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Dark Photon Searches at the PADME Experiment

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Massive photon-like particles are predicted in many extensions of the Standard Model as possible portals to a hidden sector where Dark Matter is secluded [1]. They are vector bosons mediating the interaction between ordinary and dark matter and can be produced in different processes through a feeble mixing to the photon. The PADME experiment [2], conducted at Laboratori Nazionali di Frascati of INFN, searches for a signal of a Dark Photon A' in the reaction $e^+e^- \rightarrow \gamma A'$ in a positron-on-target experiment. For this purpose, the missing mass spectrum of annihilation final states with a single photon is analysed. Collecting approximately 1013 POT, a sensitivity on the interaction strength down to 0.001 is achievable in the mass region $M(A') < 23.7$ MeV.

In addition, the PADME approach allows searches 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, etc. 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).

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

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