

Abstract Submitted  
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**Single-Photon X-ray Detector Using Al-GaN/GaN Heterostructure**<sup>1</sup> IMAN REZANEZHAD GATABI, Electrical Engineering Department, Texas A&M University-College Station, TX, JOEL SANDER, RUPAK MAHAPATRA, Physics and Astronomy Department, Texas A&M University, College Station, TX, HARLAN RUSTY HARRIS, Physics and Astronomy and Electrical Engineering Departments, Texas A&M University, College Station, TX, HARRIS INTEGRATED PHOTONICS AND ELECTRONICS LAB TEAM, MAHAPATRA RESEARCH GROUP TEAM — Rejection of external photons is critical in eliminating background signals for low background detectors including dark matter detectors. Experiments typically employ expensive shielding including ancient Pb. Herein we describe the design of a single-photon detector in the MeV range using an AlGaN/GaN heterostructure. Thin, electrically isolated GaN is used as the bulk material for electron-hole pair generation, and a device is formed with the 2D electron gas (2DEG) at AlGaN/GaN interface due to GaN spontaneous polarization. Numerical simulations of the distribution of carriers with MeV excitation are used to estimate device response of the structure. Applications to photon veto in dark matter and double beta decay research is discussed, and an integration scheme is outlined that will allow nearly complete photon veto of cosmic EM background.

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