

Department of Physics

Particle Physics
The Denys Wilkinson Building, Keble Road, Oxford OX1 3RH



Experimental Particle Physics Seminar

at 2.15 pm

Dennis Sciama Lecture Theatre

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LiquidO: Novel Opaque Neutrino Detection Technology

Abstract

The neutrino discovery, by Reines & Cowan, paved the technical ground behind the establishment of much of today's neutrino detection. Large instrumented volumes can and have been achieved via a key (implicit) principle: detector transparency. Much of that technology has yielded historical success since the 50's, including several Nobel prizes. The discovery of Neutrino Oscillation phenomenon is the latest example, thus solving the long standing "Solar" and "Atmospheric" anomalies by SNO and SuperKamiokande — along with many other experiments. Despite the remarkable success, much of such a "transparent technology" is known to suffer from some key limitations even after 70 years of maturity towards perfection. The challenge continues to be to endow detectors with powerful active background rejection while allowing large volume articulation. Indeed, poor native particle identification is a long standing issue long alleviated by adding external shielding (active or passive), including major overburden granted by underground laboratories. In this seminar, I shall present for the first time a new technology, under intense R&D, called "LiquidO" relying heavily on detection medium opacity for the first time. The effort is led by the LiquidO collaboration (20 institutions over 11 countries). We shall compare LiquidO to its transparent counterpart for maximal appreciation. While not perfect, LiquidO seems to be able to offer several detection features that might lead to breakthrough potential in the context of both neutrino and rare decay physics. This will be briefly highlighted too.