NATIONAL HIGH MAGNETIC FIELD LABORATORY

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National High Magnetic Field Laboratory

User FAIR Data Management Plan

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We note that this plan will be routinely updated to reflect the most up-to-date guidance as work continues to establish data and metadata requirements, and as fields and available technologies evolve. The latest version of this plan can be found at: LIVE DMP

Plan Abstract

Publicly-funded research data should be preserved and freely available to maximize impacts of government resources and scientific discoveries. The National Science Foundation (NSF) is committed to clear and open dissemination of research results and has recommended that NSF-funded research data and metadata should strive to align with FAIR (Findability, Accessibility, Interoperability, and Reuse) guiding principles [1].

The National High Magnetic Field Laboratory (National MagLab) is supported by the NSF, and provides seven high magnetic field user facilities (AMRIS, DC Field, EMR, High B/T, ICR, NMR and Pulsed Field facilities) across the three campuses at Florida State University, the University of Florida, and Los Alamos National Laboratory. Each user facility is built around unique, world-leading magnetic-field capabilities and scientific expertise, and serves a multi-/inter-disciplinary scientific research community comprised of thousands of domestic and international users. Given the innate potential value of data produced, products of research conducted at any of the MagLab's seven user facilities should be made broadly available to the scientific community and general public.

The MagLab prioritizes implementation of a data management plan (DMP) that supports our user community. The following sections detail the data management-related resources available to all MagLab users, including data and metadata preservation services, and outlines overarching procedures for managing data and the products of research associated with the MagLab. It is supplemented by facility-specific DMPs that offer additional details specific to the facility and practices of its user-community. Users are welcome to leverage (or reference) MagLab DMPs and resources in preparation of their own individual funding proposals.

The MagLab acknowledges that DMPs are living documents that must evolve based on user feedback, technological innovations, and guidance from research communities and funding agencies. The lab's policies will be reviewed and updated annually to ensure strong alignment with FAIR principles amidst a data management landscape in constant flux.

[1] http://www.go-fair.org/fair-principles

Products of the Research

Data from the MagLab's diverse user program consists primarily of electronic records of measurements taken during a scheduled experiment. Metadata and the products generated by research vary depending on facility, sample, and measurement technique. More detailed descriptions of products of research can be found in the facility-specific DMPs.

For the majority of experiments performed at the MagLab, sample preparation is performed offsite. In such cases, users are responsible for capturing and organizing metadata including descriptions of samples, protocols for their preparation, and relevant quantitative and qualitative information about the samples (e.g. experimental conditions, sample quantity and concentration, solvents/buffers, etc). Facility

personnel will assist users with the capture, storage, and organization of high-field experimental conditions, and data and metadata resulting from work taking place at the MagLab. This includes details of any further on-site sample processing performed by facility personnel on behalf of users prior to the performance of experiments, as well any products of research resulting from data analysis via facility data processing workflows.

Data Format

Data formats/media vary across user facilities, and depend upon the sample type, measurement technique, or data acquisition software utilized. Where appropriate, data, metadata, and other products of MagLab research that are stored in unusual or not generally accessible formats will be converted to the most accessible file formats to facilitate ease of use. If data cannot be converted to accessible formats, software necessary for data visualization/interpretation will be made publicly available to support users and independent investigators. Additional details can be found in facility DMPs.

Data Sharing & Access Policies

As a user facility, the MagLab acknowledges that the Principal Investigator (PI) of each experiment is the steward of the research data. As such, the PI will select the vehicle(s) for publication or presentation of products of research, and ultimate authority in their initial use. Where applicable, it is the responsibility of the PI to ensure protection of privacy, confidentiality, intellectual property, national security, or other rights or requirements.

Additionally, the PI is expected to comply with all public access requirements that are laid out by the funding agencies sponsoring the research. The NSF Public Access Policy [2] requires PIs who publish peer-reviewed journal articles or juried conference papers to make copies of such items (either the final accepted version, or the version of record) available to the public free of charge within one year of publication [2]. The NSF Public Access Repository (NSF-PAR), provides mechanisms that enable NSF-supported investigators to meet this requirement, and provides search mechanisms to enable to the public to find and use these materials [3, 4].

[2] https://www.nsf.gov/news/special_reports/public_access/index.jsp

[3] https://www.nsf.gov/news/special_reports/public_access/about_repository.jsp

[4] https://www.research.gov/common/attachment/Desktop/NSF-PAR_Getting_Started_Guide.pdf

Data Sharing

Prior to publication, access to experiment data will be granted only to individuals designated as project collaborators by the PI, and registered in the MagLab User System. Requests from other interested parties will be directed to the PI. MagLab facility personnel may access or share data internally to gauge instrument performance, meet NSF reporting requirements, or for preservation/archival purposes.

