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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

PRISMA+ Colloquium

Jan. 18, 2023 at 1 p.m.
Lorentz-Raum, 05-127, Staudingerweg 7

Dr. Anatael Cabrera
Paris, France

Light Detection and Imaging within Opacity using the Novel LiquidO Technique

The neutrino discovery (1956), by Reines & Cowan, paved the technical ground behind the establishment of much of today's neutrino detection. Large instrumented volumes have been achieved via a key (implicit) principle: the impeccable transparency of detector, almost regardless of detection technique.Much of that technology has yielded historical success, including several discoveries and Nobel prizes, such as that of 2015 for the discovery of the Neutrino Oscillation phenomenon leading to an important modification of the Standard Model of Particle Physics. Despite their remarkable success, much of the transparent-based technology is also known to suffer from some key limitations, even after 70 years of maturity towards perfection. The pending challenge is to be to endow detectors with powerful active background rejection while allowing large volume articulation. Indeed, poor particle identification is a long standing issue. This forces experiments to rely on expensive and cumbersome external shield (active or passive), including major overburden in underground laboratories, as the only mean to mitigate otherwise overwhelming backgrounds.

In this seminar, the referent shall introduce the LiquidO technology — in final stages of demonstration — relying, for the first time, heavily on detection medium opacity. The goal is enable sub-atomic particle event-wise imaging, so event topology may be use for particle ID purposes, even in the low MeV region. The development is led by the homonymous LiquidO international academic consortium with institutions over 10 countries. While not perfect, LiquidO appears to be capable to offer several detection features that might lead to breakthrough potential in the context of both neutrino and rare decay physics. The physics potential will be briefly highlighted. Beyond its most basic demonstration, LiquidO remains a testbed context for further detection R&D, where much innovation is expected and ongoing.

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