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A Passive Method for Identifying and Locating Fissile Materials Using Cosmic-Ray Muons

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The recent signing of the new Strategic Arms Reduction pact between the United States and Russia creates an important need for nonintrusive identification and quantification of nuclear warheads in various deployment scenarios. We are developing a technique to achieve this goal by taking advantage of the unique fission signature produced when muons stop in fissionable and fissile materials. This can be accomplished in a passive-interrogation scenario using the ubiquitous fluence of muons at the Earth's surface that is produced via cosmic-ray interactions in the upper atmosphere. Combining this method with a muon-tracking system developed at Los Alamos National Laboratory furthermore allows us to locate and count individual masses (>10 kg) of fissionable material in the field. Proof-of-concept experiments are currently being conducted and early results are presented.