Monte Carlo simulations for the Pierre Auger Observatory using the VO auger grid resources
Executive Summary

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What is this contribution about?

We describe the usage of the Virtual Organization (VO) auger for the production of reference shower and detector simulation libraries used in a handful of analyses, ranging from photon searches to the studies of hadronic interactions within the Pierre Auger Collaboration. On demand, the grid is also used for extensive simulation libraries which cannot be produced on standard local computing farms.

Why is it relevant/interesting?

AugerPrime, the Pierre Auger Observatory upgrade, is swiftly progressing and the demand for new simulation libraries for the new detectors is high. The production of simulation libraries including the radio component of air showers is the most challenging endeavor as it requires studies regarding the possibility of using the Message Passing Interface of the CORSIKA code on the grid which may be of relevance for the current and next generation cosmic-ray experiments exploiting this detection technique.

What has been done?

A Monte Carlo simulations task was established to coordinate, plan, and produce extensive simulation libraries for the Pierre Auger Collaboration. The bulk of the simulations are produced in the grid using the VO auger. The reference simulation libraries serve as a baseline for numerous Auger analyses spanning over several research topics. The task works in close collaboration with the Auger Offline team, helping to debug, improve and develop new features. We also worked on a standard set of scripts that allow all Auger members to produce CORSIKA air shower and Offline simulations with the reference settings for the specific analyses.

What is the result?

Reference and on-demand Auger libraries are used in tens of analyses, several of them serving as a base for full author list papers. Five contributions presented in this conference are based on these simulations.

In 2020 we doubled the grid usage in Auger and had comparable relative elapsed time with regards to other Astrophysics VOs. Given the high demand in simulations for AugerPrime, we aim to increase the production of extensive simulation libraries and consolidate our position among the leading Astrophysics VOs.

2020 - Astrophysics VOs
Relative elapsed time

others 6.9
hess 4.8
ams 7
auger 17.7
cta 26.7
virgo 36.9