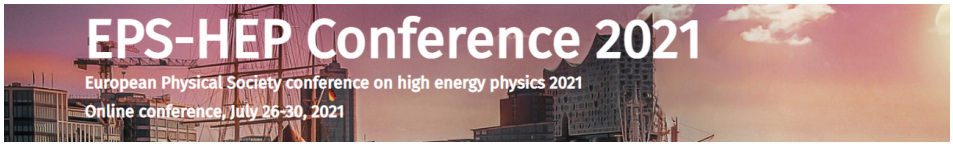

Contribution ID: **640** Type: **Parallel session talk**

Performances of a 3D optical readout TPC for the CYGNO experiment

Monday, 26 July 2021 15:00 (15 minutes)

Gaseous Time Projection Chambers (TPC) with optical readout are an innovative and very promising detection technique to enhance the the sensitivity for light dark matter candidates.

The Cygno experiment is pursuing this technique by developing a TPC operated with gas mixtures at atmospheric pressure equipped with a Gas Electron Multipliers (GEM) amplification stage that produces visible light. Light is collected by as high sensitivity and resolution scientific CMOS camera, while a fast photodetector is used to measure the drift time of the primary ionisation electrons and thus reconstruct the third coordinate of the ionisation track.

In this contribution, we illustrate the technical solutions developed to construct detector prototypes and discuss their performances when exposed to radioactive sources. We present results in terms of electroluminescence yield and charge gain when operated with several gas mixtures based on He-CF4, He-CF4-isobutane, Ar-CF4, and different electric field configurations. We also illustrated the solutions adopted for the DAQ and trigger systems and the performances of an innovative multi-stage pattern recognition algorithm based on advanced clustering techniques. We show how such solutions are essential to identify and select interesting events and how we plan to have them online to cope with the data throughput. Finally, we show the evolution of the project from small size detectors to the current 50 litres prototype which will be installed and tested underground at LNGS this year. A 1 cubic meter demonstrator is expected to be built in 2021/22 and subsequently installed and commissioned at LNGS aiming at a large scale apparatus in a later stage.

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Collaboration / Activity

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Session Classification: T12: Detector R&D and Data Handling

Track Classification: Detector R&D and Data Handling