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Archeological Lead detectors for neutrino physics

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Neutrinos play a crucial role in the Standard Model of particle physics, but also in Astrophysics. The evolution of a massive star strongly depends on the properties of these particles, especially in Supernova explosions. On this subject very few information are available concerning their production, absorption, and scattering processes and elementary aspects of neutrino transport in dense environments.

Furthermore, one extremely relevant topic is the nature of neutrinos, whether they are Majorana or Dirac particles, but also their absolute values. Neutrinoless double-beta decay is among the best probe for the study of these properties.

In this respect, archeological Lead can be an important and active target material for the study of neutrino properties using Lead-based cryogenic detectors. Archeological Lead is a suitable material for rare events investigations, given its excellent radiopurity and its efficient stopping power.

In this work, we will present the performance of a sample of pure archeological Lead operated as cryogenic detector, and we will review its potential as Supernova neutrino detector.

Moreover, we will show the performance a massive PbMoO_4 crystal produced from archeological Lead for double-beta decay applications.

Less than 5 years of experience since completion of Ph.D

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Student (Ph.D., M.Sc. or B.Sc.)

N

Primary author: Dr PATTAVINA, Luca (Laboratori Nazionali del Gran Sasso (Italy) & Technical University of Munich (Germany))

Presenter: Dr PATTAVINA, Luca (Laboratori Nazionali del Gran Sasso (Italy) & Technical University of Munich (Germany))

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