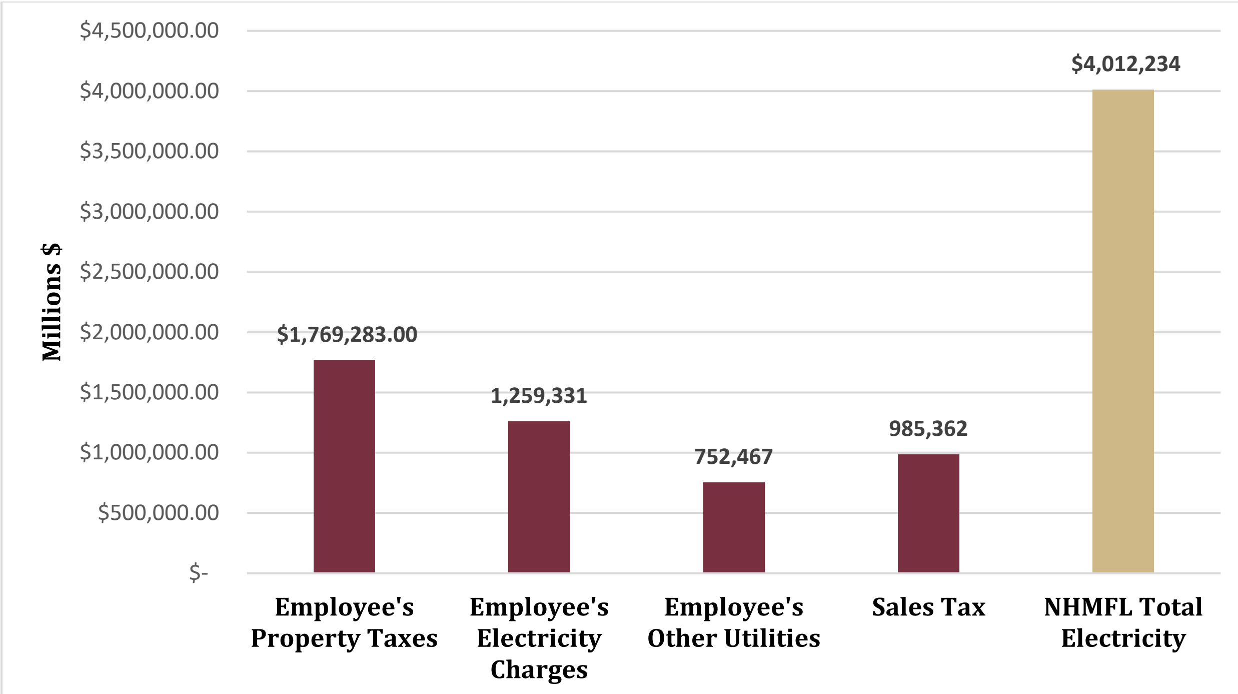

Figure 22. Taxes and Fees Collected Annually by the City of Tallahassee by the MagLab and Its' Employees

VII - Conclusions

The MagLab requested that an economic impact study be conducted in 2025, as it marks the thirtieth year of the opening of the MagLab's scientific user program. The economic research project undertaken by FSU CEFA involved data compilation and economic impact analysis of the MagLab annually and projected over the next twenty years (to year 2044) on the Tallahassee metropolitan statistical area (MSA), the state of Florida, and the United States.

Economic impacts are results of economic activity in a given area. They may be expressed in terms of: 1) business output (or sales volume), 2) value added (or gross regional product), 3) wealth (including property values), 4) personal income (including wages), or 5) jobs. Any of these measures can be an indicator of improvement in the economic well-being of area residents. Net economic impact is viewed as the expansion (or contraction) of an area's economy resulting from changes in a facility or project, or in assessing the economic impact of an already existing facility or project. Economic impacts are different from the valuation of individual user benefits and the broader social impacts (amenity value) of a facility or project. However, assuming they can be quantified, they may be included to the extent they affect an area's level of economic activity. Short-term economic impacts are the net changes in regional output, earnings, and employment that are due to new dollars entering into a region from a given enterprise or economic event. The following economic impact analysis report provides a summary of the local, state, and national area economic impacts associated with the MagLab.

