

# 30th International Symposium on Lepton Photon Interactions at High Energies



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## Dark matter studies with the PADME experiment

*Wednesday, 12 January 2022 12:40 (20 minutes)*

In recent years the physics of Feebly Interacting Particles (FIPs) saw a growing interest as a possible solution to the Dark Matter issue [1]. FIPs are exotic and relatively light particles, not charged under the SM gauge group, whose interactions with the SM bosons or fermions are extremely suppressed. They are assumed to be part of a possible secluded sector, called the dark sector, with the lightest stable dark particle(s) playing the role of DM.

In this scenario is inserted the Positron Annihilation into Dark Matter Experiment (PADME) ongoing at the Laboratori Nazionali di Frascati of INFN. PADME is searching primarily a Dark Photon signal [2] by studying the missing-mass spectrum of single photon final states resulting from positron annihilation events on the electrons of a fixed target. Actually, the PADME approach allows to look for any new particle produced in  $e^+e^-$  collisions through a virtual off-shell photon such as long lived Axion-Like-Particles (ALPs), proto-phobic X bosons, Dark Higgs ...

After the detector commissioning and the beam-line optimization, PADME collaboration collected in 2020 about  $5 \times 10^{12}$  positrons on target at 430 MeV. These data are now under analysis and preliminary results are ready to be shown.

In the talk, it will be given an overview of the scientific program of the experiment and the performance of the detector will be presented showing Standard Model channels study (gamma-gamma events, Bremsstrahlung).

### References

- [1] P. Agrawal et al., “Feebly-Interacting Particles: FIPs 2020 Workshop Report”, arXiv:2102.12143v1.
- [2] M. Raggi and V. Kozhuharov, Adv. High Energy Phys. 509, (2014) 959802.

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