The PUNCH4NFDI Consortium

# Particles, Universe, NuClei and Hadrons for the NFDI


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GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN IN PUBLICA COMMODA SEIT 1737

# CONTENT

- User Case and related TAx-WPx.
- Göttingen local Setup (testing purposes).
- (WIP) Integration into PUNCH4NFDI infrastructure.

# PUNCH4NFDI@GAU in a Nutshell

- Involved people:
  - Main contact: baida.achkar@phys.uni-goettingen.de
  - sebastian.wozniewski@uni-goettingen.de
- Involved TAx-WPx: TA2-WP2 and TA6-WP5

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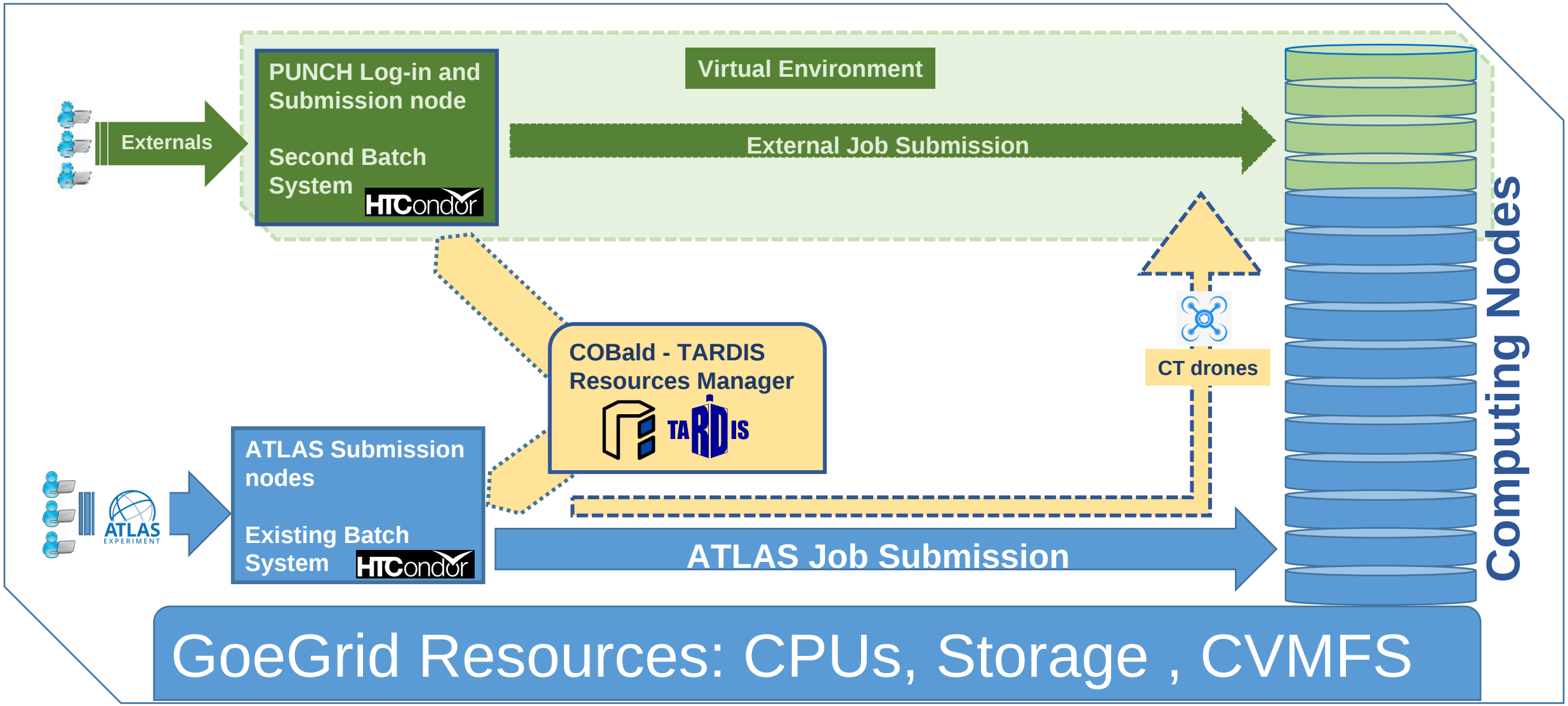
1. Interfaces to the “HLRN – High Performance Computing in Northern Germany” in Göttingen will be developed to the PUNCH4NFDI communities.
2. A fraction of the GoeGrid grid computing cluster in Göttingen will be provided to PUNCH4NFDI and beyond for analysis of the CERN open data to *users without explicit CERN or experiment affiliation.*