In order to obtain estimates of the different types of macroeconomic effects of the MagLab on the Florida economy annually, as well as over the next twenty years, the project team applied a well-established analytical tool known as the IMPLAN model. The IMPLAN Model (2024 data), an economic input-output model, was used to perform the economic modeling analyses. Historical data (for years 1990-2023) was provided by the MagLab finance and budget staff and included capital outlay, equipment, salaries/wages, among other data. For example, about 809 MagLab researchers reside in the Tallahassee area, paying property taxes totaling approximately $1.77 million in 2024[11]. More than 1,826 research facility users travel annually to the MagLab from around the world to perform research activities using its unique facilities and scientific capabilities. Over 11,700 visitors came to experience the drama, comedy, and mystery of science at the MagLab's world-class research laboratory during Open House in February 2023.

This economic impact analysis study provides a short-term perspective and its associated economic impacts on the Tallahassee, state, and national economies. The economic impact model, an input-output model, includes cross-linkages between every sector of the economy within these geographic areas. The effects of expenditures external to the Tallahassee, state and nation (termed leakages) are not included in the economic impact estimates. However, as the regional level covers a larger economic area than the county level, a greater portion of direct expenditures are captured, resulting in less leakage at the regional level.

The following table(s) present the total economic impacts, and the direct, indirect, and induced economic impact results, respectively, in current dollars. The impacts are measured with respect to output (or sales/revenues), employment (or jobs), and income (or wages). The output generated represents the value of final goods and services produced across the Tallahassee, state and national area economies, respectively, as a result of the expenditures generated by MagLab activities. The direct impacts measure the immediate effects as a result of the MagLab-related expenditure generated activities in the Tallahassee area; e.g., in employment and income. Indirect impacts are those that include changes to production, employment, income, etc., that occur as a result of the direct effects. Induced impacts are those further impacts of spending derived from direct and indirect activities – i.e., MagLab related household purchases of consumer goods and services.

[11]Source: Florida Property Tax Calculator (https://smartasset.com/taxes/florida-property-tax-calculator#florida)

Annual Benefits to the City of Tallahassee, State of Florida, and the Nation

Regarding the economic impact analysis results, the project research team found that in the Tallahassee MSA area the MagLab annually generates:

- $ 174 million in economic output;
- $ 77 million in income;
- while generating 1,266 jobs.

In the Florida area, the MagLab annually generates:

- $232 million in economic output;
- $ 96 million in income;
- more than 1,652 jobs.

Nationwide, the MagLab annually generates:

- $ 297 million in economic output;
- $ 124 million in income;
- more than 1,603 jobs.

The project research team found that (based on average annual expenditures) the MagLab annually generates for the Tallahassee MSA, State, and Nation, respectively:

Average Annual Economic Impacts			
Economic Impacts of the MagLab	**Output**	**Employment**	**Income**
Economic Impact on Local Economy	$174,118,270	1,266	$77,130,416
Economic Impact on State Economy	$231,689,303	1,652	$95,478,842
Economic Impact on National Economy	$296,519,758	1,603	$124,278,139

In 2026 $

In addition, the annual economic impacts of visitors to the MagLab facilities are:

Average Annual Economic Impacts			
Economic Impacts of Visitors to the MagLab	**Output**	**Employment**	**Income**
Visitor Impact on Local Economy	$5,934,070	30	$1,541,743
Visitor Impact on State Economy	$8,280,687	39	$2,694,196
Visitor Impact on National Economy	$11,566,426	47	$3,747,431

In 2026 $

The economic impact of visitors to the MagLab is sizeable. Nationally, the visitor impacts are $11.6 million and $3.8 million, in output (sales/revenues) and income (wages/salaries) respectively, while generating an additional 47 jobs.

In summary, it should be noted that since 2020, the COVID-19 pandemic has disrupted global supply chains, causing widespread production shortages, higher costs, and economic contraction across most industries. The time period of this current MagLab study (2019-2023) was during the height of the pandemic, and likely further dampened potential greater economic impacts associated with the MagLab's economic activities. However, the results of the following economic analysis indicate that the MagLab performs a significant role in the local Tallahassee MSA, the state of Florida, and the national economies. The economic benefits include large additions to employment, economic output, personal income, and tax revenues.

