Contribution ID: **1281**   Type: **Parallel Talk**

LiquidO: a Novel Neutrino Detection Concept

Saturday, 9 July 2022 15:30 (15 minutes)

The history of neutrino physics has been profoundly marked by the use of transparent liquid scintillator (LS) detectors. Their application in reactor and solar neutrino physics led to the discovery and the study of many fundamental properties of the elusive neutrinos. Despite all these successes and many decades of R&D, particle identification (PID) remains a weak point for this technology. In this talk I will introduce a revolutionary detector concept called LiquidO that abandons the paradigm of transparent LS and exploits an opaque LS, i.e. one with a short light scattering length but moderate long absorption length, to confine the light near its creation point. In this way, the topological information of the particle interaction pattern, normally lost in transparent LS detectors, is revealed. This allows for efficient particle identification and event-by-event topological discrimination power down to MeV-scale positron, electron, and gamma events. LiquidO technology uses a dense grid of wavelength shifting fibres, readout by SiPM at the ends, to extract the light from the opaque LS. Several advances are made possible by LiquidO technology: strong background rejection, thanks to the LiquidO PID capability, and the possibility of loading dopants at high concentrations, since transparency is no longer required. This opens the possibility of a large number of new physics measurements in several areas of neutrino, nuclear and accelerator physics as well as medical application, many of which are under active exploration. In my talk I will introduce the LiquidO principle and I will report the results, recently published on Communication Physics, of a proof of principle test. I will also present some preliminary results on a small scale prototype called "Mini-LiquidO"whose aim is the demonstration and precise performance qualification of the LiquidO technique for physics applications, as well as the future R&D program.

In-person participation

Yes

Primary author: DUSINI, Stefano (Istituto Nazionale di Fisica Nucleare)

Presenter: DUSINI, Stefano (Istituto Nazionale di Fisica Nucleare)

Session Classification: Detectors for Future Facilities, R&D, novel techniques

Track Classification: Detectors for Future Facilities, R&D, novel techniques