



Contribution ID: 30

Type: **not specified**

Innovative DAQ system for the CYGNO-04 experiment

Tuesday, 24 February 2026 15:55 (25 minutes)

The contribution presents the design and commissioning of a new Data Acquisition (DAQ) system for the CYGNO-04 demonstrator of the CYGNO experiment at LNGS, which aims for the directional detection of rare low energy recoils for dark matter detection and neutrino spectroscopy by means of a large gaseous TPC with optical readout. The system is tailored to such a gaseous optical TPC and introduces a continuous imaging mode that significantly reduces the dead time and enables the reconstruction of particle tracks extending across multiple frames. On this basis, the first synchronized multi-camera acquisition in CYGNO has been realized, allowing several optical sensors to operate simultaneously in a coherent and time-aligned way. A fully functional DAQ prototype has been implemented, featuring synchronization of multiple readout boards and precise timing alignment between cameras and PMTs, thus enabling event-by-event correlation between optical images and fast light signals. To the best of current knowledge, this combination of capabilities is genuinely innovative and has not been previously achieved in gaseous TPCs with optical readout. The talk will present the overall acquisition scheme, the performance obtained with LIME, the last prototype, and the main open issues that must be addressed in view of the next detector, CYGNO-04, where a six-camera system will rely on these DAQ features to sustain high data rates and enable advanced track reconstruction.

Presenter: PIACENTINI, Stefano (GSSI && INFN LNGS)

Session Classification: Gas detector R&D