

Abstract Submitted  
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**Ranged Isotope Detection and Identification Using Gas Ionization** BENJAMIN GRABER, DONG HO WU, US. Naval Research Laboratory — Radioactive isotopes produce gamma rays, and the gamma rays ionize gases. Since an isotope has a characteristic gamma energy spectrum, and also gas molecules have characteristic ionization energies, we speculated that the gas ionization rate would uniquely depend on not only the type of isotope but also the type of gas. Our experiments have confirmed these concepts – the experiments clearly exhibit that different isotopes produce different ion densities in different gases. Utilizing a set of four gas cells with embedded ion counters, it is then possible to construct a standoff nuclear-isotope detection system. This system has demonstrated a standoff detection and identification of isotopes at a substantial distance (more than 5 m) while testing Am, Ba, Co, Cs and Na isotopes of less than 75 uCi activity. Our prototype is cheaper, faster and easier to operate than commercial gamma-ray spectrometers. In this talk our experimental results and theoretical models for gas ionization will be presented.

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