

## Searching for a Dark Matter with the PADME experiment

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The evidence for the existence of dark matter, so far is based on its gravitational effects. Nevertheless, many theoretical models assume other non-gravitational very-weak interactions between dark matter and ordinary matter, and to test this hypothesis, different experiments are trying to directly detect dark matter signals at particle accelerators.

PADME (Positron Annihilation into Dark Matter Experiment) is peculiar since is searching for dark matter candidates, and in particular a dark photon, in the products of the annihilation of a positron beam with the electrons of an active target. This technique only requires that the dark photon couples to the ordinary one allowing to investigate its existence independently from its decay modes.

The experiment was build and commissioned at the Laboratori Nazionali di Frascati of INFN at the end of 2018 beginning of 2019, and collected in 2020  $\sim 5 \times 10^{12}$  positrons on target at 430 MeV.

The dark photon signal is searched by studying the missing-mass spectrum of single-photon final states resulting from the annihilation process. PADME is expected to reach a sensitivity up to  $10^{-6}$  in  $\epsilon^2$  (kinetic mixing coefficient) for low-mass dark photons ( $\sim 20$  MeV). Here we present the performance of the detector and the preliminary results of the ongoing analyses on SM final states:  $\gamma\gamma$ -events and positron Bremsstrahlung. Prospects for sensitivity to different dark sector candidates, ALPs and dark Higgs, will be also given.

### Reference to paper (DOI or arXiv)

### Your gender (free text)

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