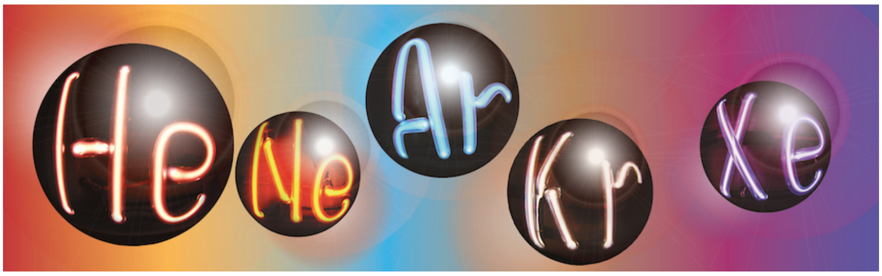

Contribution ID: **24**

Type: **Oral Presentation**

Imaging of scintillation light with Coded Aperture masks

Thursday, 23 October 2025 11:40 (20 minutes)

Large volumes of liquid Argon or Xenon constitute an excellent medium for the detection of Neutrino interactions and for Dark Matter searches. Traditionally, noble liquid detectors use scintillation light for a timing or calorimetric signal, often in combination with a Time Projection Chamber (TPC).
Imaging of scintillation light may offer an alternative to charge collection, enabling a direct optical reconstruction of events. Using finely segmented SiPM arrays and a suitable optical system, it becomes possible to construct cameras that effectively "photograph" the primary scintillation light.
A major challenge arises from the fact that both Argon and Xenon scintillate in the vacuum ultraviolet (VUV) range. To address this, we employ Coded Aperture masks in place of traditional lenses, enabling thin cameras with wide and deep fields of view. A reconstruction algorithm based on Maximum Likelihood Expectation Maximization has been developed to obtain a 3D map of energy deposition, outperforming traditional deconvolution techniques in simulation under low-light conditions.
This presentation will cover recent simulation results of neutrino interactions in a liquid Argon detector instrumented with these cameras, along with the design, construction, and first tests of a 256-channel prototype. We will also highlight ongoing progress in key enabling technologies, such as novel wavelength shifter materials and VUV-enhanced backside-illuminated SiPMs. This work was supported by Italian Research Ministry Grant "PRIN 2022KJZSYB".

Primary author: CICERO, Valentina (INFN)

Co-authors: Dr TOSI, Nicolò (INFN); Dr BASIRICÒ , Laura (Università di Bologna); Dr COLANTONI, Elisabetta (Università di Bologna); Prof. MARTINA, Luigi (Università del Salento); Prof. MAURI, Nicoletta (Università di Bologna); Dr PIA, Valerio (INFN)

Presenter: CICERO, Valentina (INFN)

Session Classification: Signal reconstruction and identification

Track Classification: Signal reconstruction and identification (analysis methods, simulations)