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In spite of the variety of attempts to create dark matter at accelerators, up-to-now, none of the conducted experiments has produced any evidence.

This elusiveness of dark matter has then triggered innovative and open-minded approaches spanning a wide range of energies with high-sensitivity detectors. In this scenario is inserted the Positron Annihilation into Dark Matter Experiment (PADME) ongoing at the Frascati National Laboratory of INFN. PADME is searching a Dark Photon signal [1] by studying the missing mass spectrum of single photon final states resulting from positron annihilation events on the electrons of a fixed target. After commissioning and beam-line optimization, PADME collected in 2020 about 5×10^{12} positrons on 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 ... In the talk, the scientific program of the experiment, and its current status will be illustrated.

References

[1] B. Holdom, Phys. Lett B 166, 196 (1986).

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