# PUNCH4NFDI@GAU: Offer to External Users

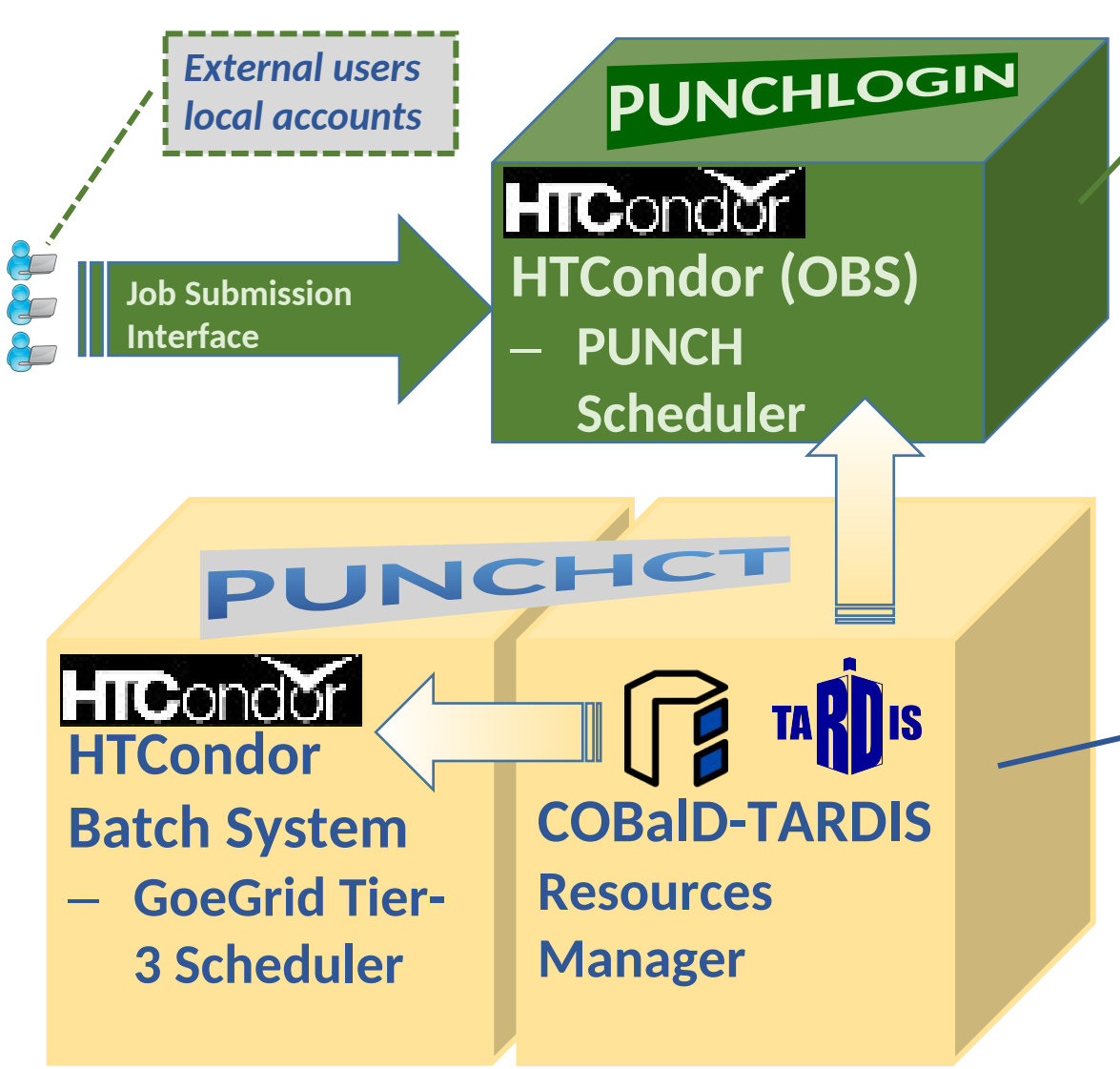
- **The offer is meant to be available to anyone. Authentication/Authorization via university/institution affiliation is not a requirement.**
- Local Setup of HTCondor Overlay Batch System OBS with exclusively own (GoeGrid - Göttingen) resources:
  - Technical implementation within GoeGrid Cluster:
    - HTCondor OBS deployed,
    - locally tested through running Compute4PUNCH tutorials that use CERN open data (ATLAS, CMS). Local users accounts used for the tests,
    - Ganglia web-based monitoring
  - WIP: Acceptance Use Policy AUP are currently under development: TA6-WP5 Talk
  - WIP: Integration into Compute4PUNCH

