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Multi-Calorimetry in Light-based Neutrino Detectors

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Neutrino detectors are amongst the largest ever built photonics systems, where the neutrino detection is inexorably linked to the challenging detection of scarce photons. The tremendous progresses in neutrino physics over past several decades are inseparable from the evolution of the detector photonics interfaces to yield ever higher precision and richer detection information. The measurement of the energy of neutrinos, referred to as calorimetry, is required today to be controlled to the per-mille level precision, thus leading to further innovation in specialized photonics. In this talk, a novel design, with the publication to be released soon, is presented that detectors can be endowed with multiple photonics interfaces for simultaneous multiple light detection to yield high-precision calorimetry. This multi-calorimetry approach opens the novel notion of dual calorimetry detectors as an evolution from the single calorimetry setups used for most experiments so far. The dual calorimetry design exploits unique response synergies, including correlations and cancellations, to yield the unprecedented mitigation of today's dominant response systematic effects. The dual calorimetry design has been adopted by JUNO experiment and could shed light on the design of future neutrino detectors.

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Classifica Sessioni: Data Science and Detector R&D

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