Annual Return on Investment to State of Florida

The annual benefits within the Florida economy are defined as the economic impacts resulting from the annual state investment in the MagLab, and the economic activity brought into Florida (via contracts and grants, government and private sponsors, auxiliary fees/services, and other external sources), resulting in the following return on investment (ROI) ratios:

Annual Average Economic Impact for Years 2024-2044			
	Output	Employment	Income
State of Florida Investment	$37,704,933	256	$15,472,535
Economic Impact of MagLab Spending in FL	**Output**	**Employment**	**Income**
MagLab Expenditures	$231,689,303	1,652	$95,478,842
Benefit to Cost Ratio	6.15	6.45	6.17

In 2026 $

The results of the economic analysis indicate that the MagLab provides a substantive rate of return on the investments made by the state of Florida. The economic benefits include large additions to employment, economic output, personal income, and tax revenues.

- Benefit to the state = $231.7 million
- Cost of the state investment = $37.7 million
- Thus, for every dollar of state money invested in the MagLab, $6.15 is generated by the MagLab in economic activity for the State of Florida.

Appendix A – Overview of Expenditures Relating to R&D and Basic Research in the U.S., Years 1980 to 2023

It's clear that federally, industrially, and university-funded research has significantly advanced the American standard of living and positioned the U.S. as a global leader in innovation. From breakthroughs in electronics and biotechnology to advances in medicine and vaccines, American R&D continues to drive meaningful improvements in quality of life. However, many research fields now face growing challenges that hinder progress. Table 14 shows U.S. expenditures on research and development (R&D) by source, measured in billions of current dollars. Over time, total R&D spending has risen substantially, from $76.2 billion in 1980 to $939.5 billion in 2023. While growth was especially strong between 1990 and 2000 (69% increase), and again between 2010 and 2020 (66% increase), the recent decade has shown sustained momentum, driven largely by industry and university investments.

Table 17. U.S. Expenditures on R&D, Total by Source (in Billions of Current Dollars)

Year	Federal	Industry	Colleges & Universities	Nonprofits	FFRDCs	Nonfederal Government	Total
1980	$11.9	$43.2	$6.5	$1.7	$12.9	n/a	**$76.2**
1990	$23.5	$107.4	$16.9	$4.1	$16.6	n/a	**$168.5**
2000	$28.5	$200.0	$29.9	$9.6	$16.0	n/a	**$284.0**
2010	$50.8	$279.0	$58.1	$18.0	$24.8	n/a	**$430.7**
2019	$62.8	$498.2	$78.1	$25.5	n/a	$0.7	**$665.3**
2020	$65.1	$543.2	$80.8	$26.7	n/a	$0.7	**$716.5**
2021	$66.7	$608.6	$85.7	$27.0	n/a	$0.7	**$788.7**
2022	$71.5	$697.3	$94.3	$28.1	n/a	$0.7	**$891.9**
2023	$73.6	$735.0	$102.0	$28.2	n/a	$0.7	**$939.5**

Sources: National Science Foundation, National Center for Science and Engineering Statistics (NSF/NCSES)

*FFRDC expenditures are calculated as part of federal expenditures beginning in 2013

*Nonfederal Government expenditures not listed before 2013

Research and development can be broken down into three categories: development, basic research, and applied research. Basic research, often referred to as pure research, serves as the foundation for expanding the stock of knowledge without immediate practical application. In contrast, applied research, as defined by the National Science Foundation, is a systematic study to gain knowledge aimed at meeting a specific, recognized need. Development involves refining and applying research findings to generate new products or processes. According to the NSF's most recent National Patterns of R&D Resources, industry continues to dominate overall R&D activity, conducting 78 percent of total U.S. R&D expenditures in 2023 (National Center for Science and Engineering Statistics, 2024).

However, when it comes to basic research, industry performed only about 33% of the total, while colleges and universities remain the largest contributors, performing approximately 46% of all basic research in the year 2023 (National Center for Science and Engineering Statistics, 2024). This distinction is important: although basic and applied research may appear separate, in practice, the boundary between them is often blurred. Many applied innovations are grounded in prior basic research discoveries. Understanding how these categories of R&D are interconnected is essential for evaluating the long-term value of basic research. Table 15 illustrates U.S. expenditures on basic research by performer, showing that total spending reached nearly $139 billion in 2023, up from just $8.7 billion in 1980.

