

The PUNCH4NFDI Consortium

Particles, Universe, NuClei and Hadrons for the NFDI

Thomas Schörner (DESY)

AG Meeting, Bremen, 15 September 2022





Gemeinsame
Wissenschaftskonferenz
GWK

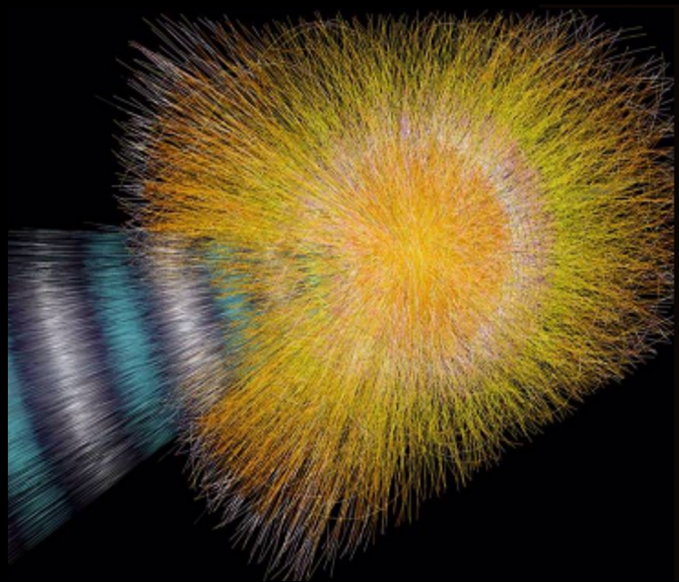
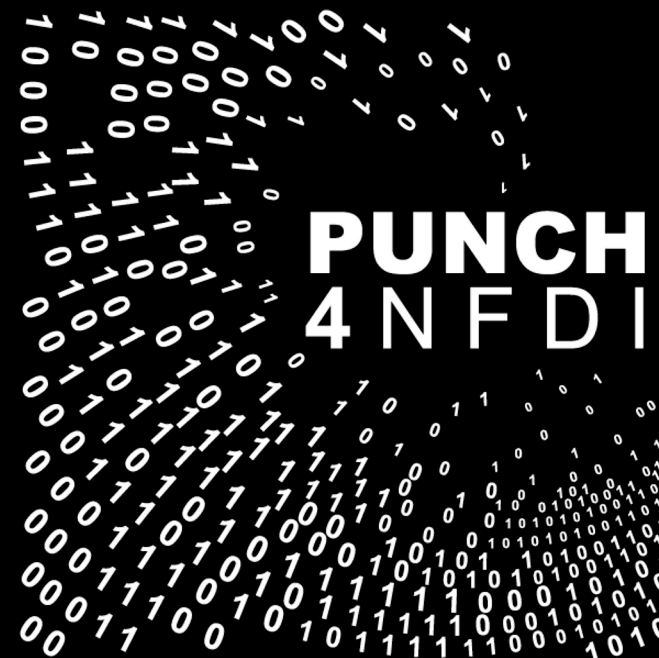
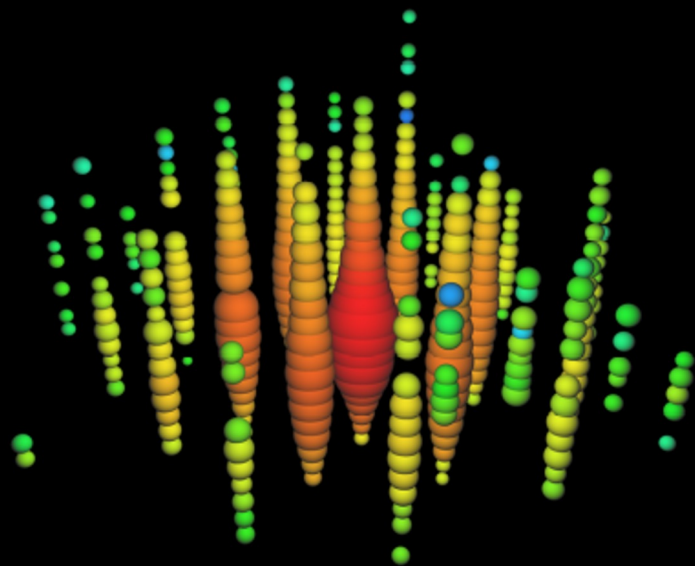
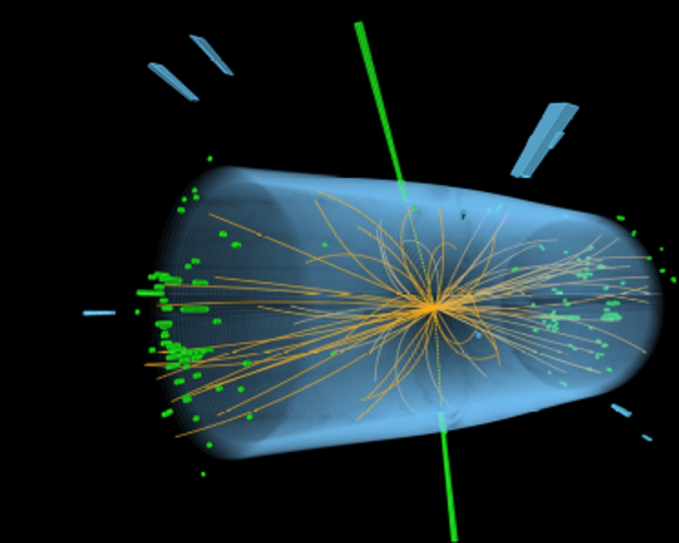


