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A Novel CMOS Electrode Readout Scheme for High Purity Germanium Detectors

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In this work a novel CMOS electrode readout scheme for HPGe(High Purity Germanium) detectors with a low noise and a low input capacitance has been presented. It is a new architecture which is different from the existing planar or coaxial or PC-HPGe (Point-Contact High Purity Germanium) detectors. We propose a readout scheme with double layers of grid electrodes on both top and bottom of the Germanium crystal. Each readout channel has a similar readout structure to the parallel planar electrode readout, but taking the advantage of pixel sensors instead of the plants. The CMOS pixel readout electrode is named Topmetal-II-. From our measurement the ENC (Equivalent Noise Charge) value is 13 e- and the input node capacitance is around 20fF. Some basic characteristics of this scheme such as the capacitances, electric field, parameters of the sensitive region and so on are also simulated and presented. Due to such a low noise and a low integrate capacitance, this scheme would be a competitive candidate for the dark matter detection.

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Session Classification: After dinner POSTER session, with drinks: (All presenters are requested/encouraged to attend their posters; All participants are requested to participate the session, with drinks!)

Track Classification: Simulations and Manufacturing