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From Bugs to Bombs: X-Ray Standards for Homeland Security

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After the September 11 and anthrax attacks in 2001, it became apparent that there were few national or international standards that could qualify the equipment that accompanied the dramatic expansion of x-ray and gamma-ray screening for explosives, special nuclear material, and other contraband. With ¿10000 IED (improvised explosive device) incidents annually, and global expenditures for transportation and commercial security in the hundreds of billions of dollars, there is a pressing need to develop, apply, and harmonize standards for x-ray and gamma-ray screening systems used to detect explosives. This talk reviews national and international measurement standards and trends for bulk-explosives detection. This project at NIST has led to a new suite of national and international standards that ensure both the imaging performance and the radiation safety of systems used to screen luggage, persons, vehicles, cargo, and left-behind objects. While offering a broad overview of the physics trends in security screening and threat mitigation using ionizing radiation, an in-depth case study in dosimetry is offered as applied to the metrology of a flying-spot of x rays used to scan persons for non-medical purposes.