Deutsche
Forschungsgemeinschaft

Nationale Forschungsdaten- infrastruktur (NFDI)

- Sustainable utilisation of research data
- Establishment of FAIR data management
- Connection to European and international efforts (like EOSC)
- Bottom-up approach of (30) independent consortia
- 5 (+5) year funding;
85 MEUR / year

See also [DFG.de/nfdi](https://www.dfg.de/nfdi) and [nfdi.de](https://www.nfdi.de)



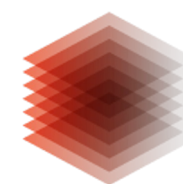
Particles, Universe, NuClei and Hadrons for the NFDI

**(42 partners, 10k scientists, support
from KET, KAT, KHuK, RdS)**

The prime goal of PUNCH4NFDI is the setup of a federated and "FAIR" science data platform, offering the infrastructures and interfaces necessary for the access to and use of data and computing resources of the involved communities and beyond.

Who We Are

Universities, Helmholtz, Max Planck, Leibniz



data generated by SKA2

Survey

Low

Mid

15.6ZB

Global Internet Traffic



420EB

HL-LHC

FAIR@GSI
PUNCH data are diverse
- in size and rate
- in complexity and purpose
- in abstraction level
30 EB

searches on Google
98PB
updates to facebook
180PB

business emails sent worldwide



3,000PB
(3EB)



PUNCH4NFDI expertise
- Big data and open data
- Data irreversibility and reduction
- Harnessing heterogeneous resources
- Highly collaborative globally distributed data management
4EB
SKA1 mid frequency

Challenges

- FAIRification: data & **workflows**
- “big data” and “open data”
- Irreversibility challenge and data loss
- heterogeneous data & infrastructures
- transfer of knowledge