Table 18. U.S. Expenditures on Basic Research, Total by Performer

(in Billions of Current Dollars)

Year	Federal	Industry	Colleges and Universities	Nonprofits	FFRDCs	Nonfederal Government	Total
1980	$1.2	$1.2	$4.3	$0.7	$1.3	N/A	**$8.7**
1990	$2.3	$4.6	$11.1	$1.9	$3.0	N/A	**$23.0**
2000	$3.8	$7.0	$22.3	$4.9	$4.0	N/A	**$42.0**
2010	$5.1	$16.4	$38.8	$9.5	$6.7	N/A	**$76.4**
2019	$12.0	$32.6	$49.3	$10.9	N/A	$0.1	**$104.9**
2020	$12.2	$36.4	$50.8	$12.2	N/A	$0.1	**$111.6**
2021	$11.7	$40.8	$54.1	$12.0	N/A	$0.1	**$118.7**
2022	$13.2	$43.4	$59.7	$13.9	N/A	$0.1	**$130.3**
2023	$14.0	$45.7	$64.5	$14.0	N/A	$0.1	**$138.4**

Sources: National Science Foundation, National Center for Science and Engineering Statistics (NSF/NCSES)

*FFRDC expenditures are calculated as part of federal expenditures beginning in 2013

*Nonfederal Government expenditures not listed before 2013

Appendix B- IMPLAN Model

For state and local economic impact portion of this study, the FSU Center for Economic Forecasting and Analysis (CEFA) staff used the state of Florida Impact Analysis for Planning, or IMPLAN, model. The IMPLAN model is used extensively by government agencies to measure proposed legislative and other program and policy economic impacts across the private and public sectors. In addition, it is the tool of choice to measure these impacts by a number of universities and private research groups that evaluate economic impacts across the state and nation. There are several advantages to using these models:

- They are calibrated to local conditions using a relatively large amount of local county level and state of Florida specific data;
- They are based on a strong theoretical foundation; and
- They use a well-researched and accepted applied economics impact assessment methodology supported by many years of use across all regions of the U.S.

The IMPLAN model used for this analysis was specifically developed for the state and counties of Florida. IMPLAN's principal advantage is that it may be used to forecast direct, indirect and induced economic effects for an initial economic stimulus, in this case MagLab spending.

References

Adedoyin, F. F., Alola, A. A., & Bekun, F. V. (2020). An assessment of environmental sustainability corridor: The role of economic expansion and research and development in EU countries. *The Science of the Total Environment*, *713*, 136726. https://doi.org/10.1016/j.scitotenv.2020.136726

Ardito, L., & Svensson, R. (2024). Sourcing applied and basic knowledge for innovation and commercialization success. *The Journal of Technology Transfer, 49*(3), 959–995. https://doi.org/10.1007/s10961-023-10011-3

AUTM. (2022). *2022 Licensing Survey*. https://autm.net/surveys-and-tools/surveys/licensing-survey/2022-licensing-survey

Beacon Economics. (2021). *The University of California Systemwide Economic, Fiscal, and Social Impact Analysis*. https://www.universityofcalifornia.edu/sites/default/files/economic-impact-report-2021.pdf

Bianchini, S., Llerena, P., & Patsali, S. (2019). Demand-pull innovation in science: Empirical evidence from a research university's suppliers. *Research Policy, 48*(100005). https://doi.org/10.1016/j.repolx.2019.100005

Bramwell, A., & Wolfe, D. A. (2008). Universities and regional economic development: The entrepreneurial University of Waterloo. *Research Policy, 37*(8), 1175–1187. https://doi.org/10.1016/j.respol.2008.04.016

Breugelmans, J. G., Roberge, G., Tippett, C., Durning, M., Struck, D. B., & Makanga, M. M. (2018). Scientific impact increases when researchers publish in open access and international collaboration: A bibliometric analysis on poverty-related disease papers. *PloS One*, *13*(9), 1-20. https://doi.org/10.1371/journal.pone.0203156

CEFA. (2005). *The National High Magnetic Field Laboratory (NHMFL) and Its Forecasted Impact on the Florida Economy.*

City of Tallahassee. (2024). *CITY OF TALLAHASSEE 2024 TEN YEAR SITE PLAN ELECTRICAL GENERATING FACILITIES AND ASSOCIATED TRANSMISSION LINES*. City of Tallahassee Utilities. https://www.talgov.com/Uploads/Public/Documents/you/tysp_cotu.pdf

Coyne, K. (2022, December 19). *Mapping the Brain's Weird Web of Waste*. National MagLab. https://nationalmaglab.org/news-events/feature-stories/mapping-the-brain-s-weird-web-of-waste/

