From the Past To the Future:
Legacy Data in Small and Medium-Scale "PUNCH"-Experiments – a Blueprint for PUNCH and Other Disciplines

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for the PATOF Project

HMC Welcome Meeting, 04 April 2023

Who We Are

PATOF: Joint Project by HIM & DESY

WHO?

- Scientists from DESY and HI Mainz contribute in complementary ways.
- PATOF integrates diverse expertise: library, domain scientists, data management.
- Helmholtz & PUNCH scientists in unique position to address basic (infra)structural and cultural topics and to take leading steps towards a FAIR data management.

SCOPE?

- legacy data in small and medium-scale "PUNCH"-experiments
- PUNCH = **P**articles, **U**niverse, **N**u**C**lei & **H**adrons

Who We Are

PATOF: Joint Project by HIM & DESY

HIM
HELMHOLTZ
Helmholtz-Institut Mainz

- provides data from the **A4** and – in future – the **PRIMA** and **P2** nuclear physics experiments

DESY.

- currently commissioning/planning the **ALPS II** and **LUXE** experiments

Ensure their data's sustainability and FAIRness.
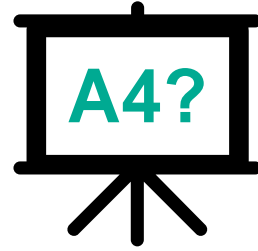
DESY. Library

- bundles experience from **PUNCH4NFDI** and **A4**
- meta-perspective to develop a **cookbook** of recommendations
- builds a generic **FAIR Metadata Factory**

Finalisation of A4 data & metadata exploitation

Work Package 1

Mainz A4 nucleon structure experiment

The remaining organisation of available research data and their collection in a modern storage system searchable for and accessible to authorised parties via a web interface.

Structuring and harvesting of existing logbooks including the relevant environmental and slow-control data into machine-readable form.

Definition and implementation of metadata based on the results from Work Package 3.

Preparation of the APPLe data & metadata exploitation

Work Package 2

APPLe

future experiments ALPS II, PRIMA, P2 and LUXE

Consider the experience from A4 and the recommendations from
the DESY library.

Define metadata schemas and ways to implement the FAIR principles at an early stage
in their planning, so that the FAIR Metadata Factory is ready to be used at an early state.

Metadata schemas & cookbooks

Work Package 3

Menu:

PUNCH use cases
- High energy particle physics
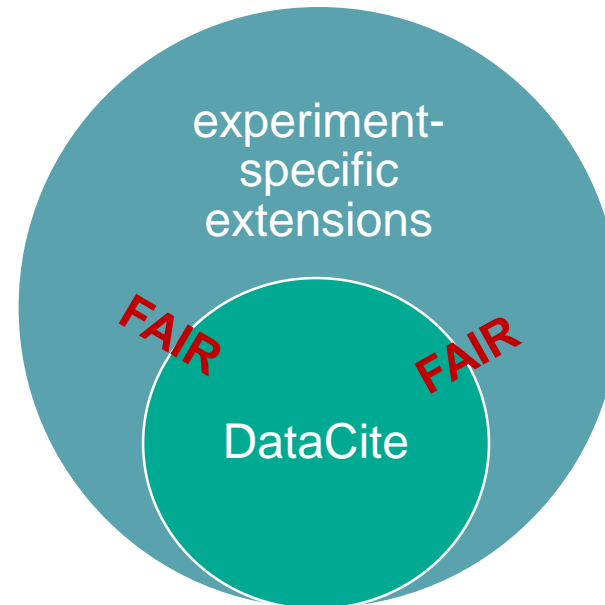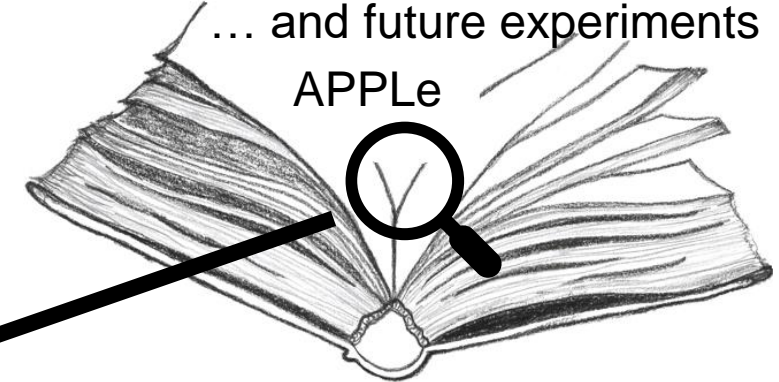- Astroparticle physics
- Lattice QCD
- …

A4

Metadata Factory

How to cook a metadata-dish:

experiment-specific extensions

FAIR   **FAIR**

DataCite

1) *Cookbook*

Recipes for metadata composition

- description, documentation, recommendation
- for PUNCH … and A4 … and future experiments APPLe

Adaptation for:
2) A4
3) future experiments APPLe

HMC & PATOF

Linkage to HMC and integration of the project's results

HMC and PATOF:

- diverse metadata schemas in PUNCH experiments
  - ⟫ HMC: document criteria and analysis steps required to generate such a metadata schema variant
- metadata mappings of PUNCH4NFDI serve as "dishes" of a menu of possibilities
  - ⟫ HMC focus is on the underlying recipes, bundled into a "cookbook"

Sustainability beyond project lifetime:

- e.g. Base4NFDI with next potential step: Conceptual elaboration of the cookbook, consisting of abstractions of the individual experiment-specific documentations that are widely applicable.
  - ⟫ "**cooking school**", base service: a well-maintained repository of recipes and advices for new implementations

PATOF proposes to apply expertise in FAIR data management gained in PUNCH experiments to other disciplines. The results - including the generalisation of the FAIR Metadata Factory - will be openly available, with the perspective of establishing a **"living cookbook"** useful for any data project, also for other research fields, experiments and HMC applications.

PATOF

Outreach & further prospects

Already established contacts referring to small and medium scale experiments:

- Research Cluster ELEMENTS & IKP of TU Darmstadt:
  electron accelerator **S-DALINAC** using electron and photon scattering
- Physics Institute of the University of Bonn:
  Electron Stretcher Facility **ELSA**
  (electron accelerator and experimental facilities for the investigation of the resonance structure of protons, neutrons, and mesons)

- And further ongoing talks and collaborations *to be extended ...*

Thank you!

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