Task Areas

TA 2: Data
management

TA 3: Data
transformations

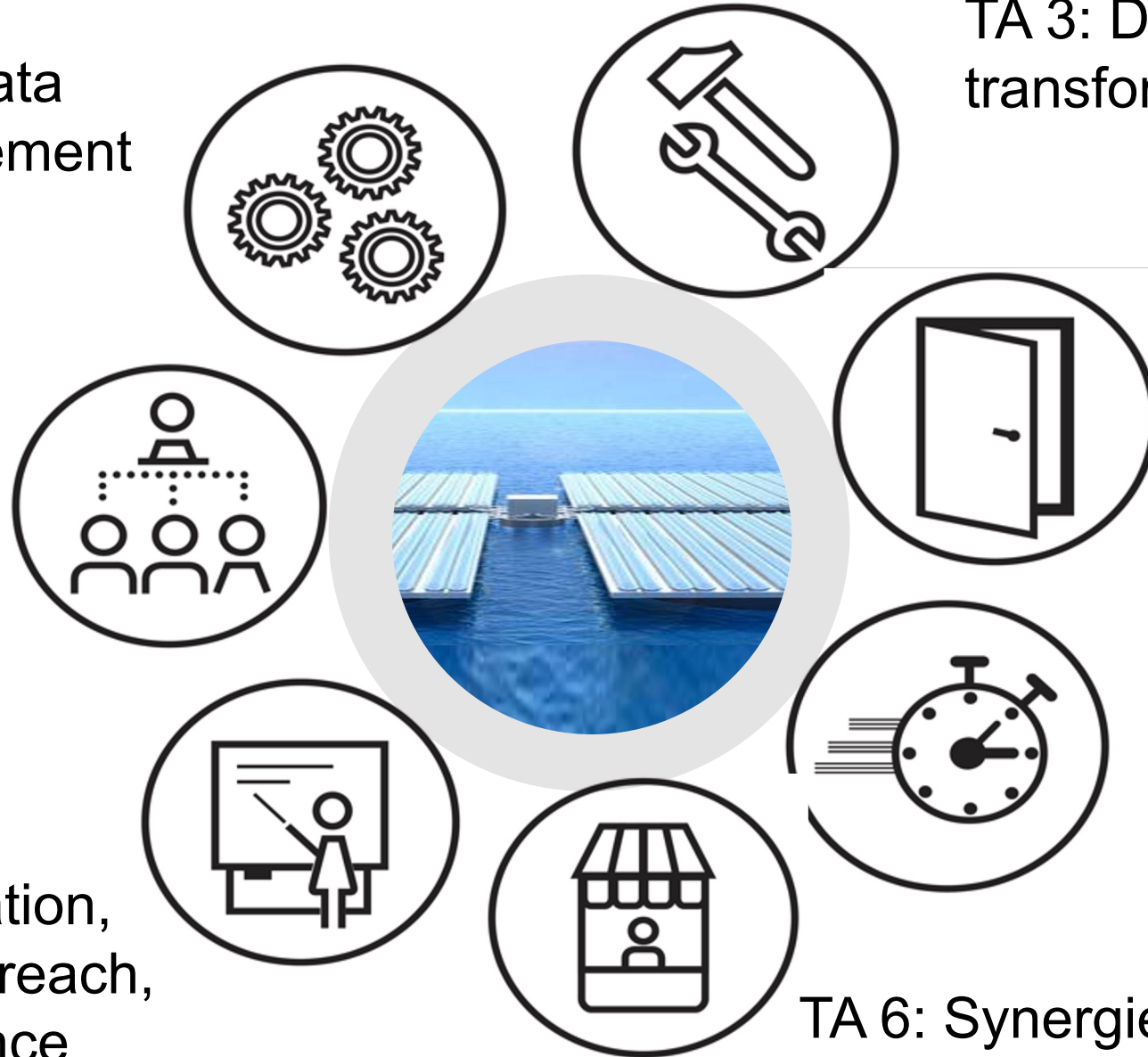
TA 1: Management
and governance

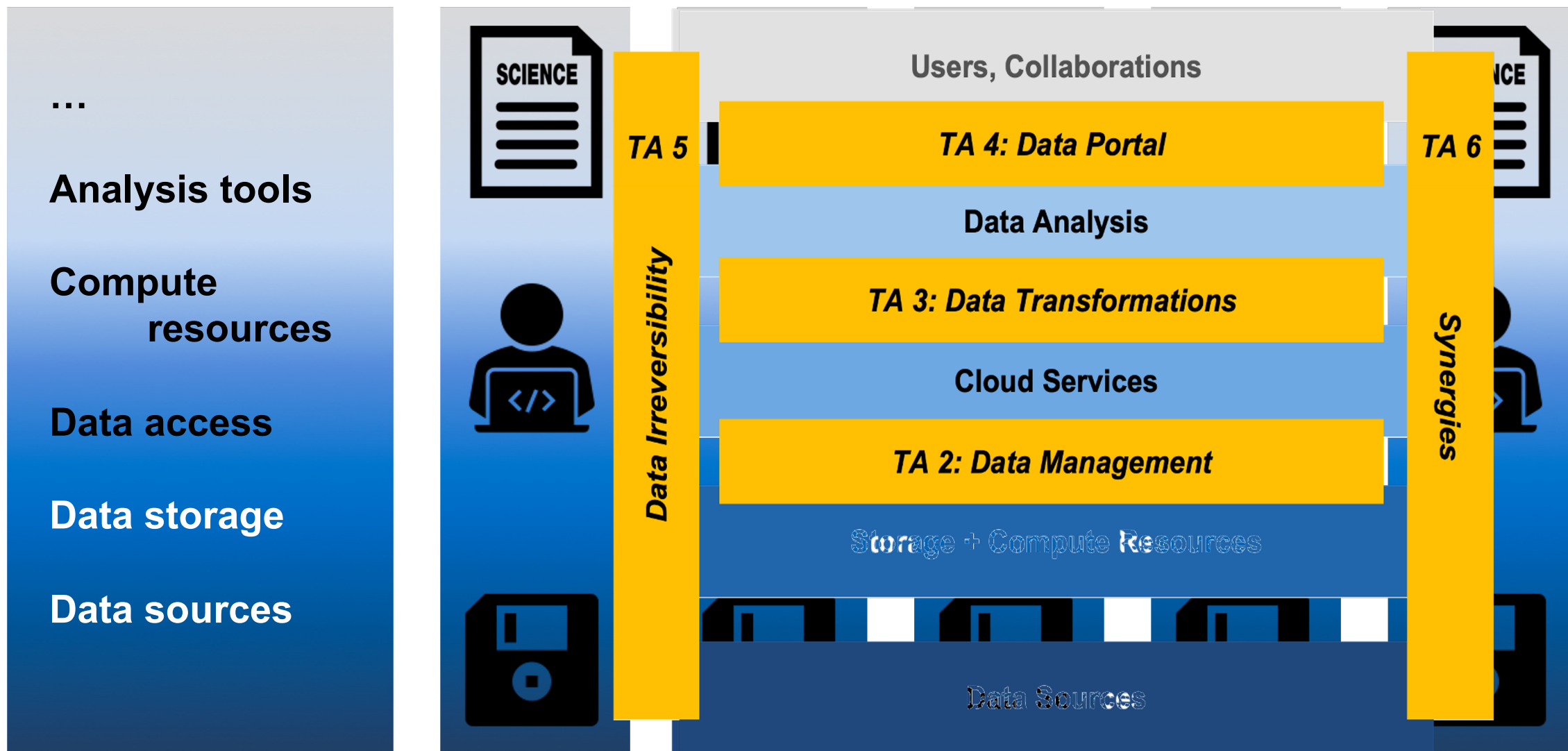
TA 4: Data
portal

TA 7: Education,
training, outreach,
citizen science