# PUNCH GoeGrid Pool - PGPool

# PUNCH4NFDI@GAU / PUNCH GoeGrid Pool PGPool Setup



# PUNCH4NFDI@GAU / PGPool Infrastucture




HTCondor Overlay Batch System OBS:
MASTER, COLLECTOR, NEGOTIATOR,
SCHEDD & GANGLIAD

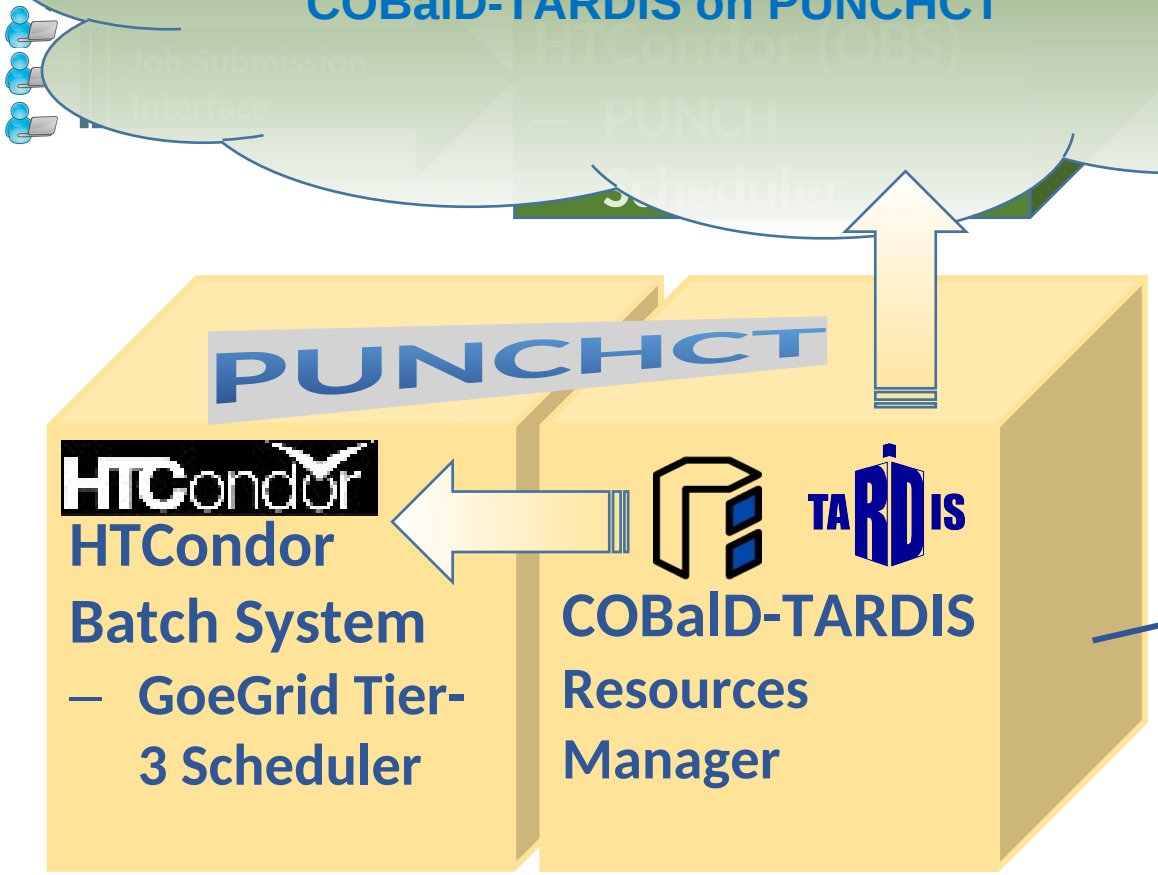
- ✓ A COBalD-TARDIS instance runs as a system service:
  systemctl start cobald@cobald_obs_site
- ✓ Configured with:
  - ✓ HTCondor Batch System Adapter,
    - ✓ Options: pool: punchlogin.local
    - ✓ HTCondor Site Adapter:
      quota: 160
      drone_heartbeat_interval: 60
      drone_minimum_lifetime: 3600
- ✓ TARDIS starts drones (via Vanilla pilot.jdl jobs), which then are integrated themselves into the OBS using the HTCondor Batch System Adapter.
- ✓ Pilot jobs run under the accounting group Group_ATLAS.punchct on GoeGrid WNs