Coyne, K. (2023, February 6). *With mini magnet, National MagLab creates world-record magnetic field*. National MagLab. https://nationalmaglab.org/news-events/news/lbc-project-world-record-magnetic-field/

Dietrich, T. (2023, February 23). *MagLab makes magic with magnets*. National Science Foundation. https://new.nsf.gov/science-matters/maglab-makes-magic-magnets

Dobson, B. (2017, October 4). *Florida State receives record funding from NIH; MagLab scores big on new center*. Tallahassee Democrat. https://www.tallahassee.com/story/news/2017/10/04/florida-states-receives-record-funding-nih-maglab-scores-big-new-center/732649001/

Economic and Planning Systems. (2021). *A Study of the Economic Impact of Lawrence Berkeley National Laboratory*. https://newscenter.lbl.gov/wp-content/uploads/2021/03/191079_LBNL-Final-Report_02-08-2021.pdf

ElSabry, E. (2017). Who needs access to research? Exploring the societal impact of open access. *Revue Française Des Sciences de l'information et de La Communication*, *11*. https://doi.org/10.4000/rfsic.3271

Fabrizi, A., Guarini, G., & Meliciani, V. (2024). The impact of environmental research networks on green exports: An analysis of a sample of European countries. *Structural Change and Economic Dynamics*, *69*, 143–154. https://doi.org/10.1016/j.strueco.2023.11.017

Frenken, K., Ponds, R., & Van Oort, F. (2010). The citation impact of research collaboration in science-based industries: A spatial-institutional analysis. *Papers in Regional Science*, *89*(2), 351–372. https://doi.org/10.1111/j.1435-5957.2010.00309.x

García-Romero, A., Escribano, Á., & Tribó, J. A. (2017). The impact of health research on length of stay in Spanish public hospitals. *Research Policy*, *46*(3), 591–604. https://doi.org/10.1016/j.respol.2017.01.006

Geng, H., Wu, Y., & Shi, X. (2022). International Collaboration and Research Organization Performance: Evidence from China. *Asian Economic Papers*, *21*(3), 60–77. https://doi.org/10.1162/asep_a_00856

Goldschlag, N., Lane, J., Weinberg, B. A., & Zolas, N. (2018). Proximity and economic activity: An analysis of vendor-university transactions. *Journal of Regional Science, 59*(1), 163–182. https://doi.org/10.1111/jors.12397

Greenhalgh, T., & Fahy, N. (2015). Research impact in the community-based health sciences: an analysis of 162 case studies from the 2014 UK Research Excellence Framework. *BMC Medicine*, *13*(1), 232–232. https://doi.org/10.1186/s12916-015-0467-4

Guerrero Bote, V. P., Olmeda-Gómez, C., & de Moya-Anegón, F. (2013). Quantifying the benefits of international scientific collaboration. *Journal of the American Society for Information Science and Technology*, *64*(2), 392–404. https://doi.org/10.1002/asi.22754

Guerrero, M., Cunningham, J. A., & Urbano, D. (2015). Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. *Research Policy, 44*(3), 748–764. https://doi.org/10.1016/j.respol.2014.10.008

Guerrero, M., Urbano, D., & Fayolle, A. (2016). Entrepreneurial activity and regional competitiveness: Evidence from European entrepreneurial universities. *The Journal of Technology Transfer, 41*(1), 105–131. https://doi.org/10.1007/s10961-014-9377-4

Hailemariam, A., Ivanovski, K., & Dzhumashev, R. (2022). Does R&D investment in renewable energy technologies reduce greenhouse gas emissions? *Applied Energy*, *327*, 120056. https://doi.org/10.1016/j.apenergy.2022.120056

Hanna, C. R., Boyd, K. A., & Jones, R. J. (2021). Evaluating cancer research impact: lessons and examples from existing reviews on approaches to research impact assessment. *Health Research Policy and Systems*, *19*(1), 36. https://doi.org/10.1186/s12961-020-00658-x

Hanna, C. R., Gatting, L. P., Boyd, K. A., Robb, K. A., & Jones, R. J. (2020). Evidencing the impact of cancer trials: insights from the 2014 UK Research Excellence Framework. *Current Controlled Trials in Cardiovascular Medicine*, *21*(1), 486. https://doi.org/10.1186/s13063-020-04425-9