TA 5: Data
Irreversibility

TA 6: Synergies
& services

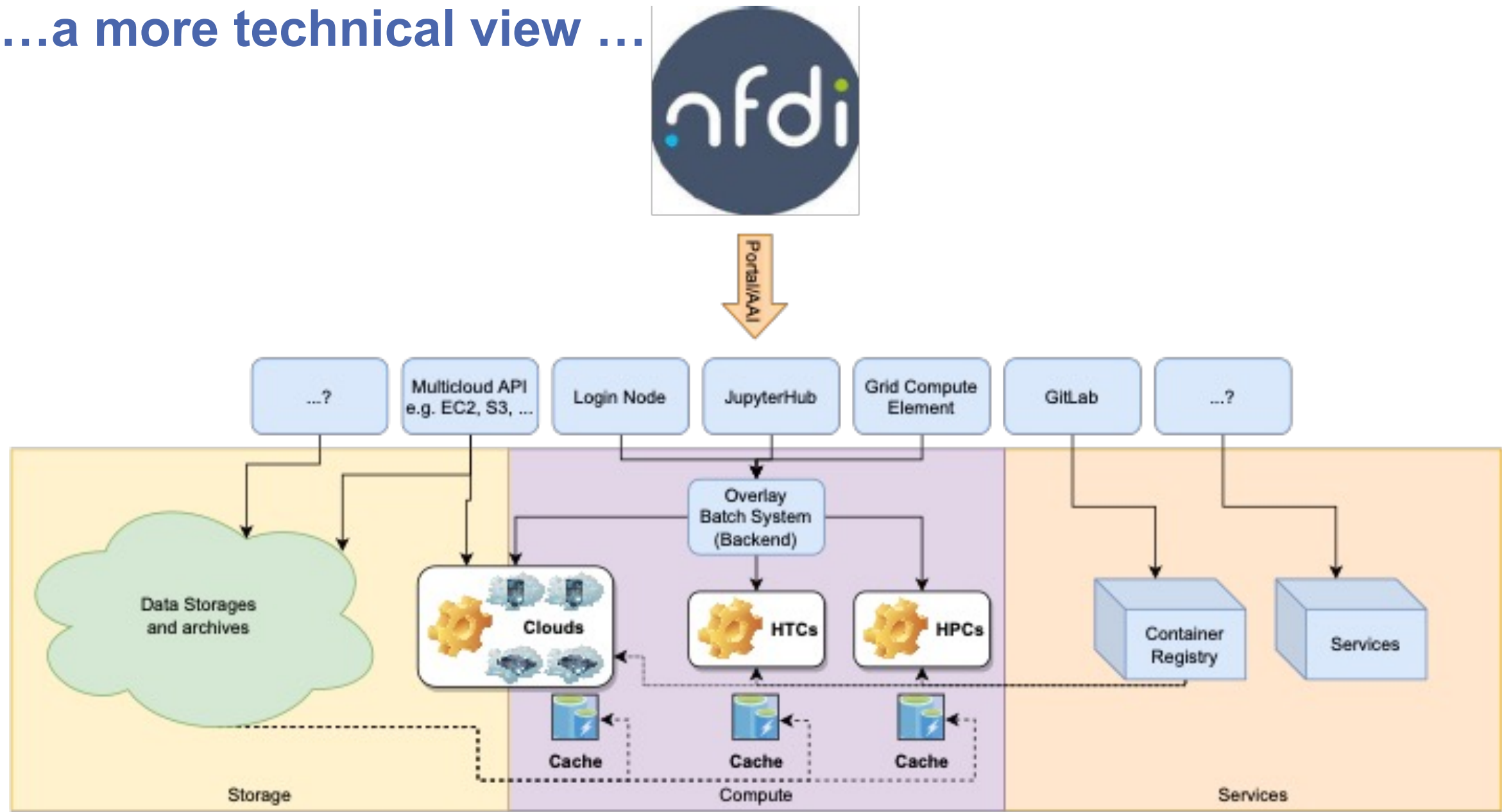




Flexibility, efficiency, scalability:
data volumes, number of users and analyses, heterogeneous resources; data combinations



...a more technical view ...