20 drones x 8 CPU hou
~ 1% of GoeGrid
capacity (Tier-3)

# PUNCH4NFDI@GAU / PGPool Integration (WIP)

- PUNCH Login Node
- PUNCH AAI: Group Scope for External
- HTCondor OBS to communicate with COBalD-TARDIS on PUNCHCT

HTCondor Overlay Batch System OBS: MASTER, COLLECTOR, NEGOTIATOR, SCHEDD & GLIAD

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# PUNCH4NFDI@GAU / PGPool / HTCondor-WN Updates

- ✓ StartD drone updated to Rocky Linux 8 and htcondor-release-23.x-1.
- ✓ Configuration of the HTCondor Worker Node using ansible. HTCondor itself is configured using https://pypi.org/project/condor_git_config/ hook (dynamical configuration from a git repository).
- ✓ Configuration files are hosted on https://gitlab-p4n.aip.de/.
- ✓ /cvmfs is bind mounted from the GoeGrid WN host to a directory within the container —> No need to enable user-/mount namespaces
- ✓ Users jobs are restricted to run inside a container: wlcg-wn:latest can do the job.
- ✓ For the integration to C4P:
  - ✓ Use of Condor Connection Brokering CCB on the working node for out bounding: CCB (CCB_ADDRESS = $(COLLECTOR_HOST)).
  - ✓ Request for HTCondor IDTOKEN to join the pool.
  - ✓ The Central Manger of the Compute4punch pool will communicate with our local CoBalD Tardis manager. Some configuration settings to be adapted. To check with Manuel.
  - ✓ Use an access token, with a group scope. The same group will be defined for the resources we are offering. The access token defines which resources users are allowed to access/use. To follow with Oliver

# Acknowledgements

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DFG Deutsche Forschungsgemeinschaft

