



Open sources tools survey

Work package 6.4 : Open-source data
analysis tools

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Task Area 6 : Synergies and services

WP 1 : Marketplace

WP 2 : Authorisation
and authentication structure

WP 3 : Cross-community
efforts towards FAIR data

**WP 4 : Open-source
data analysis tools**

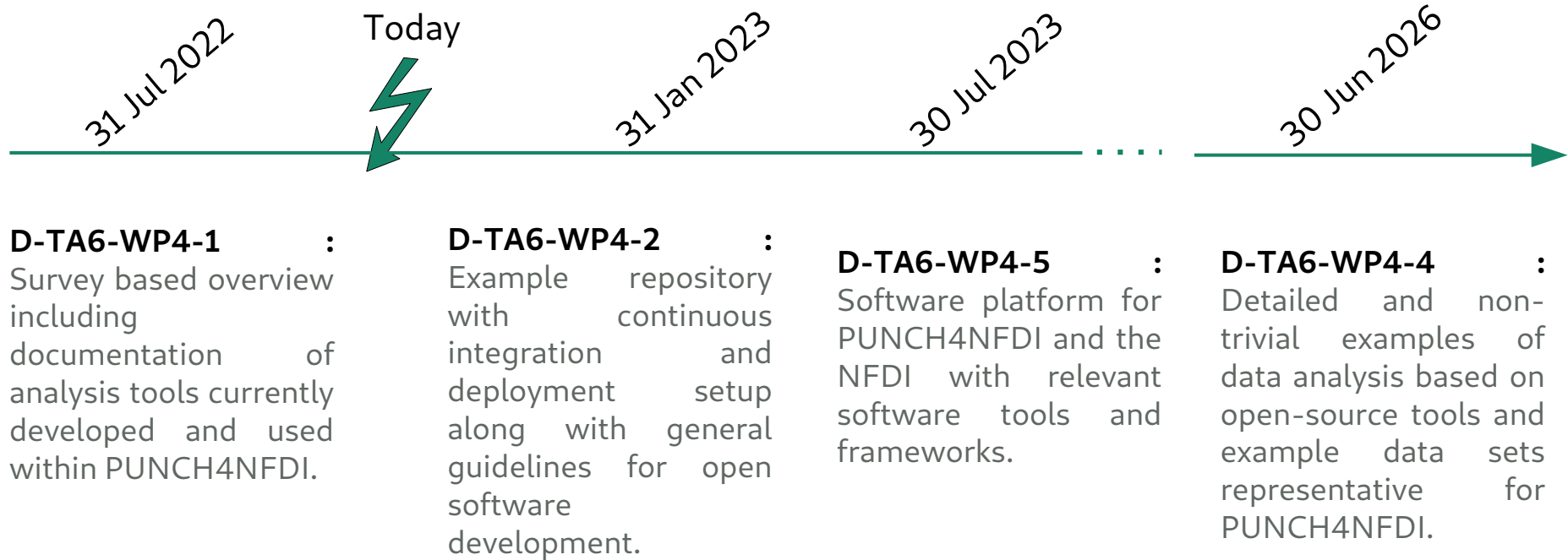
WP 5 : Services in big
data management

TA 6 – WP 4 : Open-source data analysis tools

This work package addresses the PUNCH objectives

- ➔ 2 : Strengthen the implementation of the FAIR principles in its community
- ➔ 4 : Provide better documentation of analysis workflows
- ➔ 6 : Enable “live analysis” and “live peer review” : in the future, a research product would be associated with the paper under review, and the reviewer can now cross-check the complete implementation of the workflow, wherever needed

TA 6 – WP 4 : Open-source data analysis tools



D-TA6-WP4-1 : Survey of open-sources tools

Name	Description	Link	Download	Tutorials	Code	Use / Contribute	#citations
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System

General

Analysis / Simulation

Workflow management

D-TA6-WP4-1 : Survey of open-sources tools

System

Manjaro
NextCloud
Emacs
Latex
OpenSSH
OpenConnect
Mattermost
Mu
Xournalpp
...

General

astropy
numpy
keras
scikit
paraview
jupyter
dealii
gnuplot
Octave
...

Analysis & Simulations

gammapy
gamera
Root:RDataFrame
ctapipe
corsika
fermipy
Awkward
agnpy
Fermitools
...

Workflow managment

Luigi
Snakemake
Reana
Taiga
Camunda
Processmaker
...

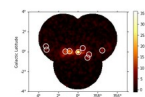
makarim@mpi-hd.mpg.de

Subject : TA6WP4D1

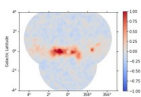
D-TA6-WP4-1 : Survey of open-sources tools

Gammapy :

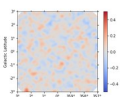
- Gamma ray dedicated open source analysis python package
- Prize winning software
- Adapted to GADF format
- Already used for HESS, HAWC, FERMI, selected for CTA



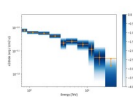
Basic image
exploration and fitting



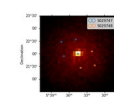
3D detailed analysis



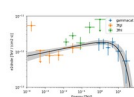
3D map simulation



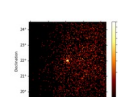
Spectral analysis



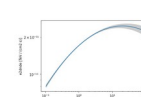
Spectral analysis with
energy-dependent
directional cuts