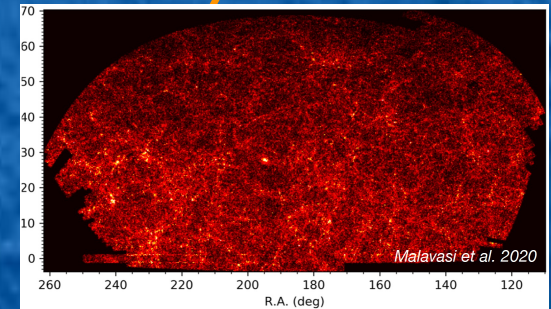


SciTrace

SciTrace research product

Thanks!

I want to use SDSS data for exploring the cosmic web (and reproducing Malavasi et al. 2020)



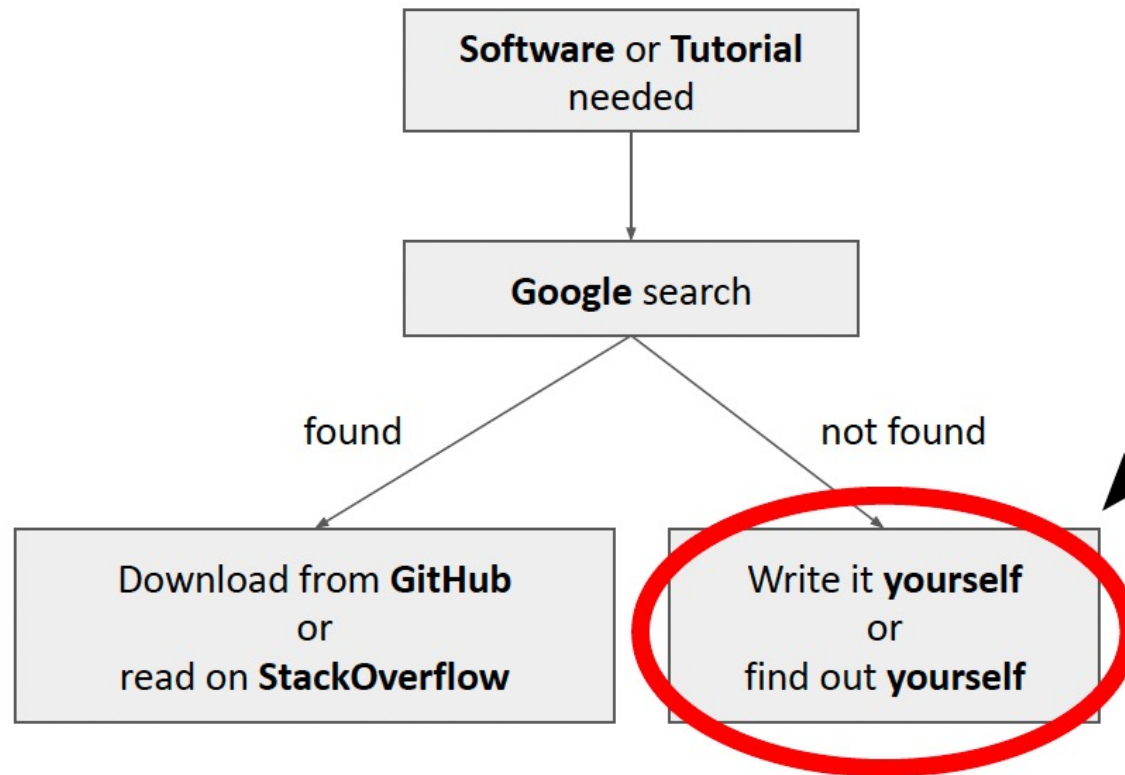
SDSS catalogue



The PUNCH4NFDI Marketplace

Addressing fundamental problems of daily work

Scientists want software or tutorials



A platform for collecting & managing requests:

- Users create requests
- Users search and comment requests
- Users vote for requests → impact?

Advantage for PUNCH4NFDI:

- No need to develop → use existing resources
- No need to host anything → cheap and easy
- Content can be generated from now now!

inefficient:

- lots of manpower in the scientific community
- but also lots of parallel development

instead:

coordinate creation of desired software/tutorials



Recent questions and answers



how do we bring Compute4Punch into service level ?

asked Jan 7 in [Software](#) by Kilian Schwarz | 3 views

[software](#)[services](#)

0
votes

0
answers

fast compression of 8 bit MeerKAT/SKA data

asked Dec 15, 2021 in [Software](#) by landessternwarte (180 points) | 3 views

[library](#)[compression](#)[c](#)[c++](#)[radio data](#)

+1
vote

0
answers

How to download Meerkat data?

asked Nov 22, 2021 in [Tutorials](#) by landessternwarte (180 points) | 1 view

[data](#)[meerkat](#)

0
votes

0
answers

How to analyze HESS data with gammapy?

asked Nov 19, 2021 in [Tutorials](#) by landessternwarte (180 points) | 2 views

[tutorial](#)[data analysis](#)[hess](#)[gamma-ray](#)[gammapy](#)

+1
vote

0
answers



Welcome to PUNCH4NFDI Marketplace, where you can ask questions and receive answers from other members of the community.