The MagLab is exploring the use of project management tools, such as the Open Science Framework (OSF), to serve as a project management and data sharing platform between MagLab facilities and external users. At this time, users are encouraged to use the OSF to share data, but it is not required. The PI can send/receive and share materials and data as they deem appropriate through their preferred electronic delivery mechanisms in consultation with MagLab facility staff.

Access to Data

To balance the need to make data openly available to the community with user expectations that they will be able to publish results of their scientific efforts without fear of preemption:

- ☐ All data and associated metadata for an approved user project are expected to be made available via public databases or repositories at the time of publication, or after a three year embargo period.

- If a resulting publication or patent application is under review at the end of the embargo period, a reasonable delay is acceptable.

☐ Repository, DOI, and other relevant accession information must be included in publications, or reported to facility personnel at the time data is made publicly available.

Some data are not required to be made publicly available, and are exempt from public access requirements. These are data that will not form the basis of a publishable research finding nor are associated with a user project, including:

☐ Data from experiments known to be faulty in some regard, e.g. through mishap or due to a flawed experimental design,

☐ Data from preliminary tests of sample quality/integrity, or standards/calibration experiments for which results are not needed to interpret legitimate project data,

☐ Data generated to verify successful operation of an instrument or demonstrate a capability.

Users should consult with MagLab facility staff if they have questions about their data and its suitability for public consumption. Products of proprietary research, not funded by the NSF are exempt from these data access requirements.

FAIR guidelines stipulate that data and metadata should be submitted to a discipline-specific, community-recognized, public data repository. If no such repository exists, a generalist public repository should be used. The journal, *Scientific Data* (Springer Nature), recommends several generalist repositories [4], among which the MagLab recommends the OSF. The OSF supports the ability to embargo data and metadata in accordance with the policies outlined above. While embargoed, all submitted materials or datasets are given their own unique, persistent URLs. DOIs can be generated when projects or selected components are made public. These may be cited and accessed by the public, and are indexed in Google Scholar. The OSF is a flexible alternative to some field-specific repositories to efficiently, and wholly disseminate all data and metadata related to complex, large-scale projects spanning multiple disciplines. To learn more about the Open Science Framework, go to https://osf.io/.

The PI is expected to utilize an appropriate repository; entry, DOI, and other relevant accession information must be submitted to the MagLab Publication System at the time of publication. Finally, any products of research deposited and accessed from public data repositories should include an acknowledgement as outlined in the “Policies for Re-use, Re-distribution, and Production of Derivatives” section, below. Data that is submitted to repositories is made available per the terms, conditions, and licenses adopted by the repository.

[4] https://www.nature.com/sdata/policies/repositories#general

Policies for Re-Use, Re-Distribution, and Production of Derivatives

Any publications or presentations that utilize MagLab data, results, software, or other resources must properly cite relevant literature, or acknowledge the researchers who generated the samples, data, results, technology, software, or other materials and include relevant DOIs wherever possible.

In addition, all published manuscripts, datasets, and presentations must acknowledge the MagLab, the MagLab’s NSF grant number and the State of Florida. For example:

A portion of this work was performed at the National High Magnetic Field Laboratory, which is supported by the National Science Foundation Cooperative Agreement No. DMR-2128556 and the State of Florida.

or

The National High Magnetic Field Laboratory is supported by the National Science Foundation through NSF/DMR-2128556 and the State of Florida.

For data collected from 2012-2017, the appropriate grant number is DMR-1157490. For data collected from 2018-2022, the grant number is DMR-1644779. For data collected from 2023-2027, the grant number is DMR-2128556. Please include all grant numbers corresponding to the periods during which data were collected.

For the Pulsed Field Facility, the acknowledgement should also include the U.S. Department of Energy.

Archiving of Data

The MagLab provides data storage, backup, and archiving services for all user data collected on facility computers, and copies of data provided to facility personnel with approval of the PI. Users that generate or capture MagLab facility data on hardware not owned by the MagLab, and who decline to provide copies to facility personnel must describe their plans to archive the data by completing the User FAIR Data Management Form during the proposal submission process.

Available physical and cyber resources for data storage and preservation depend on the location of the facility (FSU, UF, or LANL). Additional details can be found in facility DMPs. Archived data will be retained indefinitely, and will only be made available to individuals at the request of the PI. This retention policy is reviewed annually and may be revised at the request of our user community, or in response to the continually evolving capabilities and reduction in costs of data storage.