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Development of a Full3D Optical Time Projection Chamber for Neutrino Interactions

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An Optical Time Projection Chamber with 2 stages of amplification using THGEMs (THick Gaseous Electron Multipliers) that are operated in high-pressure Ar:CF_4 is being developed. Argon doped with 1% of CF_4 provides wavelength shifting of argon scintillation photons from the vacuum-ultraviolet (VUV) to the visible region, centred at 630nm. A Timepix camera coupled to a red light image intensifier can provide Full3D optical imaging of particle tracks with high readout rates, by obtaining the z-coordinate from time-of-arrival and x,y camera pixel number to mm conversion. Reconstruction of low-energy particles from neutrino interactions can be carried out with nanosecond time resolution and fine spatial resolution.

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