All categories

[Software](#)

2

[Tutorials](#)

2



Recent questions and answers

Help get things started by [asking a question](#).

Gitlab in PUNCH4NFDI (1)

A multi-purpose application

PUNCH4NFDI Gitlab



Use the PUNCH4NFDI AAI !

If your institution is not member / registered with DFN-AAI or any other AAI

PUNCH4NFDI AAI can accommodate identification from your account on

ORCID GitHub Google

Please read the Registration Instructions for the PUNCH4NFDI AAI:

https://www.punch4nfdi.de/sites/sites_custom/site_punch4nfdi/content/e117438/e142359/e149152/PUNCH-AAI-registration.pdf

Username or email

Password

☐ Remember me [Forgot your password?](#)

Sign in with

☐ Remember me

Understands OAUTH2 (→ talks with AAI)

Carries another communication tool:
Mattermost

Major purposes:

- code management for software with versioning, branching, releases (tagging)
- support testing and code integration for distributed teams

Combined with **continuous integration (CI)**, this allows to build and manage containerised software installations

- Built-in capabilities for container registries
- Built-in registry for packages (various code languages: python, java ...)

Combines with e.g. workflow engine
REANA

Gitlab in PUNCH4NFDI (2)

PUNCH4NFDI intranet

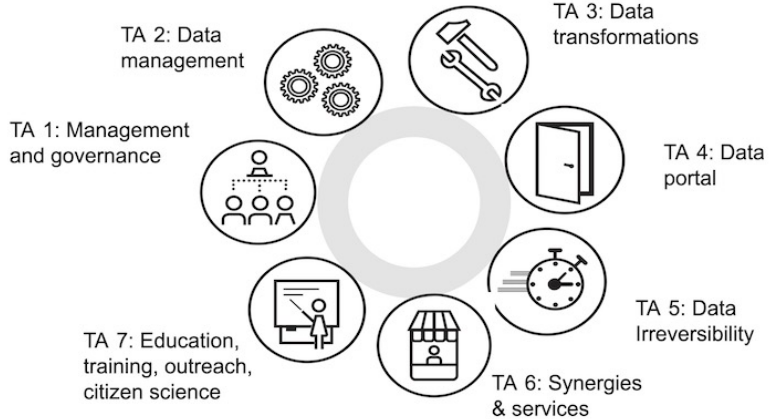
PUNCH4NFDI Intranet documentation [edit page on gitlab](#)

Particles, Universe, NuClei and Hadrons for the NFDI

Home Consortium NFDI TA2 TA3 TA4 TA5 TA6 TA7 Marketplace

Overview

The task areas of the PUNCH4NFDI consortium.



The diagram shows seven task areas (TA) arranged in a circle around a central grey circle. Each TA is represented by an icon and a label:

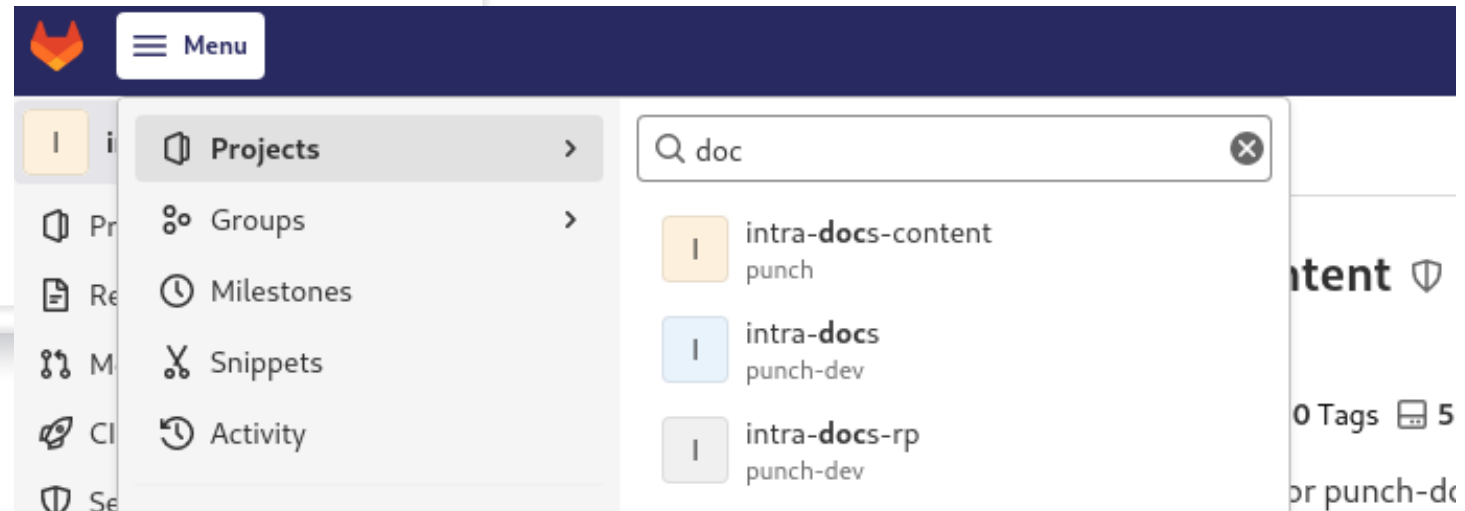
- TA 1: Management and governance (Icon: three people)
- TA 2: Data management (Icon: three interlocking gears)
- TA 3: Data transformations (Icon: a wrench and a screwdriver)
- TA 4: Data portal (Icon: a door)
- TA 5: Data Irreversibility (Icon: a clock with a lightning bolt)
- TA 6: Synergies & services (Icon: a storefront with a person)
- TA 7: Education, training, outreach, citizen science (Icon: a person at a computer)

