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The PADME Detector

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The Positron Annihilation into Dark Matter Experiment (PADME) [1] aims to search for a dark photon (A') produced in the process $e^+ e^- \rightarrow A' \gamma$. It uses the positron beam provided by the DAΦNE LINAC, maximum energy 550 MeV, at the Frascati National Laboratory of INFN [2].

The aim of the experiment is to evaluate the missing mass of single-photon final states following the positrons annihilation on the electrons of a thin target. To measure such a reaction, the PADME apparatus has been built. It consists of a small-scale detector composed of the following parts:

- a diamond active target, to measure the position and the intensity of the beam in each single bunch;
- a beam monitor system consisting of two different silicon-pixel detectors;
- a spectrometer, to measure the charged particle momenta in the range 50-400 MeV;
- a dipole magnet, to deflect the primary positron beam out of the spectrometer and calorimeter and to allow momentum analysis;
- a finely segmented, high resolution electromagnetic calorimeter, to measure 4-momenta and/or veto final state photons.

Each element has specific requirements that are stringent and sometimes at the limit of present technology.

In the talk will be given an overview of each component, and a description of the chosen technical solutions implemented to accomplish the experiment needs. Results of the commissioning data taking, will be illustrated.

References

[1] M. Raggi and V. Kozhucharov, Adv. High Energy Phys. 2014, 959802 (2014).

[2] <http://www.lnf.infn.it/acceleratori/btf/>

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