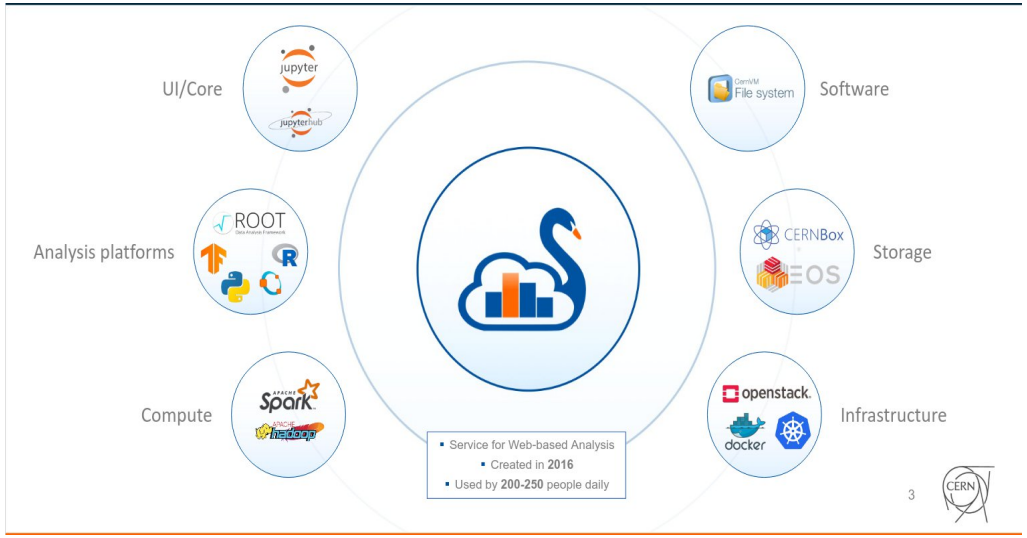
German Research Foundation

# Backup

# PUNCH4NFDI@GAU / Motivation

- Providing access to computing resources, analysis tools used by High Energy Physicists and to ATLAS Open Data for users without CERN- or experiment-affiliation
- Enabling students to learn physics using the very same tools & services used by HEP scientists, and enabling teachers to prepare/offer analysis_based exercises and tutorials by providing educational environment
- ***We will make a fraction of the GoeGrid grid computing resources (WLCG-Tier3) available for users without experiments affiliations***

- CERN offers SWAN, a Service for Web Analysis. Perform interactive data analysis in the cloud: Jupyter Notebook interface, Job submission to CERN Spark Clusters. Access to data in the CERN cloud (EOS)
- ***HOWEVER ➡ Having a CERNBox account is a requirement to use SWAN***
- CERN-SWAN future development: Migration to Kubernetes, migration to Jupyterlab, + more CERN services: cern-talk-2023-swan-cs3.pdf