EScience@AIP Leibniz Institute for Astrophysics, An der Sternwarte 16, 14482 Potsdam, Germany, Tel: +49-331-7499-0

Gitlab ‘webhook’ capability using md files; combined with web server application (built on Caddy software)

Allows for:

- collective editing of intranet content
- implementing editorial hierarchy
- fulfills all requirements of a content managing system



The screenshot shows the GitLab web interface. At the top is a dark blue header with the GitLab logo and a 'Menu' button. Below the header is a sidebar with a list of items: 'i', 'Pr', 'Re', 'M', 'CI', and 'Se'. The main content area displays a search bar with the text 'doc' and a list of search results:

- intra-docs-content punch
- intra-docs punch-dev
- intra-docs-rp punch-dev

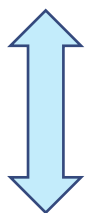
On the right side, there is a partial view of a 'Content' section with a shield icon, and a 'Tags' section showing '0 Tags' and a '5' icon.

PUNCH4NFDI AAI

Authentication & Authorisation Infrastructure

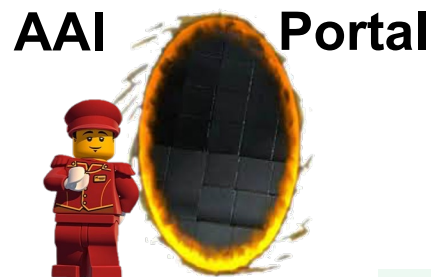
Authentication: (step 1)

- should be possible via institution of PUNCH co-workers and users
 - modern interface: OAUTH2
 - enables Identity-Providers (IdP)
 - home institution (DFN, CERN, ...)
 - ORCID
 - Google (and other Social accounts)
- to provide the verification of the identity (usually based on email)



Infrastructure: Helmholtz-AAI

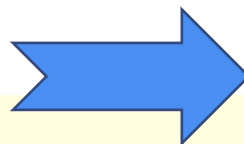
- Web interface for user
- Web interface for resource provider
- valid (web) services via API



Goal: single sign-on!

Authorisation: (step 2)

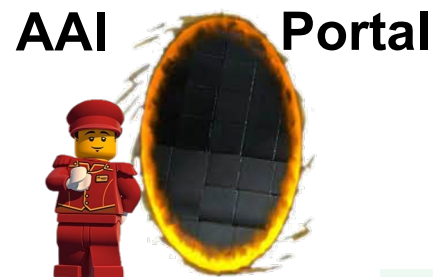
- authenticated users get access to services
 - access rights are connected by the account
 - groups
 - roles
- are used to map (internally) account to access rights



all co-workers, all users of resources
resource provider register valid services (certificates, keys)
draw information from AAI to provide (validated) services

PUNCH4NFDI AAI

Authentication & Authorisation Infrastructure



Authentication: (step 1)

Particles, Universe, NuClei and Hadrons for the NFDI

Login to PUNCH AAI user's home

ORCID

You can log in using your institutional account or another account you have on the web.

	Consorcio de Bibliotecas Universitarias de Galicia
	Consorcio de Servicios Universitarios de Catalunya
	Consorcio para el disenyo, construccion y explotacion del...
	Consorcio para el Equipamiento y Explotación del Labora...
	ORCID

Authorisation: (step 2)

PUNCH4NFDI Intranet documentation [edit page on gitlab](#)

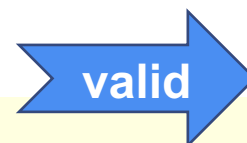
Particles, Universe, NuClei and Hadrons for the NFDI

Home Consortium NFDI TA2 TA3 TA4 TA5 TA6 TA7

Marketplace Gitlab, Mattermost, Intranet PUNCH search... (shift+f to f)

