Bridging Domain-Specific Data Center and Cross-Domain Metadata Frameworks

V. Tokareva for PUNCH4NFDI, KCDC, NAPMIX

Astro-CC European Data Provider Forum
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Overview

Data centre for high-energy astroparticle physics

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German national research data infrastructure consortium for fundamental physics (and it's metadata model)

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OSCARS project, aimed to create a cross-domain metadata schema for nuclear, astroparticle, and particle physics communities

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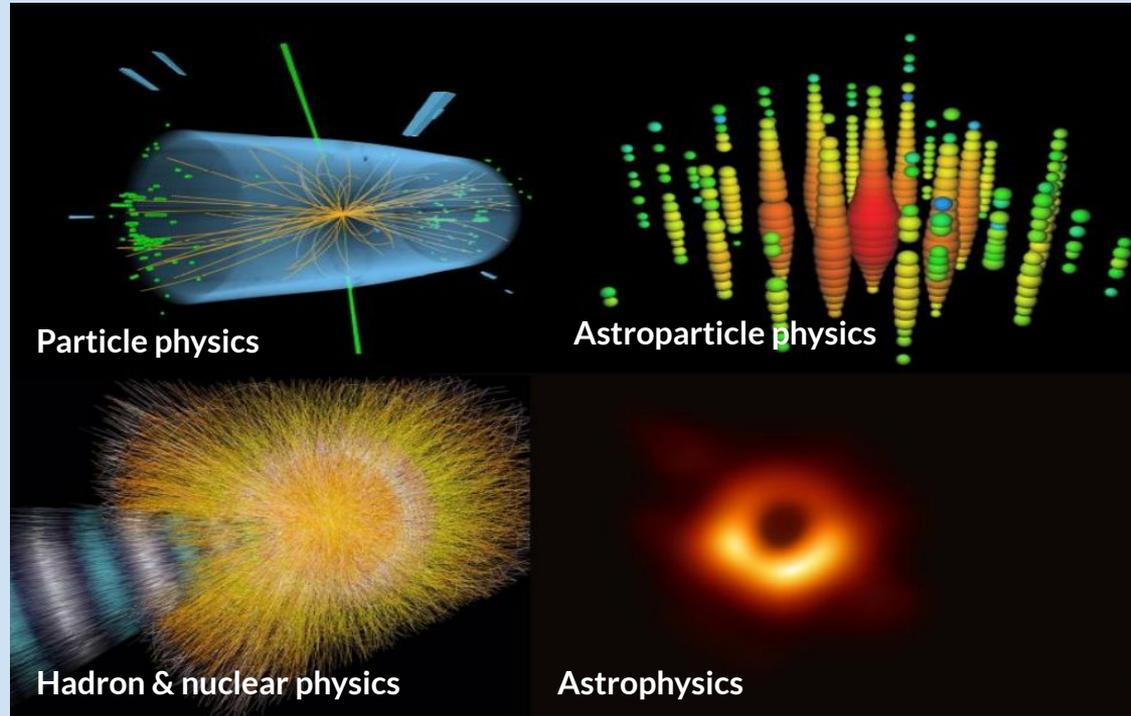
1

OSCARS project, aimed to create a cross-domain metadata schema for nuclear, astroparticle, and particle physics communities

3

Particles, **U**niverse, **N**u-**C**lei and **H**adrons **4** (for) **N**ationale **F**orschungs-**D**aten **I**nfrastruktur

is the consortium of particle, astroparticle, hadron & nuclear physics and astrophysics (PUNCH Communities)

