

HELPMI: the Helmholtz Laser-Plasma Metadata Initiative

Start developing a data standard for the global LPA community

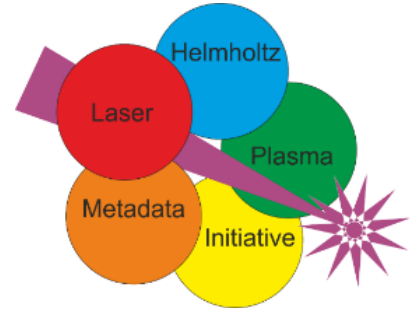
This project (ZT-I-PF-3-066) is funded by the Initiative and Networking Fund of the Helmholtz Association in the framework of the Helmholtz Metadata Collaboration project call.

Ultra-intense LASER-driven PLASMAS as particle ACCELERATORS

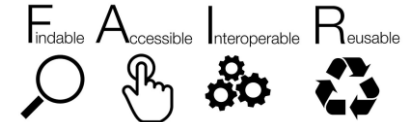
- 100s of labs around the world: university – national lab, often user operation

Who is behind HELPMI?

- GSI: Johannes Hornung, Udo Eisenbarth, Vincent Bagnoud
 - PHELIX laser @ heavy ion storage ring
- HI Jena: Alexander Kessler, Malte Kaluza
 - POLARIS and JETI200 lasers, main partner in LUXE @ Eu XFEL project
- HZDR: Franz Pöschel, Michael Bussmann, Alexander Debus, Hans-Peter Schlenvoigt
 - DRACO and PENELOPE lasers, RELAX laser @ Eu XFEL
- Project Observers: Axel Huebl (LBLN-US), Andreas Doepp (LMU), Rajeev Pattathil(STFC-UK), Birgit Plötzeneder, Lajos Schrettnr, Balázs Bagó (ELI pillars)



- Initiative: **start** the development of a data standard for LPA experiments
 - Consulting and assistance from HMC community
 - Concepts, tools, trends, best practices, lessons learned...



- Adopt NeXus standard** from PaN experimental community
 - Use existing base classes, possibly define new ones
 - Propose application definition

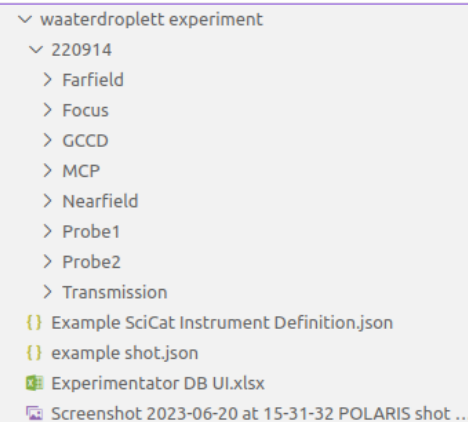


- Extend the openPMD standard** and API for arbitrary hierarchy
 - Currently established for simulations in LPA community
 - Fileformat-agnostic

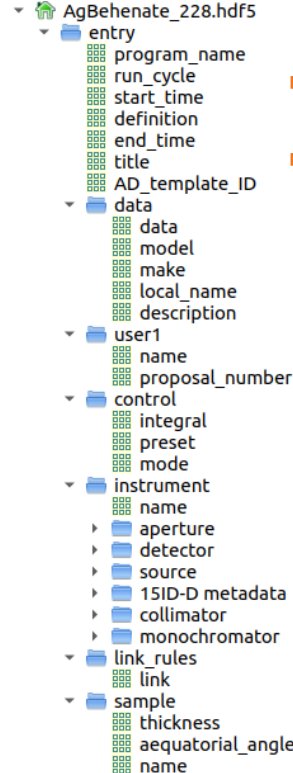
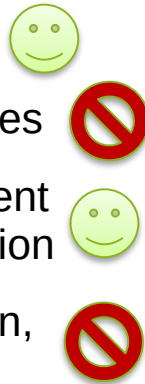
Generate a glossary:
Domain-specific terms

HELPMI: Working example

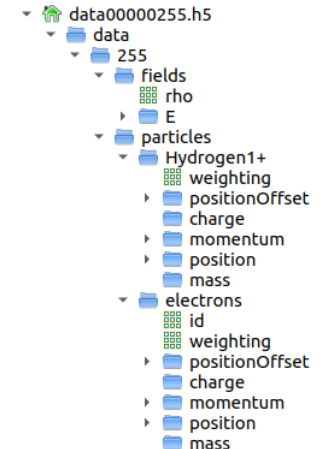
Example data chunk to perform our trials, and other examples



