

## Particle detectors in Rare-gas crystals

Low energy threshold detectors are necessary in many frontier fields of the experimental physics. In particular these are extremely important for probing Dark Matter (DM) possible candidates. We present the activity of the AXIOMA matrix R&D project, a novel detection approach that exploits Rare gases crystals both undoped and doped maintained at low temperature. In the undoped matrices, the direct ionization of the incident particle creates free charges that could be extracted through the solid-vacuum interface and then detected. In the doped crystals scheme we probe the energy levels of atoms embedded into the crystals. We exploit laser-assisted transitions that are triggered by the absorption of the incident particle in the material and leads in the emission of a fluorescent photon or in an electron. Two possible schemes are thus possible: one is based on a light signal while the other takes advantage of high efficiency-in vacuum charge detection. The second approach offers the advantage of single-electron detection combined with a very low dark count rate using microchannel plate or channeltron sensors. However, to ensure electrons' drift, we need high quality crystals with an impurity level lower than ppb especially for high electronegativity atoms. Through these schemes, we could be able to detect low energy release in the range [sub eV-tens of eV] in large volume crystals opening thus the possibility to investigate lighter DM candidates.

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