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Design and First Results of the CoDeX Liquid-Xenon Compton-Imaging Detector BRIAN TENNYSON, SIDNEY CAHN, Yale University, ETHAN BERNARD, University of California, Berkeley, ELIZABETH BOULTON, Yale University, NICHOLAS DESTEFANO, University of Connecticut, BLAIR EDWARDS, ARIANA HACKENBURG, Yale University, MARKUS HORN, University of California, Berkeley, NICOLE LARSEN, University of Chicago, JAMES NIKKEL, Royal Holloway University, CHRISTOPHER WAHL, H3D, MOSHE GAI, University of Connecticut, DANIEL MCKINSEY, University of California, Berkeley
— CoDeX (Compton-imaging Detector in Xenon) is an RD Compton gamma-ray imaging detector that uses 30 kg of xenon in a two-phase time projection chamber. Time projection relative to the initial scintillation signal provides the vertical interaction positions, and either PMT-sensed gas electroluminescence or a charge-sensitive amplifier quantifies the drifted ionization signal. Detector features to enable Compton imaging are a pair of instrumented wire grids added to sense the horizontal position of clouds of drifted electrons that traverse the detector. Each wire is individually amplified in the cold xenon environment. Design choices addressing the thermodynamic and xenon purity constraints of this system will be discussed. We will also discuss the mechanical designs, engineering challenges, and performance of this Compton-imaging detector.

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