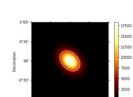
Flux point fitting



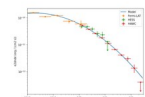
Makers - Data
reduction



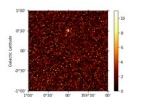
Source catalogs



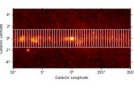
Models



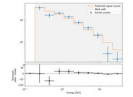
Multi instrument joint
3D and 1D analysis



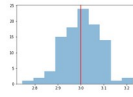
Event sampling



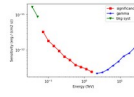
Flux Profile Estimation



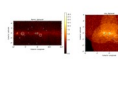
Spectral analysis of
extended sources



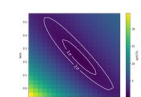
1D spectrum
simulation



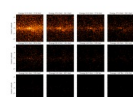
Point source
sensitivity



Modelling



Fitting



Maps

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Gamera :

- C++ library for modeling in high energy astrophysics.
- It is also available as a swig-wrapped python module (which is internally called gappa)
- It is launched by the Max Planck Institute for Nuclear Physics (MPIK)



Tutorials

How to ...

- calculate the broad-band radiation spectrum from a parent population of hadrons or electrons
- evolve a particle population in a time-constant environment
- evolve a particle population in a changing environment
- set up more complicated Inverse-Compton radiation fields (SSC, anisotropy, arbitrary shape)
- pick your hadronic interaction model
- take particle escape into account
- display the particle energy loss scales
- Take into account gammagamma absorption

D-TA6-WP4-2/5 : Example repository → Software platform

Towards a NFDI Software Marketplace - virtual workshop		
Monday Sep 19, 2022, 9:00 AM → 11:00 AM Europe/Berlin		
Registration <input type="checkbox"/> You are registered for this event. Check details		
9:00 AM → 9:10 AM	Welcome Speakers: Martin Hammitzsch, Bernd Flemisch NFDI-Software-Mar...	10m
9:10 AM → 9:20 AM	Betty's (Re)Search Engine: A client-based search engine for research software stored in repositories Speaker: Vasily Seibert BRE_TUC.pdf	10m
9:20 AM → 9:25 AM	PUNCH4NFDI marketplace Speaker: Michael Zacharias Zacharias_PUNCH...	5m
9:25 AM → 9:30 AM	TMF ToolPool Gesundheitsforschung - A repository for software and services for supporting clinical and epidemiological research Speaker: Matthias Lobe NFDI-Software-Mar...	5m
9:30 AM → 9:40 AM	bio.tools - essential scientific and technical information about software tools, databases and services for bioinformatics and the life sciences Speaker: Björn Grüning bio.tools.pdf	10m
9:40 AM → 9:50 AM	Research Software Directory (RSD) - Improving the impact of research software Speakers: Jason Maassen, Christian Meeßen 2022-09-19_RSD_N... Heinrich RSD Pilot Research Software ...	10m
9:50 AM → 10:00 AM	SQA - From license compatibility checks to software quality assurance Speaker: Matthias Rüster (DFP Potsdam) SQA_NFDI_Marketp...	10m
10:00 AM → 10:10 AM	HERMES - Software publications with rich metadata and automated workflows Speaker: Oliver Berthold (Forschungszentrum Jülich) slides.pdf	10m
10:10 AM → 10:20 AM	Questions and answers	10m
10:20 AM → 10:45 AM	Exchange of ideas, identification of promising approaches	25m
10:45 AM → 11:00 AM	Discussion and coordination of potential next steps, closing	15m



bio.tools and the tools ecosystem

essential scientific and technical information about software tools, databases and services (for bioinformatics and the life sciences)

September 19th, 2022



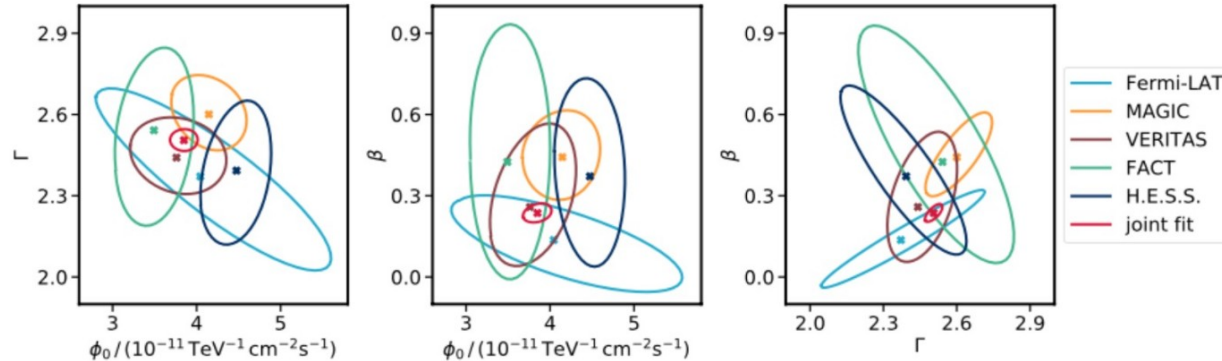
www.elixir-europe.org

D-TA6-WP4-4 : non-trivial examples using open source tools

Example of analysis : Crab

Multi-Instrument (Fermi-LAT, MAGIC, VERITAS, FACT, HESS) analysis in gamma rays astronomy of **formatted data** (GADF) using an **open source software** (GammaPy) .

Analysis is fully **reproducible** (Shared notebooks).



Conclusion