Harrington, J., Awad, B., & Glassner, D. (2009). *Dollars and Sense: The National High Magnetic Field Laboratory and its Forecasted Impact on the Florida Economy*. Center for Economic Forecasting and Analysis. https://cefa.fsu.edu/sites/g/files/imported/storage/original/application/610011814ec8905b8a08d918af295be0.pdf

Harrington, J., Court, C.D., Hodges, A.W., & Whitney, S. (2021). *Economic Contributions of the State University System of Florida in 2019-2020*. https://cefa.fsu.edu/sites/g/files/upcbnu1851/files/FSUS%20Final%20Report%206-30-2021%20Clean.pdf

Harrington, J., Feng, S., & Niekus, Martijin. (2019). *Economic Impact Analysis of the National High Magnetic Field Laboratory*. Center for Economic Forecasting and Analysis.

Harrington, J., Mellone, W., & Glassnear, D. (2014). *The Economic Impact of the National High Magnetic Field Laboratory (NHMFL or "Maglab").* Center for Economic Forecasting and Analysis. https://cefa.fsu.edu/sites/g/files/upcbnu1851/files/141212%20MagLab%2020%20Year%20Economic%20Impact%20Report%20FINAL.pdf

Haughney, K. (2019, June 12). *National MagLab creates world-record magnetic field with small, compact coil*. Florida State University News. https://news.fsu.edu/news/science-technology/2019/06/12/national-maglab-creates-world-record-magnetic-field-with-small-compact-coil/

Haughney, K. (2023, June 28). *NIH invests $5.3M in MagLab biomedical advances*. Florida State University News. https://news.fsu.edu/news/university-news/2023/06/28/nih-invests-5m-in-maglab-biomedical-advances/

Schultz, E. (2024). *Helium Recovery Bags - MagLab*. Nationalmaglab.org. https://nationalmaglab.org/about-the-maglab/around-the-lab/what-is-that/helium-recovery-bag/
https://doi.org/10.12688/f1000research.8460.1

Lynch, T., & Harrington, J. (2003). *Summary of FSU National High Magnetic Field Laboratory Users Survey and Economic Impact Study*. Center for Economic Forecasting and Analysis.

MagLab, N. (n.d.). *National MagLab*. YouTube. Retrieved January 25, 2025, from https://www.youtube.com/channel/UCqkM2MNmBwg7_fnnNeMYisA

Martin, B., & Tang, P. (2006). *The Benefits from Publicly Funded Research*. Science and Technology Policy Research. https://www.researchgate.net/profile/Ben-Martin-8/publication/24132170_The_benefits_from_publicly_funded_research/links/58809b5ea6fdcc77e113a638/The-benefits-from-publicly-funded-research.pdf

Mirnezami, S. R., & Beaudry, C. (2022). Does Experiencing International Research Collaboration Permanently Affect the Impact of Scientific Production? Evidence from Africa. *Journal of African Economies*, *31*(3), 251–271. https://doi.org/10.1093/jae/ejab008

Moscone, F., Tosetti, E., Costantini, M., & Ali, M. (2013). The impact of scientific research on health care: Evidence from the OECD countries. *Economic Modelling*, *32*, 325–332. https://doi.org/10.1016/j.econmod.2013.01.012

National Center for Science and Engineering Statistics. (2024). *National patterns of R&D resources: 2021–22 data update* (NSF 25-327). National Science Foundation. https://ncses.nsf.gov/pubs/nsf25327

National High Magnetic Field Laboratory. (2020). *NationalMagLab*. Instagram. https://www.instagram.com/nationalmaglab/

National High Magnetic Field Laboratory. (2023). *National MagLab At A Glance 2023*. https://nationalmaglab.org/media/ulcmsqs1/areport-2023-ataglance.pdf

National High Magnetic Field Laboratory. (2024a). *Awards - MagLab*. https://nationalmaglab.org/about-the-maglab/facts-figures/awards/

National High Magnetic Field Laboratory. (2024b). *By The Numbers - MagLab.* https://nationalmaglab.org/about-the-maglab/facts-figures/by-the-numbers/

National High Magnetic Field Laboratory. (2024c). *Collaborations - MagLab*. https://nationalmaglab.org/magnet-development/magnet-science-technology/collaborations

National High Magnetic Field Laboratory. (2024d). *Publications - MagLab*. https://nationalmaglab.org/research/publications/

National High Magnetic Field Laboratory. (n.d.). *NationalMagLab*. X (Formerly Twitter). https://x.com/NationalMagLab

National MagLab. (2024, August 11). *Economic Impact*.

