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Thomas Thorpe (University of Hawaii): A Prototype Directional Dark Matter Detector

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As direct dark matter detectors become larger, and gain sensitivity, they will start detecting neutrinos via coherent scattering with their target nuclei. The most powerful way to discriminate neutrino from dark matter scattering, amongst other backgrounds, is to measure the direction of the nuclear recoils and use this information to reconstruct the source location, a so-called directional detector. As part of the CYGNUS collaboration, which is aimed at constructing large directional detectors, our group is operating a small prototype. The prototype is a Negative Ion Time Projection Chamber (NITPC) with GEM amplification and, eventually, HD pixel readout will be installed. Such a design would allow for 3-D tracking with powerful background suppression and could serve as “unit-cell” for a large, future, directional detector.

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