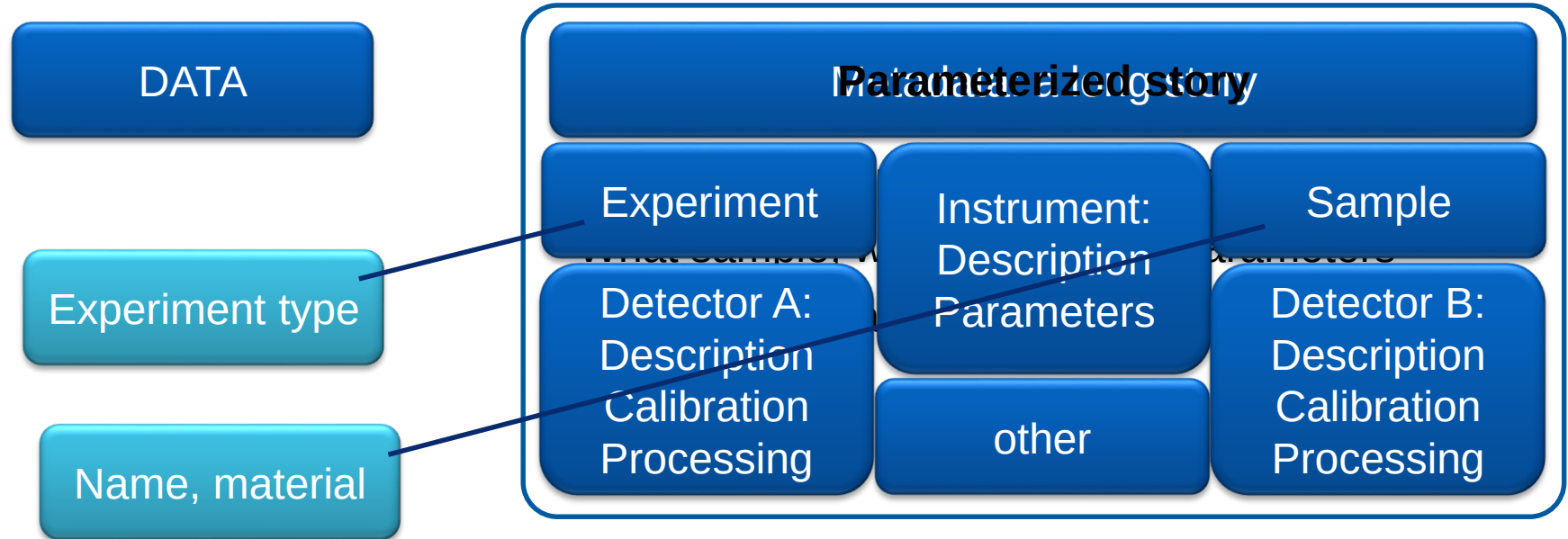
- Hierarchical structure
- Meta/Data in folder names
- Files containing instrument and experiment description
- Setup models, calibration, scripts



- Data fields with attributes
- Groups for logical gathering (hierarchy)
- Links for arbitrary layouts
- NeXus base classes encoded in attributes NX_class
- Named fields
 - partly by definition



Data-ization of metadata



Modelling of experiments

Level of complexity to be defined by community

Physics Model

- Quantities
- Relations
- Interactions
- Approximations
- Observables

Conceptual design model

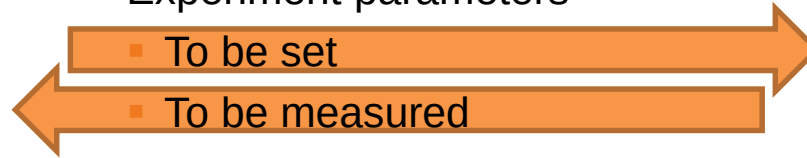
- Implementation-independent
- Experiment parameters
 - To be set
 - To be measured

Technical design model

- Implementation-specific
- How to be measured or set
 - e.g. accuracy

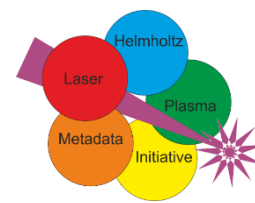
Experiment

- Type
- Instrument
- Sample
- Detectors



Community involvement

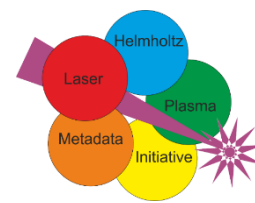
helpmi@hzdr.de



<HMC>

HELMHOLTZ
Metadata
Collaboration

- LPA: Presentations at NEILS meeting (April) and EAAC conference (September)
 - Throughout positive feedback
- Data management:
 - HELIPORT meeting: related for later FAIR data publication
 - HDF Usergroup meeting.
 - CoRDI conference: mentions in related presentation, contact to plasma-MDS
 - Dedictated submissions were declined
- Own workshop ahead: Nov 13/14 at GSI (also hybrid)
 - <https://indico.gsi.de/e/helpmi-workshop-2023>
 - Bring both communities together for deep discussions and maybe start working



- Contact us: helpmi@hzdr.de
 - Contribute: Workshop @ GSI Nov 13/14
 - <https://indico.gsi.de/e/helpmi-workshop-2023>
 - Some slides were inspired by
 - S. Brockhauser @ [FAIRmat Tutorial #6](#) on Metadata standardisation
 - B. Watts @ [HDF5 and Nexus](#)
 - This project (ZT-I-PF-3-066) was funded by the Initiative and Networking Fund of the Helmholtz Association in the framework of the Helmholtz Metadata Collaboration project call.
- ## Who is HELPMI?
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