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Results Obtained with a Prototype Negative Ion Time Projection Chamber (NITPC) Designed for Measuring the Prompt X-ray Emission from Gamma-ray Bursts¹ ZACHARY PRIESKORN, University of Iowa, J.E. HILL, USRA, NASA GSFC, P. KAARET, University of Iowa, J.K. BLACK, Rock Creek Scientific, NASA GSFC, K. JAHODA, NASA GSFC — Gas based time projection chambers (TPCs) have been shown to be highly sensitive X-ray polarimeters having excellent quantum efficiency while at the same time achieving large modulation factors . To observe polarization of the prompt X-ray emission of a Gamma-ray burst (GRB), a large area detector is needed. Diffusion of the electron cloud in a standard TPC could be prohibitive to measuring good modulation when the drift distance is large. We propose using a negative ion TPC (NITPC) with Nitromethane (CH_3NO_2) as the electron capture agent. An NITPC will have improved diffusion characteristics due to the thermal coupling of the negative ion to the surrounding gas and reduced electronic power consumption due to the slower velocity of the negative ions. We present results from tests of a single and double GEM TPC and NITPC. SciEnergy GEMs of $3\times 3\text{ cm}^2$ and $2\times 5\text{ cm}^2$ were used in the experiment and tested with various concentrations and pressures of P10, NeCO_2 and $\text{NeCO}_2\text{CH}_3\text{NO}_2$. Gain curves, photoelectron tacks and modulation curves will be presented for each instrument.

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