Particle physics

Astroparticle physics

Hadron & nuclear physics

Astrophysics

Towards PUNCH4NFDI-2.0
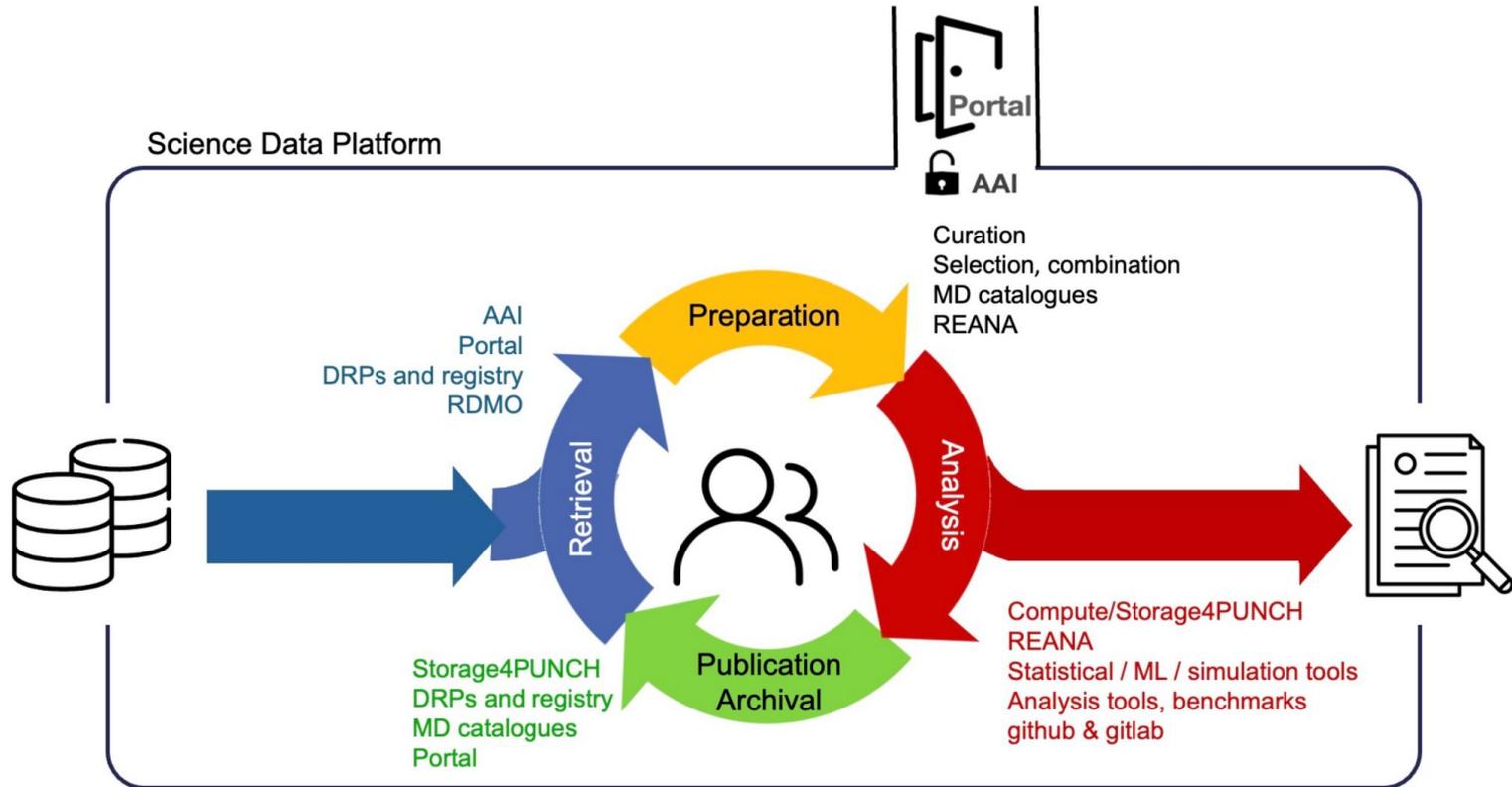
PUNCH4NFDI Digital Research Product

DRP encapsulates digital research outputs of PUNCH4NFDI communities within SDP ecosystem.

Allows:

