Contribution ID: **63** Type: **not specified**

Probing the axion-photon interaction with QUAX experiment: status and perspectives.

Wednesday, 16 June 2021 13:00 (25 minutes)

In the context of unveiling the Dark Matter problem, in recent years the tentative of detecting axions has made its way. QUAX is an haloscope experiment based in Legnaro (INFN-LNL) and Frascati (INFN-LNF), Italy, designed to detect axions through two different interactions with matter: the axion-photon interaction (QUAX-aγ) and the axion-electron spin interaction (QUAX-ae). Here I present the status of the QUAX-aγ experiment, the recent results and its future prospects.

Recently, QUAX-aγ has reached a milestone in the field, operating the haloscope with a JPA at the quantum limit and reaching a sensitivity to the axion QCD band, becoming a competitor experiment in the panorama. This was possible with the haloscope at Legnaro, where a resonant cavity was put in a 8 T magnetic field at a temperature of about 200 mK, while the noise temperature resulted in less than 1 K. This allowed us to put an average upper limit to the axion-photon coupling of $g_{a\gamma\gamma} = 0.766 \times 10^{-13}$ GeV^{-1} at 90% confidence level, for an axion mass of $m_a = 43$ μeV.

A new haloscope is being assembled in Frascati: there, a dilution refrigerator with base temperature of 10 mK is now available, and this will host a 9 T magnet. The R&D of resonant cavities continues to test superconducting materials to build cavities with, as Nb_3Sn, and also consists in designing a frequency scan scheme. This is possible either with a usual tuning rod inside the cavity, or inserting a multiple cavity in the magnetic field.

Speaker

Alessio Rettaroli

Primary author: Mr RETTAROLI, Alessio (Istituto Nazionale di Fisica Nucleare)

Co-authors: ALESINI, David (LNF); BRAGGIO, Caterina (PD); CARUGNO, Giovanni (PD); CRESCINI, Nicolo' (LNL); D'AGOSTINO, Domenico (Istituto Nazionale di Fisica Nucleare); DI GIOACCHINO, Daniele (LNF); DI VORA, Raffaele (Istituto Nazionale di Fisica Nucleare); FALFERI, Paolo (TIFP); GAMBARDELLA, Umberto (INFN-Sezione di Napoli, Gruppo Collegato di Salerno); GATTI, Claudio (LNF); IANNONE, Gerardo (NA); LIGI, Carlo (LNF); LOMBARDI, Augusto (LNL); MACCARRONE, Giovanni (LNF); ORTOLAN, Antonello (LNL); PENGO, Ruggero (LNL); RUOSO, Giuseppe (LNL); TAFFARELLO, Luca (PD); TOCCI, Simone (Istituto Nazionale di Fisica Nucleare)

Presenter: Mr RETTAROLI, Alessio (Istituto Nazionale di Fisica Nucleare)

Session Classification: Session 9