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GRID-based off-line infrastructure for the PADME experiment at the DAFNE BTF

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The long standing problem of reconciling the cosmological evidence of the existence of dark matter with the lack of any clear experimental observation of it, has recently revived the idea that the new particles are not directly connected with the Standard Model gauge fields, but only through mediator fields or "portals", connecting our world with new "secluded" or "hidden" sectors. One of the simplest models just adds an additional U(1) symmetry, with its corresponding vector boson A'.

At the end of 2015 INFN formally approved a new experiment, PADME (Positron Annihilation into Dark Matter Experiment), to search for invisible decays of the A' at the DAFNE BTF in the INFN Frascati National Laboratories (LNF). The experiment is designed to detect dark photons produced in positron on fixed target annihilations ($e^+e^- \to \gamma A'$) decaying to dark matter by measuring the final state missing mass.

The collaboration aims to complete the design and construction of the experiment by April 2018 and to collect $\sim 10^{13}$ positrons on target by the end of 2018, thus allowing to reach the $\epsilon \sim 10^{-3}$ sensitivity up to a dark photon mass of ~ 24 MeV/c^2.

Data coming from the experiment's DAQ system, currently estimated to a total of 300 TB of raw data for the first year of run, will be transferred to the GRID-interfaced storage system of the Tier 2 site at INFN LNF. Here the data will be reconstructed and analyzed using GRID resources initially located at INFN LNF, INFN CNAF, and Sofia University. All GRID resources will also be used for the simulation, reconstruction, and analysis of MC events.

A full copy of the data will be stored to the INFN CNAF tape library with an emergency backup copy on the KLOE2 tape library, located at INFN LNF.

Given the limited amount of data, of GRID sites, and of available man-power, instead of using one the powerful but complex GRID infrastructures in use by, e.g., the four LHC experiments, we decided to handle job submissions and data transfer using a set of self-developed services based on the standard GRID tools.

This talk will describe the off-line infrastructure of the PADME experiment with details on data production and handling, on the available CPU and storage resources, and on the services created to handle the whole system.

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