

# QUAX and AXIOMA: new experimental methods in axion detection

*Monday 20 June 2016 17:50 (20 minutes)*

We present two different experimental schemes in the field of axion detection that are under investigation within the context of the research call “What Next” of INFN. AXIOMA is a project based on laser-spectroscopy techniques, in which the incident particle contributes to the excitation of an atomic or molecular low-lying energy level and is detected through a fluorescence signal from a higher energy level.

QUAX exploits the interaction of the cosmological axion with the spin of fermions (electrons or nucleons). In recent theoretical works the effect of the “axion wind” on a magnetized material is described as an effective oscillating microwave field with frequency determined by the axion mass and amplitude related to the symmetry breaking scale. An axion detector can then be developed through a magnetized sample whose Larmor frequency is tuned to the axion mass by means of an external polarizing static field (e.g. 0.6 T for 17GHz, corresponding to a 70 $\mu$ eV axion mass). The interaction with the axion effective field drives the total magnetization of the sample, whose oscillations can be possibly detected through the LOngitudinal Detection technique (LOD), even though a bolometric approach is also being considered.

**Primary author:** Dr BRAGGIO, Caterina (University of Padova and INFN)

**Co-authors:** Prof. DI LIETO, Alberto (University of Pisa and INFN); Dr ORTOLAN, Antonello (INFN, LNL); Prof. CARUGNO, Giovanni (University of Padova and INFN); Dr RUOSO, Giuseppe (INFN, LNL); Dr SANTAMARIA, Luigi (CNR, INO); Dr GUARISE, Marco (University of Padova and INFN); Prof. TONELLI, Mauro (University of Pisa and INFN); Dr MADDALONI, Pasquale (CNR, INO); Dr GALLO, Sebastiano (INFN)

**Presenter:** Dr BRAGGIO, Caterina (University of Padova and INFN)