On 20.08.2021 an introductory session has been conducted, organised by the [Ad Hoc team Collaborative Tools](#)

Documentation



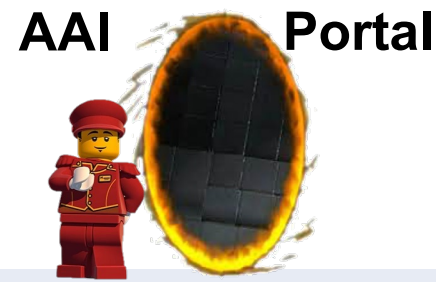
Infrastructure: Helmholtz-AAI

- Web interface for user
- Web interface for resource provider
- valid (web) services via API

all co-workers, all users of resources
resource provider register valid services (certificates, keys)
draw information from AAI to provide (validated) services

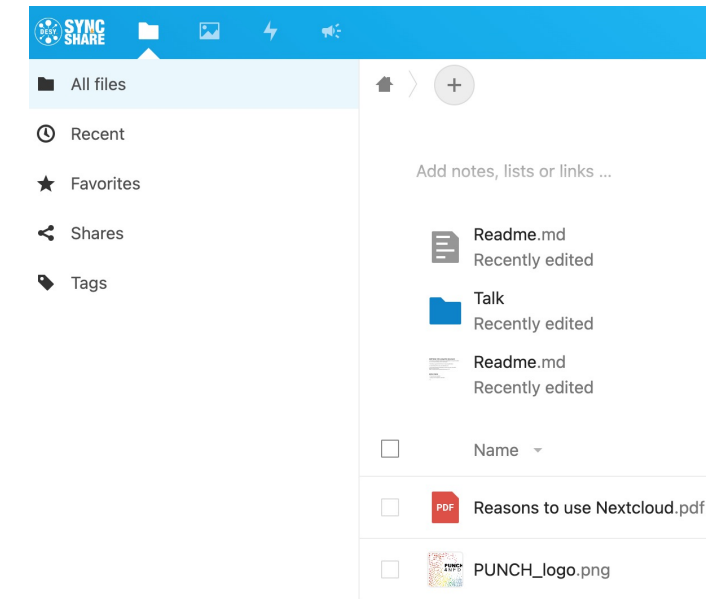
PUNCH4NFDI AAI

Authentication & Authorisation Infrastructure



AuthenticatioAuthorisation info for another service with intermediate AAI instance

Keycloak / DESY



valid

Infrastructure: Helmholtz-AAI + DESY SSO

- Web interface for user
- Web interface for resource provider
- valid (web) services via API

all co-workers, all users of resources
resource provider register valid services (certificates, keys)
draw information from AAI to provide (validated) services

The PUNCH4NFDI Portal

... later entry point to the science data platform SDP

Also provided so far: collection & links of frequently used software for astro, HEP, lattice, ... in the PUNCH4NFDI intranet.

PUNCH4NFDI Intranet documentation

edit page on gitlab

Particles, Universe,
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for the NFDI

[Home](#) [Consortium](#) [NFDI](#) [TA2](#) [TA3](#) [TA4](#) [TA5](#) [TA6](#) [TA7](#) [Marketplace](#)

List of Astrophysics Codes

search.. (shift+f to focus)

This is a list of some of the Astrophysics codes that are on the current priority list for being adapted for easy use on HPC machines. Please click on the code name to be linked to the code webpage.

- [BHAC](#) on gitlab.itp.uni-frankfurt.de

BHAC (the Black Hole Accretion Code) is a multidimensional general relativistic magnetohydrodynamics code based on the MPI-AMRVAC framework. BHAC solves the equations of ideal general relativistic magnetohydrodynamics in one, two or three dimensions on arbitrary stationary space-times, using an efficient block based approach.
- Bonsai on [GitHub](#)

Bonsai is a GPU gravitational [Barnes-Hut]-tree code. There also exists a version for SPH application.
- [CASA](#)

CASA, the Common Astronomy Software Applications package, is the primary data processing software for the Atacama Large Millimeter/submillimeter Array (ALMA) and NSF's Karl G. Jansky Very Large Array (VLA), and is frequently used also for other radio telescopes. The CASA software can process data from both single-dish and aperture-synthesis telescopes, and one of its core functionalities is to support the data reduction and imaging pipelines for ALMA, VLA and the VLA Sky Survey (VLASS).
- CASTRO on [GitHub](#)

CASTRO is part of the AMReX suite of astrophysical hydrodynamics codes that collectively provide the simulation capabilities to model explosive astrophysical phenomena. Castro specializes in near-sonic and supersonic flows, where reactions can be an important driver of the dynamics. Radiation and magnetic contributions are supported. A lot of emphasis is placed on accurately coupling reactions and hydro, with a variety of time-stepping techniques available.

Thank you!

The PUNCH4NFDI Consortium

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