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Screening the Photon Haystack:
The Role of Radiation Detection Technology in Securing Special Nuclear Material

Since the fall of the former Soviet Union, and especially since the events of 11 September 2001, the perceived threat of a nuclear attack has increased considerably. One response was the formation in 2005 of the Domestic Nuclear Detection Office that now has the mission to develop a Global Nuclear Detection Architecture extending from the source of nuclear material to potential targets. At the heart of the present strategy is passive radiation detection technology, including over a billion-dollar request for spectroscopic radiation portal monitors. But detecting nuclear materials, especially highly enriched uranium, is an enormous challenge. To understand the role of radiation detection technology, one must grasp the basic physics involved and the complications nature imposes. This presentation will discuss the physics of nuclear detection technology and what role radiation detection technology may play in the architecture.

Dr. Robert Runkle is a physicist performing research into radiation detection for national security applications. He is the author of over 50 journal publications and formal technical reports. As the principal investigator of several system studies and detector development projects at the Pacific Northwest National Laboratory, his duties include the development of unattended radiation detection sensor systems and advanced radiation portal monitors. Robert recently accepted a temporary position to serve as a technical advisor to the Office of Non-proliferation Research and Development within the National Nuclear Security Administration. Robert joined PNNL after receiving his Ph.D. in nuclear astrophysics from the University of North Carolina at Chapel Hill. He is a member of the IEEE-Nuclear Science Society and the American Physical Society.