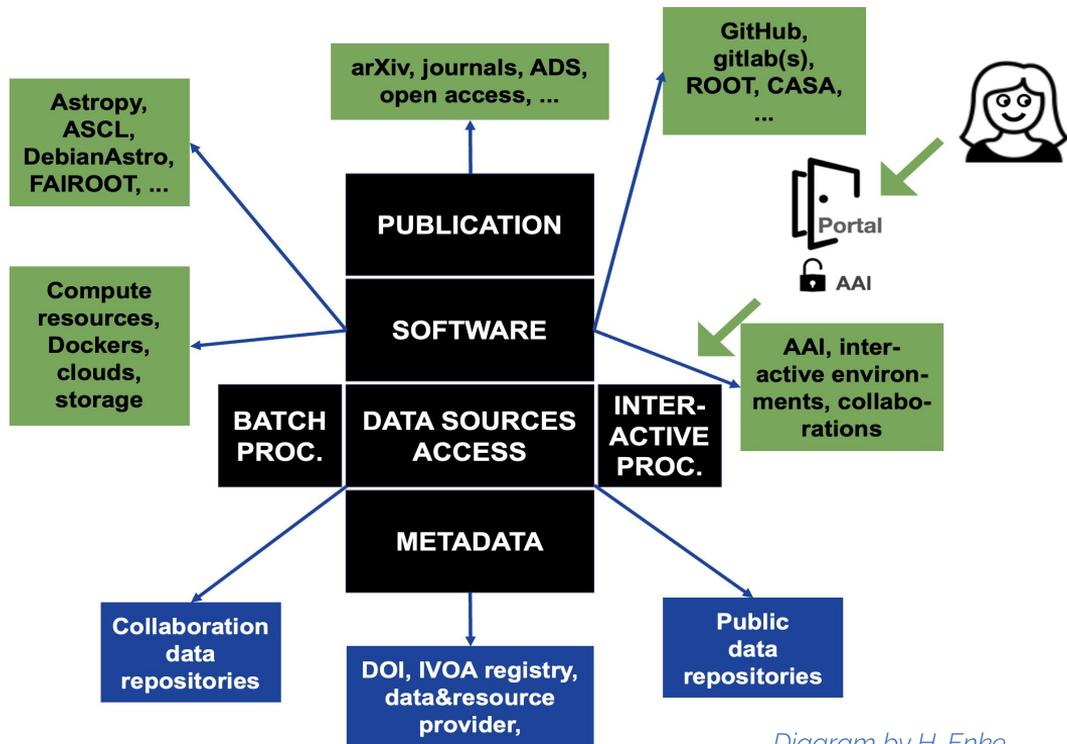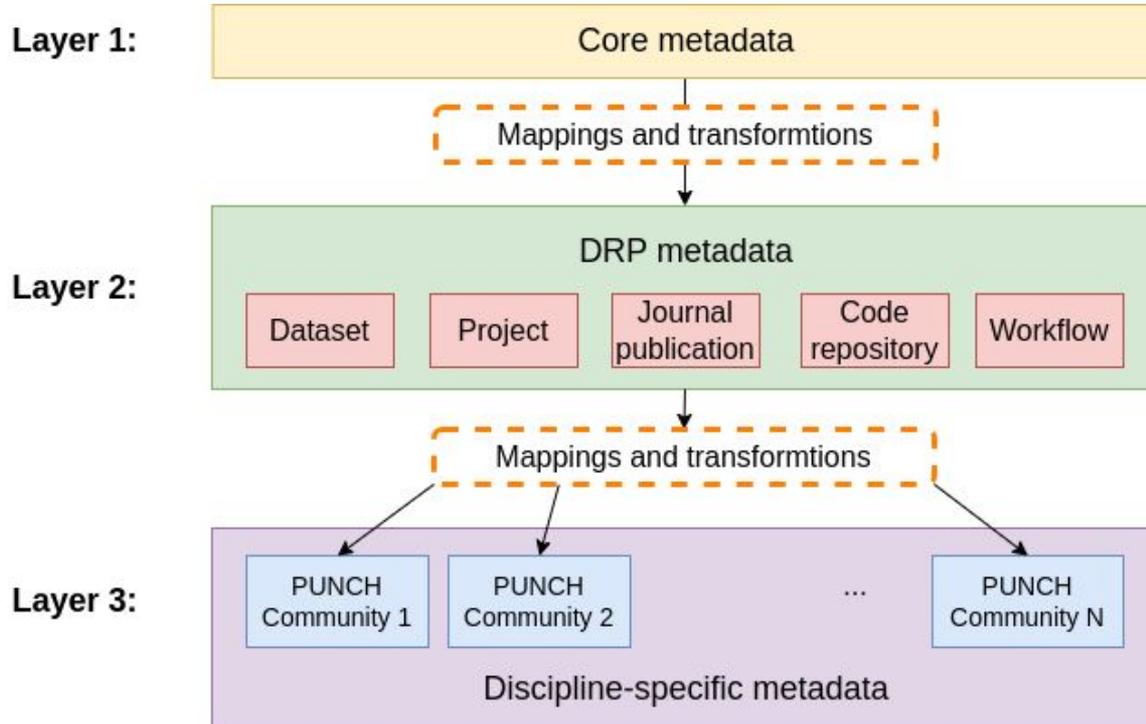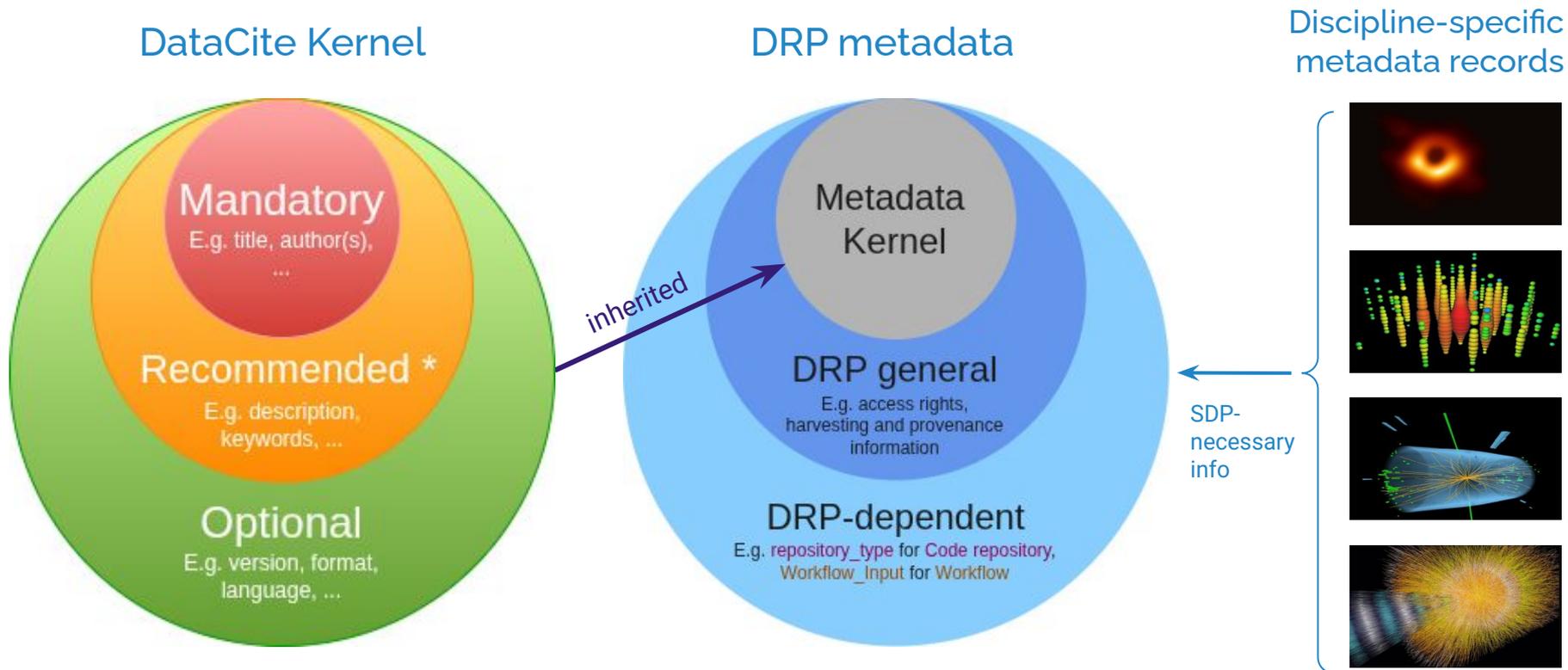- live analysis and live peer review
- blind discovery