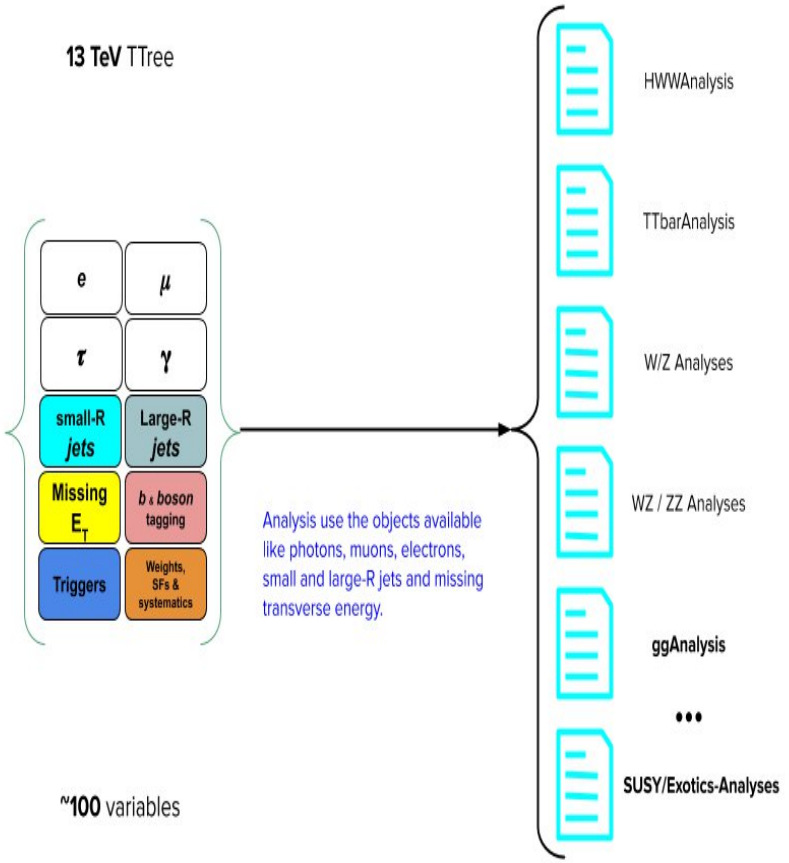


# 13 TeV ATLAS OPEN DATA

https://atlas-opendata.web.cern.ch/atlas-opendata/samples/

**GAU - Local Storage**

- **13 TeV ATLAS Open Data (~150 GB of storage):**
  ✓ 61 runs from the first 4 periods of the 2016 **proton-proton** data-taking
  ✓ 10 $fb^{-1}$ of **pp collision data** (~ 270 million collision events) **& MC simulation samples** describing several Standard Model SM processes (top quark pair, single top, Z+jets, W+jets, WW/WZ/ZZ, SM Higgs and BSM signals)
- **+ 12 examples of physics analysis**: https://cds.cern.ch/record/2707171
- **Accompanied** by a set of analysis frameworks: C++ interfaced with ROOT atlas-outreach-cpp-framework-13tev, PyROOT atlas-outreach-PyROOT-framework-13tev, and notebooks under ROOT



# Back-UP

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# ttbar_atlas_13Tev_tutorial@C4P

# Contribution to TA2-WP2 Comput4PUNCH Tutorials

## ttbar ATLAS 13 TeV with open data ( 1 lep)

**Analysis part:**
**4 DATA + 25 MC samples**
**Lumi: 10 fb$^{-1}$**
**Events: 264,268,336 p-p data + 68597266 MC**
ATLAS-opendata/samples/2020/1lep/

**Condor_submit submit_TTbarAnalysis.jdl**

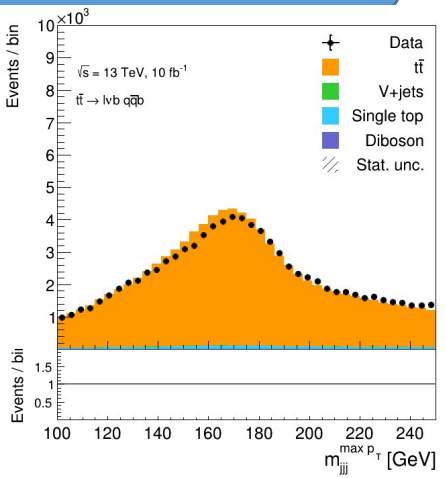
**Output_TTbarAnalysis Directory 29 root files**

**Plotting part:**
**1 merged DATA + 29 MC root files from the Analysis part**

**Condor_submit submit_Plotter.jdl**

```
executable = run_Plotter.sh
output = logs/$(cluster).$(process).out
error = logs/$(cluster).$(process).err
log = logs/cluster.log
ShouldTransferFiles = YES
WhenToTransferOutput = ON_SUCCESS
transfer_input_files = Plotter.C, inputfiles, Plotting.h, Output_TTbarAnalysis
transfer_output_files = histograms
request_cpus = 8
request_memory = 20000
+SINGULARITY_JOB_CONTAINER = "wlcg-wn:latest"
queue 1
```

**Histograms Directory png, pdf**




ATLAS_open_data_ttbar_tutorial@C4P

# TA2-WP2 Delivrables

- Deliverables:
  - D-TA2-WP2-1 (30 Jun 2022): Demonstrator for federated compute infrastructure Compute4PUNCH.
  - D-TA2-WP2-2 (30 Jun 2024): Adaption of Compute4PUNCH for domain specific large data collection (LOFAR, MeerKAT, CERN open data).
  - D-TA2-WP2-3 (30 Jun 2022): Prototype for container registry.
  - D-TA2-WP2-4 (31 Dec 2024): Integration of a variety of compute resources available in PUNCH4NFDI into Compute4PUNCH.
  - D-TA2-WP2-5 (30 Jun 2023): Realisation of entry points as JupyterHub and batch system.
  - D-TA2-WP2-6 (30 Jun 2024): Integration of opportunistic cache systems into Compute4PUNCH, and testing.
  - D-TA2-WP2-7 (30 Sep 2025): Data-locality aware scheduling available in the overlay batch system.
  - D-TA2-WP2-8 (30 Sep 2026): Fully capable container registry.