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Present status and future perspectives of high precision X-ray measurements at LNF for nuclear physics and agrifood applications

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The INFN Laboratories of Frascati host a sparkling community working on X-ray detection and its possible applications. Among this community, the SIDDHARTA-2 and the VOXES collaborations developed and implied, in the last years, a series of spectroscopic detectors for several purposes, ranging from a few keV to almost 300 keV.

The SIDDHARTA-2 experiment at LNF exploits the large area of Silicon Drift Detectors (SDD) to measure for the first time the strong interaction induced shift and width of the 1s level in kaonic deuterium; in parallel, CdZnTe and HPGe detectors are also installed within the main experimental apparatus to measure transitions from other kaonic atoms having potential breakthrough impacts like, for example, a new precise measurement of the charged kaon mass, still an unsolved puzzle.

The VOXES collaboration started, in 2016, to develop a Bragg spectrometer based on HAPG mosaic crystal aiming at future measurements of kaonic atoms with sub-eV precision and a few eV resolution; while working in this direction, the developed spectrometer proved itself to be suitable for a series of other interesting applications involving isotropic sources of millimetric and centimetric dimensions, like for instance the possible determination of metals' oxidation states in wine.

In this talk, we present the recent advancements, both in terms of detector development and obtained results, for all the above-mentioned activities.

Primary author: SCORDO, Alessandro

Presenter: SCORDO, Alessandro

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