Diagram by H. Enke

PUNCH4NFDI SDP metadata model

- **Multi-layered model**

- Builds on the widely used **DataCite Kernel** required keywords

- Supports **incorporation of discipline-specific schemas** from PUNCH communities

- Harvesting: preferred **OAI-PMH or REST** based APIs

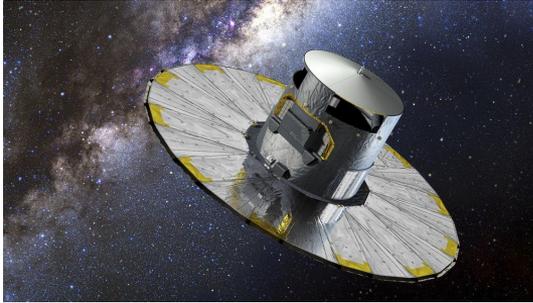- Metadata exchange format: **XML, JSON**
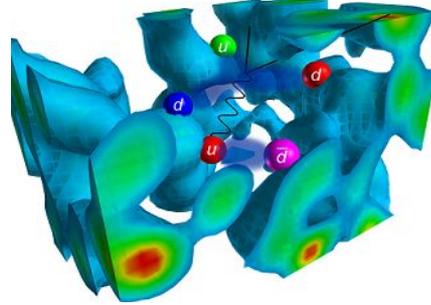
Metadata obligation levels explained

DataCite Kernel

Mandatory
E.g. title, author(s),
...

