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## LIME: a gaseous TPC with optical readout

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The ability of identifying and discriminating electronic and nuclear recoil events at the experimental low energy threshold represents the main limitation of the modern dark matter direct detection experiments. In this context, the gaseous Time Projection Chambers (TPCs) with optical readout are a promising and innovative technique. Thanks to the high granularity and sensitivity of the latest generation of sCMOS light sensors, this approach is characterized by very good energy and 3D position reconstruction capabilities. The Cygno experiment is developing a gaseous TPC operated with a He:CF<sub>4</sub> gas mixture at atmospheric pressure equipped with a Gas Electron Multipliers (GEM) amplification stage that produces visible light collected by a scientific CMOS camera, and by a set of fast photosensors.

In this contribution we will present the 50 L prototype, called Long Imaging Module (LIME), foreseen to conclude the R&D phase of the Cygno project.

LIME has been recently installed underground at the Laboratori Nazionali del Gran Sasso (LNGS), with the aim of studying the performance of the Cygno experimental approach in a low background environment and developing a refined trigger and DAQ system for the future upgrades.

This is a crucial step towards the development of a larger  $\mathcal{O}(1\text{m}^3)$  demonstrator, which will be made up of several LIME modules.

### In-person participation

Yes

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