Abstract Submitted for the DPP11 Meeting of The American Physical Society

Experimental Program to Investigate the Technique of Remote Detection of Suspected Nuclear Materials With a 670 GHz Gyrotron C.A. ROMERO-TALAMÁS, A. SHKVARUNETS, B. LENARDO, R.C. ELTON, D. KASHYN, R. PU, G.S. NUSINOVICH, V.L. GRANATSTEIN, University of Maryland, College Park, MD 20742 — Planned experiments and diagnostics to investigate the technique of remote detection of concealed suspected nuclear materials (SNMs), utilizing gyrotron radiation at 670 GHz to cause air breakdown, are presented. The technique relies on the principle that ionizing radiation in the vicinity of SNMs creates number densities of free electrons that are orders of magnitude higher than background conditions, making breakdown highly likely at the focal region of the 670 GHz wave beam. The detection system is expected to be deployed in a wide range of atmospheric conditions, and thus testing of wave beam propagation and breakdown will include the presence of aerosols with and without elevated free electron densities. Diagnostics include a specially constructed calorimeter for the wave beam, optical and mass spectroscopy, and microwave scattering for the breakdown region.

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Date submitted: 26 Jul 2011 Electronic form version 1.4