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A novel large-volume spherical detector with proportional amplification read-out

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A new type of radiation detector based in the spherical geometry is presented. The detector consists of large spherical gas volume with central electrode and radial electric field. Charges deposited in the drift volume are drifting to the central sensor where are amplified and collected. We introduce a new spherical proportional sensor located at the center of curvature acting as a proportional amplification structure. It allows to reach high gas gains and operates from low to high gas pressure. Signal development and the absolute amplitude of the response are consistent with predictions. Sub-keV energy threshold with good energy resolution is achieved. This simple and robust structure allows to read large volumes with a single read-out channel. The detector performance presently achieved is already dose to fulfill the demands of many challenging projects from low energy neutrino physics to dark matter detection with applications in neutron, alpha, gamma spectroscopy.

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