

Data 27/03/2023

## LNL Data Management Plan

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### Subject

Data Management Plan for research activities making use of ion beams delivered by the LNL accelerators.

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## 1 INTRODUCTION

The LNL Data Management Plan (DMP) concerns all research data collected in experiments performed by using ion beams delivered by the LNL accelerators and is ruled by two documents: the “LNL Data Policy” and the “LNL Data Management Plan”, the present document.

The aim of the DMP is to plan the life cycle of data. It offers a long-term perspective by outlining how data will be collected, documented, shared and preserved and describing the process rules, the management workflow, roles and responsibilities of involved parties.

Some definitions of terms are listed in the second section. The various scenarios for the use of the beams from the LNL accelerators are defined in the third section. Methods for storing and ensuring the long term durability of data are described in later sections.

## 2 DEFINITION OF TERMS

- EXPERIMENTAL ACCOUNT: Directory created by the **Information Technology Service** containing the data record for an experiment and therefore all the data linked to the experiment.
- DATA MANAGER: Person responsible for the data. Generally, the spokesperson of the experiment.
- DIGITAL OBJECT IDENTIFIER (DOI): Unique, long-term identifier allowing the identification of a data record. This identifier will be created by LNL by using the DataCite platform.
- EMBARGO PERIOD: Period during which the data are available only to the experimental team. Beyond that period the data must be open to the widest audience.
- RAW DATA: all kinds of data collected by experiments carried out by using ion beams delivered by LNL accelerators.
- METADATA: all information necessary to manage and perform the analysis of the raw data, including (but not limited to) the context of the experiment, the experimental team, the experimental conditions, the data format, the logbook, software packages, etc.
- SPOKESPERSON: person responsible for the experiment, identified on the scientific proposal submitted to the LNL Program Advisory Committee, and for the data management collected during the experiment.

- EXPERIMENTAL TEAM: experimental group which includes the spokesperson and any other person to whom the spokesperson designates the right to access resultant raw data and associated metadata.
- OPEN ACCESS: data accessible, upon request, by the community at large, and protected by open license.

### 3 DATA ACQUISITION AND STORAGE

Legnaro National Laboratories (LNL) are engaged in research activities, making use of ion beams, mainly addressed to nuclear physics, nuclear astrophysics, development of innovative detectors, material science and applications of nuclear techniques. The various data management scenarios, depending on the different use of the beamtime, are listed below:

- Data achieved with LNL instrumentation and stored using local resources (Data acquisition system and servers for storage). Data and metadata will be stored for a temporary period (one year at maximum) on a local server. After that, data record will be transferred to the experimental account on a GRID site for long-term storage.
- Data achieved with LNL instrumentation which use a data acquisition and storage system that does not belong to LNL. However, data sharing and durability will be guaranteed by LNL by keeping a copy of the data generated which must be provided by the spokesperson of the experiment. Raw data and metadata will be stored in the experimental account on a GRID site for long-term storage.
- Data generated from instruments belonging to a collaboration which uses its data acquisition system and LNL servers for initial storage. This is typically the case of itinerant detectors such as AGATA, PARIS, FAZIA, etc. Data and metadata will be stored for a temporary period (one year at maximum) on a local server. After that, data record will be transferred to the experimental account on a GRID site for long-term storage.
- Data generated from instruments belonging to a collaboration with acquisition and servers outside LNL. The initial data storage does not use resources belonging to LNL. In this case as well, LNL will keep locally a copy of the data (provided by the spokesperson) as a guarantor of the data produced using LNL research infrastructures. Raw data and metadata will be stored in the experimental account on a GRID site for long-term storage.
- Data generated during commercial use of LNL research infrastructures belong to the client and will not be stored on local servers unless agreed otherwise.

The experimental team needs to ensure that experiment metadata be complete, as this will enhance the possibilities for everybody to search for, retrieve and interpret the data in the long term. Moreover, metadata from these experiments will probably be used to categorize experiments and data records accurately.

### 4 OWNERSHIP OF DATA

LNL is the owner and the custodian of the raw data (and associated metadata) produced by using its research infrastructures.

All raw data (and associated metadata) collected in experiments approved by the LNL Program Advisory Committee (excluding commercial use of LNL research infrastructures) will be open access after an initial embargo period during which access is restricted to the experimental team, represented by the spokesperson.

All raw data (and associated metadata) obtained as a result of proprietary research will be owned exclusively by the client who purchased the beamtime and is not covered by this DMP. Commercial users must agree with the facility management how they wish their raw data and metadata to be managed before the start of any experiment.

## 5 CURATION OF RAW DATA AND METADATA

Raw data and metadata will have read-only access for the duration of their lifetime. Raw data formats must be well documented in the metadata. All raw data and metadata will be organized in a well-defined structure which will be made available by LNL.

Only data with associated metadata will be archived. The spokesperson has the responsibility to provide the metadata (in electronic or pdf format) to the **Information Technology Service**.

Each experiment and data set will have a unique permanent identifier. Anybody publishing results based on open access data must quote the same identifier. **This Digital Object Identifier (DOI) will be created by LNL through the DataCite organization (<https://www.datacite.org/>).**

High level metadata such as Title, Authors, Abstract, will be made public as soon as possible using DataCite. This information will be available through the persistent identifier. Experiments details will be retrievable using <https://search.datacite.org/>.

**Raw data and metadata stored on the GRID site (long-term storage) will be deleted after a period of fifteen years since the experiment data taking.**

## 6 ACCESS TO RAW DATA AND METADATA

Access to raw data and the associated metadata obtained from an experiment is restricted to the experimental team for an embargo period of at least **five** years after the end of the experiment. Any spokesperson that wishes to retain restricted access to data for a period longer than **five** years will have this possibility to renew this **five** years period by submitting a written request, specifying the reasons for the proposed prolongation, to the LNL director who will accept or reject the request. In exceptional circumstances, data can be made openly accessible before the end of the embargo period if the spokesperson agrees. Thereafter, the data will become accessible upon request.

The spokesperson has the possibility to transfer parts or the totality of her/his rights during the embargo period to LNL or another registered person of the experimental team.

The spokesperson has the possibility to create and distribute copies of the raw data within the collaboration (without using LNL resources).

Data and associated metadata will be accessible through the persistent identifier.

Researchers who aim to carry out analyses of raw data and metadata which are openly accessible should, where possible, contact the original spokesperson and the Management Board of the collaboration to exploit the data and suggest a collaboration if required. Researchers must acknowledge the source of the data and cite its unique persistent identifier as well as any publications linked to the same raw data.

Authorized LNL staff (e.g. scientists, computing group members) have access to any curated data or metadata for facility related purposes. LNL will undertake that confidentiality of such data is preserved during the embargo period.

## 7 PUBLICATION INFORMATION

Publications related to data collected in experiments performed at LNL must cite the persistent identifier of the data.

Once known, the DOI of the publication has to be sent to the Information Technology Service ([calcolo@lnl.infn.it](mailto:calcolo@lnl.infn.it)) or the Scientific Secretary of the LNL Research Division ([sdr@lnl.infn.it](mailto:sdr@lnl.infn.it))

## 8 PERSONAL DATA

Personal information will be saved and archived by LNL. The surnames, first names and affiliations of the participants in the experiments are part of the metadata.