Recommended *
E.g. description,
keywords, ...

Optional
E.g. version, format,
language, ...

DRP metadata

Metadata
Kernel

DRP general
E.g. access rights,
harvesting and provenance
information

DRP-dependent
E.g. repository_type for Code repository,
Workflow_Input for Workflow

inherited

Discipline-specific metadata records

SDP-
necessary
info

Plenty of discipline-
specific information

* Recommended for interoperability -
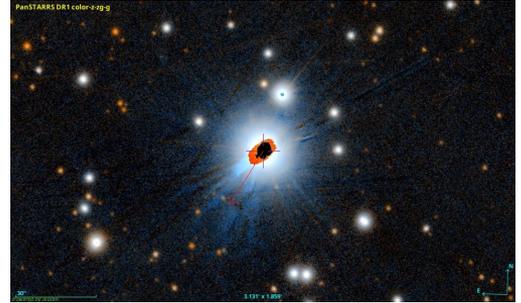but not obligatory

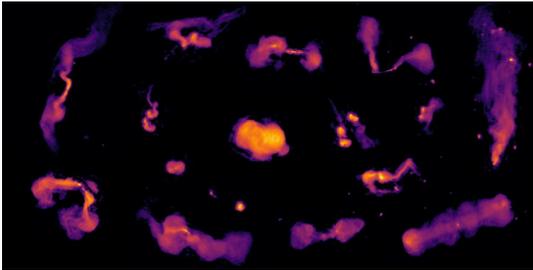# PUNCH Data Providers and Use Cases

Leibniz-Institut für Astrophysik Potsdam
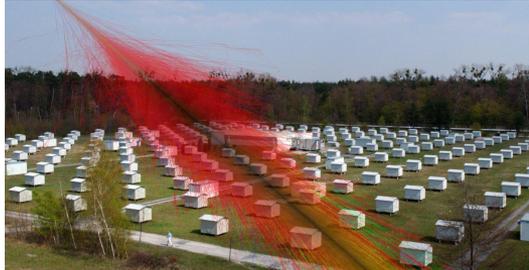

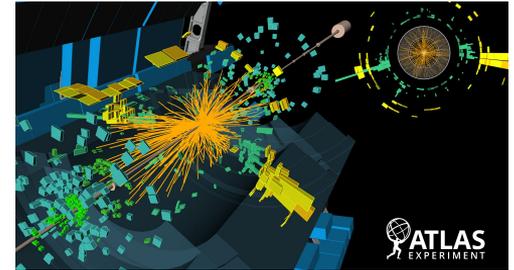International Lattice Data Grid

Astronomisches Rechen-Institut Heidelberg

LOFAR

KASCADE Cosmic Ray Data Centre

ATLAS Open Data

KASCADE Cosmic Ray Data Centre (KCDC)

- KCDC is the public data centre for high-energy astroparticle physics

- Based on the data of the KASCADE experiment, contains as well data by KASCADE-Grande, LOPES, Maket-Ani, allows further extensions

- Provides free, unlimited, reliable open access to datasets in high-energy astroparticle physics

- Serves as information platform: physics and experiment backgrounds, spectra, event display, tutorials, reference information

- Established in 2013

- https://kcdc.iap.kit.edu/

KCDC API

Example: Extraction of the all data with an energy range from 17-19eV[log10]

