

# **Local Funding Initiative Example Form**

## Community Issue Performance Evaluation

1. State Agency:  
Florida State University

2. State Program (or Type of Program):  
Education & General

3. Project Title:  
National High Magnetic Field Laboratory, the "Magnet Lab"

4. Recipient name and address:  
Location county/counties: Leon

5. Is the recipient a governmental entity, a private non-profit entity, or a private for-profit entity:  
Governmental entity

6. <u>FUNDING:</u> FY 2012-13 Recurring General Revenue	FY 2012-13 Recurring Trust Funds	FY 2012-13 Recurring TOTAL FUNDS	GAA Specific Appropriation Number (ch. 2012-118, L.O.F.)
\$3.3 M	\$0	\$3.3 M	Ch. 2012-118

7. FY 2012-13 GAA proviso specifically associated with the project (if any):  
Not Applicable

8. Project Purpose/Description:

The National High Magnetic Field Lab (NHMFL) at Florida State University is the largest, most interdisciplinary and scientifically productive magnet lab in the world. Established by the National Science Foundation in 1990, the lab is a national resource open to both curious visitors and world-renowned scientists. Centralizing the country's greatest magnet-related tools, resources and expertise is not only efficient and cost-effective, but also encourages fruitful, collaborative research at the highest level. Every year, more than 1200 visiting scientists and engineers from across the world conduct experiments using our state-of-the-art equipment. Our magnets are far larger, far more powerful and far more complex than the everyday magnets most people are familiar with. Many were designed, developed and built by our magnet engineering and design team, widely recognized as the finest in the world. These magnets produce tremendous magnetic fields, prized by researchers who use them to study a wide range of materials and processes. Our most powerful magnets produce fields more than a million times stronger than the Earth's magnetic field. What happens in experiments under such conditions give scientists important insights that pave the way for advances in physics, biology, bioengineering, chemistry, geochemistry, biochemistry, materials science and engineering.

In fact, high magnetic fields play a critical role in developing new materials that affect nearly every modern technology. Electric lights, computers, motors, plastics, high-speed trains and MRI all came about after researchers learned more about materials and living structures through magnet-related research. The vast scope of work currently underway at the lab includes the study of new superconductors with the potential to

revolutionize how power is stored and delivered; a search for new medicines; and analysis of petroleum samples that could lead to better oil extraction.

The education mission of the laboratory is fully integrated into the lab's R&D activities. The MagLab's Center for Integrating Research and Learning (CIRL) reaches over 10,000 K-12 students and more than 200 teachers each year. In addition, at any point in time, the Magnet Lab has 35 undergraduates affiliated and engaged in science or R&D projects, for a total of 65 undergraduates in 2011.

Yearly appropriations are used for the most critical needs associated with the NHMFL's continued world leadership in the science conducted in the highest magnetic fields, the advancement of magnet-related technologies, and the expansion of educational opportunities in science and engineering.

**9. Number of years this project has received state funding:**

Project funded in 1991-92, 1992-93, and 1996-97

**10. Does this project align with the core missions of the agency or the program area in which it is funded?  
(Explain):**

Florida State University is one of leading research universities in the State of Florida. The mission of the Magnet Lab, as a broadly multi-disciplinary scientific institution, dovetails perfectly with the mission of FSU, namely education, research and service.

**11. Does the program meet a demonstrated need in the community that is not otherwise being met?  
(Explain):**

The MagLab meets the needs of the local community through increased efforts in the area of STEM education. In particular over 9000 students were reached through CIRL's classroom outreach representing students in 43 schools. In particular, over 70% of these visits were to Title I schools.

The MagLab provides STEM education to the community at large through its Science Café program where monthly scientific programs are given at a local venue. Staff also gives presentations to children and adults at local schools and libraries.

In addition, the MagLab conducts hands-on, extended study programs, including Middle School Mentorship (a semester long program where middle school students are paired with MagLab scientists), and summer camps that range in duration from 1 to 2 weeks. Research shows that extended programs like these help to increase young people's persistence in STEM careers. Our programs specifically target underrepresented groups in STEM including women and minorities. Of the 97 students that participated in our summer programs, 61% were young women and 42% were either African American, Hispanic, Asian, or Native American.

The MagLab also does a significant amount of education for undergraduates, reaching 68 in previous year, as well as graduate students. Furthermore, the MagLab provides service to the greater scientific community with a yearly Summer School for experimental condensed matter physics and a Winter Theory School, both of which cater to graduate students and early career scientists. This is in addition to the scientific user facilities that help the research efforts of over 1200 scientists in the prior year alone.

