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Increasing gain and dynamic range for active-target time-projection chambers T. AHN, W. MITTIG, M. TAHAR, R. BECQUET, D. BAZIN, S. BECEIRO, Z. CHAJECKI, A. FRITSCH, NSCL, Michigan State University, J.J. KOLATA, Notre Dame University, W. LYNCH, A. SHORE, NSCL, Michigan State University — Active-target time-projection chambers (TPCs) use the unique concept of using the tracking medium of the detector simultaneously as the target for studying nuclear reactions. This gives them the advantage of providing a thick target without losing resolution and a large acceptance for reaction products. However target gases for active-target TPCs such as H_2 and ^{4}He have less favorable properties as compared to standard TPC gases, e.g. a lower maximum gain before sparking. Another difficulty is dealing with the broad range of possible recoil energies and particles resulting in a large span of energy losses. To overcome these difficulties, we tested two new methods using the MICROMEGAS electron amplification device. To handle the large energy loss dynamics, some MICROMEGAS' anode pads were polarized with a HV bias, resulting in different gains. This allows some pads to track high-energy loss particles such as high-Z ions while the others can track lower-energy loss particles such as energetic protons. For increasing the maximum gas gain, we doped the target gas with allene, which can increase the MICROMEGAS charge output by producing a larger number of ionized electrons through allene's conversion of UV radiation to free electrons.

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