



СОФИЙСКИ УНИВЕРСИТЕТ  
ФИЗИЧЕСКИ ФАКУЛТЕТ

## ФАКУЛТЕТЕН СЕМИНАР

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### **Probing the dark sector with PADME**

Among the theoretical models addressing the dark matter problem, the category based on a secluded sector is attracting increasing interest. The PADME experiment, at the Laboratori Nazionali di Frascati (LNF) of INFN, is designed to be sensitive to the production of a low mass gauge boson  $A'$  of a new  $U(1)$  symmetry holding for dark particles. This "dark photon" is weakly coupled to the photon of the Standard Model, and it provides an experimental signature for one of the simplest implementations of the dark sector paradigm. The DAΦNE Beam-Test Facility of LNF will provide a high intensity, mono-energetic positron beam impacting on a low  $Z$  target. The PADME detector will measure with high precision the momentum of a photon, produced along with  $A'$  boson in  $e^+e^-$  annihilation in the target, thus allowing to measure the  $A'$  mass as the missing mass in the final state. This technique, particularly useful in case of invisible decays of the  $A'$  boson, will be exploited for the first time in a fixed target experiment. Simulation studies predict a sensitivity on the interaction strength ( $\epsilon^2$  parameter) down to  $10^{-6}$ , in the mass region  $1 \text{ MeV} < M_{A'} < 22.5 \text{ MeV}$ , for one year of data taking with a 550 MeV beam.

In 2018 the first run will take place, and early data will give the opportunity to compare the detector performance with the design requirements. Intense activity is taking place to deliver and commission the PADME experimental apparatus on site.