National MagLab. (2024, July 19). *At A Glance 2023*. https://nationalmaglab.org/media/ulcmsqs1/areport-2023-ataglance.pdf

New Agreement to Bolster Industry Partnerships - MagLab. (2021). National High Magnetic Field Laboratory. https://nationalmaglab.org/news-events/news/new-agreement-to-bolster-industry-partnerships/

Office of Economic Vitality. (2022, August 10). *Magnetic Task Force*. https://oevforbusiness.org/about/initiatives/magnetic-task-force/

Patsali, S. (2024). University procurement-led innovation: Sources, procedures, and effects. Some field-study evidence. *Technovation, 130*(102901). https://doi.org/10.1016/j.technovation.2023.102901

Peeters, H., Callaert, J., & Van Looy, B. (2020). Do firms profit from involving academics when developing technology? *The Journal of Technology Transfer, 45*(2), 494–521. https://doi.org/10.1007/s10961-018-9709-x

Research Triangle Park. (2024). *RTP Economic Impact Study Executive Summary*. https://aurp.memberclicks.net/assets/PDFs/2024%20Economic%20Impact%20Study%20Executive%5B82%5D.pdf

Rounds Consulting Group. (2019). *2019 Economic Impact of the UA Tech Park*. https://aurp.memberclicks.net/assets/PDFs/UA%20Tech%20Park%20EconReport%20%208p5x11%20update%202023%20%286%29.pdf

Saha, S., Staudt, J., & Weinberg, B. (2017). *Estimating the Local Productivity Spillovers from Science*. Center for Economic Studies. https://www2.census.gov/ces/wp/2017/CES-WP-17-56.pdf

Schultz, E. (2023, June 23). *MagLab Tests a New Way to Look at the Lungs*. National MagLab. https://nationalmaglab.org/news-events/feature-stories/maglab-tests-a-new-way-to-look-at-the-lungs/

Seggie, S. (2021, October 24). *Understanding the entrepreneurial university*. ESSEC Business School. https://knowledge.essec.edu/en/society/understanding-entrepreneurial-university.html#:~:text=The%20notion%20of%20the%20entrepreneurial%20university%20has%20evolved,traditional%20goals%20of%20teaching%20and%20research%20(Etzkowitz,%201993)

Shao, X., Zhong, Y., Li, Y., & Altuntaş, M. (2021). Does environmental and renewable energy R&D help to achieve carbon neutrality target? A case of the US economy. *Journal of Environmental Management*, *296*, 113229. https://doi.org/10.1016/j.jenvman.2021.113229

Shu, H., Wang, Y., Umar, M., & Zhong, Y. (2023). Dynamics of renewable energy research, investment in EnvoTech and environmental quality in the context of G7 countries. *Energy Economics*, *120*, 106582. https://doi.org/10.1016/j.eneco.2023.106582

Tennant, J. P., Waldner, F., Jacques, D. C., Masuzzo, P., Collister, L. B., & Hartgerink, Chris. H. J. (2016). The academic, economic and societal impacts of Open Access: an evidence-based review. *F1000 Research*, *5*, 632.

University of South Florida. (2020). *Economic Impact.* https://issuu.com/usfucm2017/docs/ucm21028-economic_impact_report-2021

Urbano, D., & Guerrero, M. (2013). Entrepreneurial Universities: Socioeconomic Impacts of Academic Entrepreneurship in a European Region. *Economic Development Quarterly, 27*(1), 40–55. https://doi.org/10.1177/0891242412471973

Veritasium. (2023, March 14). *World's Strongest Magnet!* YouTube. https://www.youtube.com/watch?v=g0amdIcZt5I

Veugelers, R., Callaert, J., Song, X., & Van Looy, B. (2012). The participation of universities in technology development: Do creation and use coincide? An empirical investigation on the level of national innovation systems. *Economics of Innovation and New Technology, 21*(5–6), 445–472. https://doi.org/10.1080/10438599.2012.656527

VISIT FLORIDA. (n.d.). *Research*. https://www.visitflorida.org/resources/research/

Wynn, M. (2025, January 8). *Power Forward Speaker Series with Artificial Intelligence Futurist Zack Kass*. Office of Economic Vitality. https://oevforbusiness.org/tallahassee-leon-county-to-welcome-the-2025-motor-drive-systems-magnetics-mdsm-conference-in-february/