



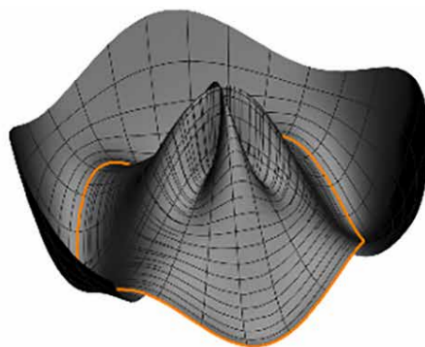
Avviso di Seminario

10 Maggio 2024 – 11:00 – Aula U1 - T010

Indico and Zoom: <https://indico.cern.ch/event/1412471/>

Search for Axion Dark Matter at INFN

Claudio Gatti LNF-INFN



Axion potential after the QCD phase transition (from: Chadha-Day, F., Ellis, J., & Marsh, D. J. E. (2022). Axion dark matter: What is it and why now? *Science Advances*, 8(8), [eabj3618]. <https://doi.org/10.1126/sciadv.abj3618>)

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.

After a brief introduction to axion physics, I will present the status and perspectives for axion dark-matter searches at INFN. I’ll show the recent results of QUAX, an INFN experiment that operates two haloscopes at the national laboratories in Frascati and Legnaro, and the related R&D on resonant cavities and superconducting devices. Finally, I will discuss the proposal for a large haloscope, FLASH, built by recycling a superconducting solenoid of 1.4 m radius, 2.2 m length and 1.1 T field at LNF. FLASH will probe axions with a mass around 1 micro-eV, as well as dark photons and high frequency gravitational waves. Recently, after the refurbishing of the cryogenic lines and of the control system, the magnet was energized with about 2700 ampere to generate, again after two decades, a 1.1 T field.

Claudio Gatti, researcher at the National Laboratories of Frascati of INFN, coordinates the activities of the COLD Laboratory (<https://coldlab.lnf.infn.it>) where axion dark matter research is carried out using superconducting quantum devices.