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Purification of xenon for the next generation of xenon experiments

Thursday, 21 May 2026 15:00 (30 minutes)

Next-generation xenon experiments designed to search for dark matter and neutrinoless double beta decay, such as XLZD, require even lower concentrations of electronegative impurities and radioactive noble gases such as argon, krypton and radon in the xenon target. The levels of electronegative impurities must be so low that electrons in LXe can drift over a distance of 3 m without significant loss. For radioactive noble gases, their concentrations –based on impurity levels corresponding to the solar neutrino rate at XENONnT [1] –must be reduced by a further order of magnitude through even better shielding, material selection and detector design, as well as through scalable technologies and new purification methods. In addition, the sensitivity in measuring the various concentrations within the detector must be improved. This talk will present the current status and results of LowRad [2] as well as other R&D projects.

[1] E. Aprile et al. [XENON Collaboration], Radon Removal in XENONnT down to the Solar Neutrino Level, Phys. Rev. X 15 (2025) 031079
[2] ERC Advanced Grant project 101055063: LowRad (Low radon and low internal radioactivity for dark matter and rare event xenon detector)

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