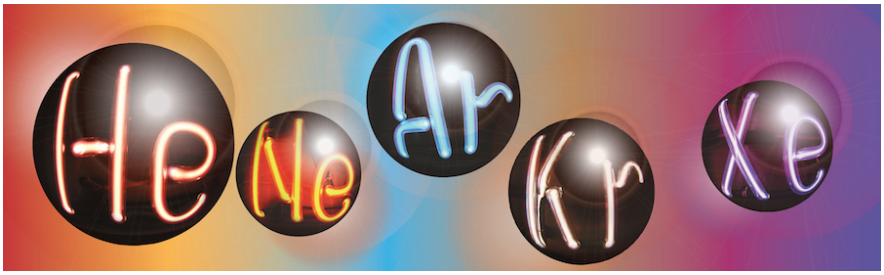

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"The Art of Cleaning Xenon: Technologies Behind Ultra-Low Backgrounds"

Wednesday, 22 October 2025 15:50 (20 minutes)

Liquid xenon (LXe) has become a cornerstone medium for rare event detection, including dark matter searches, neutrino physics, and neutrinoless double beta decay experiments. These applications demand ultra-low background environments, where even a trace amount of impurity—such as krypton, radon, or electronegative molecules—can significantly degrade the sensitivity of the detector.

In this talk, I will present the key technologies behind the purification and handling of liquid xenon, developed through the XENONnT experiment. Topics will include sub-ppt krypton removal via cryogenic distillation, radon mitigation techniques, gas-phase and liquid-phase purification circuits, as well as material outgassing control and online monitoring systems.

Emphasis will be placed not only on the performance of each method but also on the integrative design philosophy that enables long-term operation and scalability.

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Session Classification: Detector techniques

Track Classification: Detector techniques (HV, purification, cryogenics, calibration etc.)