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DURHAM, N.H. -- University of New Hampshire astrophysicist James Ryan knows how to detect radioactive emissions across the vast sweep of our galaxy.

So when he watched National Guardsmen struggle to track down a radioactive source inside a building as they conducted a drill mocking a terrorist dirty-bomb operation, the proverbial lightbulb-in-the-head lit up.

"If we can detect radioactive aluminum on the other side of the galaxy we can find other radioactive materials like cesium-137 or cobalt inside a building or on the other side of the street by the same method," Ryan says.

Ryan was a member of the UNH research team that helped build and operate the gamma-ray imaging COMPTEL telescope onboard the Compton Gamma Ray Observatory (CGRO), a 1991-2000 NASA mission dedicated to observing the high-energy universe.

Knowing that the space telescope accurately pinpointed and made images of faraway radioactive elements like aluminum-26, which is produced by dying stars and emits gamma-rays, Ryan understood that the same basic technology could be retasked for work a little closer to home - like detecting, for example, radioactive medical waste obtained surreptitiously for use in making a dirty bomb.

He and colleagues at UNH's Space Science Center dusted off two spare detectors made for COMPTEL and created a telescope that could potentially be loaded on a truck and used for homeland security work such as scanning shipping containers or buildings for radioactive materials.

The key operational aspect of the telescope, known as GRETA, short for the Gamma-ray Experimental Telescope Assembly, is that unlike other technologies such as Geiger counters or spectrometers it can accurately determine the direction from which a radioactive source is being emitted by creating an image.

Of the mock National Guard exercise Ryan notes that while soldiers did have precision spectrometers that can identify the source material, the isotope, and can determine if that material is natural or man-made, they are omni-directional instruments.

Says Ryan, "So they might detect the presence of cesium but they won't know where it is unless they get right up close to it, they'd have to fish around inside the building." Which is not an ideal scenario when the first responders have multiple issues to worry about like other potential hazards from pipe bombs or biological agents, as was the case in the high-stress disaster exercise.

Although more sophisticated technologies are currently under development, Ryan notes that there will be both a time lag and a big price tag associated with this while GRETA is a currently available technology that can get the job done.

"Here's an instrument that has the sensitivity necessary for the job and it's available now," he says.

Earlier this week Ryan's UNH colleague, project engineer Jason Legere, presented information about GRETA and its abilities to the 2008 IEEE Conference on Technologies for Homeland Security, which brought together more than 300 innovators to focus on novel and innovative technologies addressing pressing national security problems.

"What I think impressed attendees the most about GRETA wasn't just its ability to locate and identify radioactive materials, but to do so from a safe distance. This makes GRETA unique," says Legere.

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Photograph available to download here:

http://www.eos.sr.unh.edu/newsimage/comptel_gro.jpg
Photo caption: NASA's Compton Gamma Ray Observatory. Photo courtesy of NASA.