Finally the MagLab contributes to the economic well being of the local community. Over the next ten years, the MagLab will generate \$1.66 billion in goods and services and \$689 million in income in the State of Florida, creating more than 15,000 jobs. As an example, the MagLab's scientific visitors account for more than 5500

hotel room nights every year.

**12. What are the intended outcomes/impacts and benefits of the project?**

The intended outcomes, impacts and benefits of the project are:

- Promote magnet-related research to serve an interdisciplinary scientific user community spanning materials science, condensed matter physics, magnet technology, chemistry, and biology.
- Provide unique high-magnetic-field facilities through a competitive and transparent proposal review process.
- Advance magnet and magnet-related technology via high-risk, high-reward projects.
- Partner with universities, other national laboratories and industry to enhance national competitiveness in magnet and related technologies.
- Serve the NSF as a prominent example of its successful stewardship of large research facilities.
- Serve as a successful model as:
  1. *a multi-site national laboratory*
  2. *a collaboration among our three partner institutions: Florida State University (FSU), the University of Florida (UF) and Los Alamos National Laboratory (LANL)*
  3. *a partnership of the federal and state government*
  4. *a partnership of the National Science Foundation and the Department of Energy*
- Support science and technology education in the United States.
- Increase diversity in the science, technology, engineering and mathematics workforce of today and tomorrow.

**13. What performance data does the agency/entity regularly collect and report that demonstrates the value of the program to the State of Florida?**

Output data (e.g., number of clients served, students educated, units produced); Enumerate:

The number of users: 1,299 in 2011;

The number of "magnet days" awarded to users: 11,041 in 2011;

The number of peer-reviewed publications produced: 341 in 2011;

The number of Ph.D.s earned by MagLab users and associates: 69 in 2011;

The number of new principal investigators each year (indicating growth of user community): 81 in 2011;

Outreach to K-12 students: 10,000 per year;

Outreach to K-12 teachers: over 200 per year.

Outcome data (data on the effectiveness or quality of services, e.g., percentage of clients successfully completing treatment); Enumerate:

The Magnet Lab conducts an annual survey of users;

The MagLab collects post-visit feedback from users;

The MagLab surveys students and teachers participating in educational programs of the laboratory and surveys participants in Winter Theory School and Users Summer School

Unit cost data (e.g., cost per unit produced); Enumerate: n/a

Other (Explain):

The MagLab publishes an *Annual Report* that showcases the programs and activities at the MagLab and includes the metrics used by MagLab management, the MagLab External Advisory Committee, the MagLab User Committee and the NSF Site Visit committees to evaluate the MagLab's performance. Each *Annual Report* includes:

- The Year in Review, written by the Director
- Science & Engineering Highlights

- Reports and statistics from the lab's user facilities
- Summaries from the magnet engineering and materials groups
- Summaries of management, administration, education, and diversity programs
- Results of the User Collaboration Grants Program
- Summaries of MagLab industrial partnerships and collaborations
- Lists of publications, presentations, theses and other activities

The MagLab receives expert evaluation of its scientific program by other scientists, including but not limited to reports by the MagLab External Advisory Committee, the MagLab User Committee and the NSF Site Visit Committees. Numerical metrics that characterize the MagLab's performance are reported in the *Annual Report* including:

- MagLab User Committee's survey of user satisfaction with:
  - Equipment availability
  - Equipment performance
  - MagLab scientist assistance
  - MagLab administrative assistance
  - MagLab training and safety procedures
  - MagLab user proposal submission and evaluation process
  - MagLab User Profile report containing the breakdown of the total number of MagLab users by:
    - Senior investigators, postdocs, students and technicians
    - Gender and minority status
    - Affiliation of users: NHMFL, university, industry, national lab, or overseas.
    - Facility utilized: DC, Pulsed, High B/T, NMR/MRI, EMR and ICR.

MagLab Facility Usage Profile report containing the breakdown of magnet days allocated by scientific discipline, affiliation of users, and facility utilized.

- User Collaboration Grants Program (UCGP) report, including:
  - Number of proposals received
  - Proposal acceptance rates
  - Usage of facility enhancements reported from UCGP solicitations
  - Publications reported from UCGP solicitations
  - Education Program report that includes the number of participants in:
    - Research Experiences for Teachers
    - Research Experiences for Undergraduates
    - Middle School Mentorships
    - High School Mentorships
    - MagLab classroom outreach and laboratory tours.
  - Science and Research Productivity statistics, including:
    - Publications in Peer-Reviewed Journals
    - Publications in Prominent Peer-Reviewed Journals, such as Nature, Science, the Proceedings of the National Academy of Sciences, and prominent, discipline-specific journals such as Physical Review Letters and Journal of the American Chemical Society.
    - Ph.D. degrees awarded
    - Masters' degrees awarded

Annual Reports are posted on the MagLab website, [www.magnet.fsu.edu](http://www.magnet.fsu.edu) at <http://www.magnet.fsu.edu/mediacenter/publications/annualreport.aspx>.

