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Search for Axion Dark Matter with the QUAX Haloscopes

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The axion, a pseudoscalar particle originally introduced to solve the "strong CP problem", is a well motivated dark-matter candidate with a mass lying in a broad range from peV to few meV. Axions clustered inside our galaxy may be observed by means of detectors called Haloscopes consisting in a resonant cavity immersed in a static magnetic field that triggers the axion conversion to microwave photons. The QUAX collaboration has put one Haloscope into operation and is installing a second one in the two national INFN laboratories in Legnaro and Frascati, respectively. The first one recently reached the sensitivity to QCD axions with masses around 40 micro-eV. Meanwhile, a rich R&D program is ongoing to improve the detectors sensitivity with superconducting and dielectric resonant-cavities and quantum devices and to extend the axion search beyond the axion-photon interaction with a "ferromagnetic" Haloscope that exploits the coupling of axions to electrons.

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Collaboration / Activity

QUAX

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