Request:

```
curl        --insecure        --request        POST        'https://kcdc-
dev.iap.kit.edu/datashop/api/submit' \
--header 'Authorization: Basic cG92dGVyOmhhcnJ5Kytxb3R0ZXI=' \
--header 'Content-Type: application/json' \
--data-raw '
{
    "reconstruction": "",
    "output_format": "ascii",
    "datasets": [
        {
            "name": "array",
            "quantities": [
                {
                    "name": "E",
                    "cuts": [[17, 19]]
                }
            ]
        }
    ]
}'
```
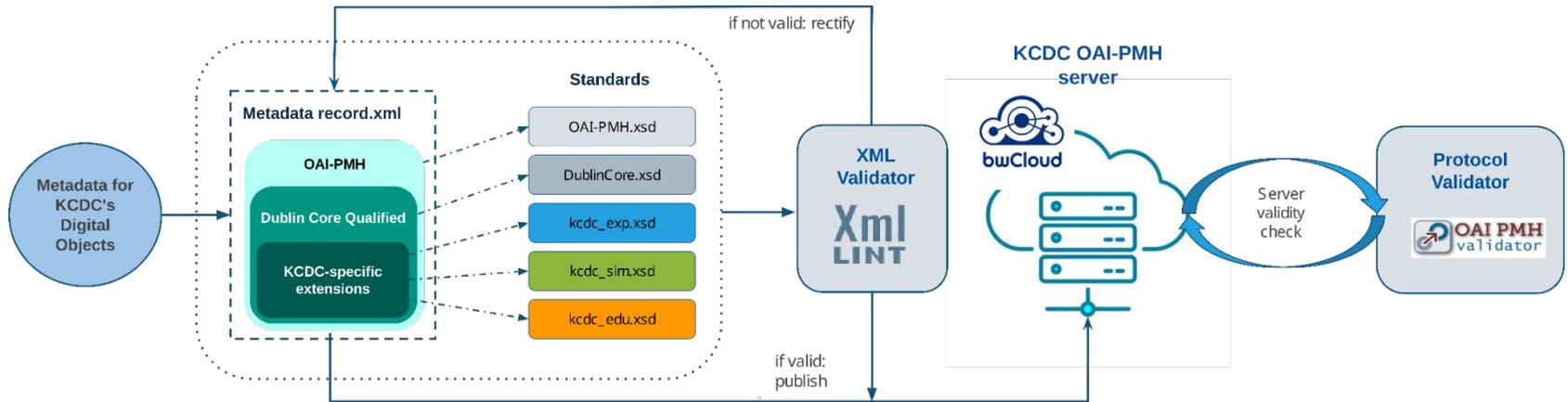
Response:

job id:

{"id":"dbf1e608b6044223afe472125c020d88"}

or error message:

{"detail":"Invalid basic header. Credentials not correctly base64 encoded."}

[1]   Online API documentation: https://kcdc.iap.kit.edu/datashop/api/docs/index.html
[2]   Wochele J. et al. KCDC User Manual:
      https://kcdc.iap.kit.edu/static/pdf/kcdc_mainpage/kcdc-Manual.pdf

OAI-PMH for KCDC

NAPMIX: Nuclear, Astro, and Particle Metadata Integration for eXperiments

OSCARS
Open Science Clusters' Action
for Research & Society

The NAPMIX project aims to create a cross-domain metadata schema tailored for the Nuclear, Astro, and Particle Physics communities. By leveraging local and international connections, NAPMIX will foster synergies with related fields, enhancing cross-domain interoperability.

ESCAPE
Astronomy, Nuclear and Particle Physics

Challenge	Solution	Scientific Impact	Partners
There is a significant gap in nuclear physics: the lack of a unified metadata schema necessary for achieving FAIR datasets. This challenge extends to the fields of particle and astro-particle physics, highlighting the need for a collaborative European effort to create a common metadata schema with user-friendly infrastructure.	NAPMIX will establish a collaborative community in experimental nuclear, astro-particle, and particle physics to develop a comprehensive metadata schema and user interface. The project will publish the schema and broaden connections within the ESCAPE community, while striving to connect to the EOSC.	NAPMIX promotes discipline-specific metadata and fosters collaboration across fields. The project will enhance the uptake of Open Science practices and contribute to scientific progress through its integration with existing infrastructures,	GSI Helmholtzzentrum für Schwerionenforschung GmbH

Authors: A. Mistry, I. Knezhevic

https://bit.ly/OSCARS-fundedproject-NAPMIX

Thank you for your attention.
Let's make RDM better together!

Contact me: victoria.tokareva@kit.edu

References:
KASCADE Cosmic Ray Data Centre: https://kcdc.iap.kit.edu/
PUNCH4NFDI: https://www.punch4nfdi.de/
NAPMIX: https://shorturl.at/71qz6