Note that all data is collected on a yearly basis. Our most recent year with complete data is 2011 and that is what is presented above. 2012 data is currently being collected. Please note that the special allocation from the state only started in July of 2012 and therefore the full measure of its impact will be better seen in future years.

14. How is program data collected and has it been independently validated for accuracy and completeness?  
User data, publications and educational statistics are collected through a variety of online systems. The Magnet Lab is reviewed annually by the independent NHMFL Users Committee, the NHMFL External Advisory Committee, and National Science Foundation. The R&D activities of the Magnet Science & Technology Division are managed via project management tools (GANNT charts, Work Breakdown Structure, formal Project Summary reports, etc.) that undergo formal internal and external, independent reviews.

15. Is there an executed contract between the agency and the recipient?  
The NHMFL is a department within the operating structure of Florida State University. Because the NHMFL is a three-site institution with user facilities at the University of Florida in Gainesville and Los Alamos National Laboratory, there is a Memorandum of Understanding that governs the relationship among these three institutions and the NHMFL. In addition, there is an executed cooperative agreement between FSU NHMFL and the National Science Foundation (NSF).

16. If there is a contract, are the outputs, measures and costs specified in a contract between the agency and the recipient?  
The MOU governs the outputs and measures. Costs and budgets are decided on annually based upon scientific and educational needs. The cooperative agreement between the FSU NHMFL and the NSF specifies the level of funding annually and includes a defined scope of work.

17. How do the unit costs compare to those of comparable or alternative projects or services? (EXPLAIN AND SPECIFY): The NHMFL is unique in the world, both in research and technology.

18. Based on performance data, is this project meeting the expected outputs and having the intended outcomes? (Explain):  
The NHMFL is having all the desired outcomes as indicated in positive reports from all of its External Advisory and User Committees. EAC report detailed the positive performance of all of the facilities of the departments of the NHMFL and gave recommendations for improvements. The User Committee also provided a positive report with specific recommendations for areas that the NHMFL should concentrate its effort for maximum scientific output in coming years. In addition, during most years the NSF sends a site visit team to the NHMFL to inspect and judge its performance. The site visit reports have been overwhelmingly positive.

The strongest indicator of the laboratory *exceeding* expectations is the July 2012, five-year renewal of the laboratory by its primary funding agency, the National Science Foundation. The award of \$168M over five years, at a time of very significant budgetary constraints, validates the beneficial and lasting partnership between the NSF, the State of Florida, the Department of Energy, and the three partner institutions -- FSU, University of Florida, and Los Alamos National Laboratory. The award followed 18 months of proposal preparation; an extensive external written question and answer period; a rigorous site visit by an external panel of experts selected by the NSF; an NSF recommendation for funding to the National Science Board, and the approval of funding by the NSB.

19. Describe how the information upon which the answer above is based was obtained and validated:

The External Advisory Committee and the User Committee have yearly meetings at the NHMFL where these experts assess the performance of the NHMFL. These committees submit a written report that details their findings. In addition, during most years, the NSF sends a site visit team to the NHMFL to review its facility and recommend future funding.

20. How much additional funding or matching funding from non-state sources is available for this project and what are the sources?

The MagLab has a yearly budget of \$30.6M from the National Science Foundation, roughly \$8.9M in other funding from the State of Florida from FSU and roughly \$5M in other grants from a variety of other funding sources including the US Department of Energy, National Science Foundation, National Institutes of Health, etc.

21. List any audits or evaluative reports that have been published for this project (including website links, if available):

The NHMFL Annual Reports are published online:

<http://www.magnet.fsu.edu/mediacenter/publications/annualreport.aspx>

The independent NHMFL Users Committee reports are published online:

<http://www.magnet.fsu.edu/usershub/userscommittee/index.html>.

The NHMFL External Advisory Committee reports is submitted to the President of FSU.

The NSF Site Visit report on the NHMFL is a confidential document of the National Science Foundation.

22. Provide any other information that can be used to evaluate the performance of this project:

The NHMFL provides significant economic stimulus to the State of Florida. A study provided by the Center for Economic Forecasting and Analysis found that for every dollar the state invests in the NHMFL from 2005 to 2015 it would realize a return on investment of \$5.50. This significant return is a conservative estimate of the real stimulus provided by the State's only national laboratory. In addition, while the report has focused primarily on the local community around the FSU site of the NHMFL, the University of Florida presence of the NHMFL provides significant educational and economic benefits to the University of Florida, Gainesville and Alachua County communities.

23. CONTACT INFORMATION for person completing this form:

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