XRD CZT Technology for Checkpoint Screening

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CZT XRD for Better Detection

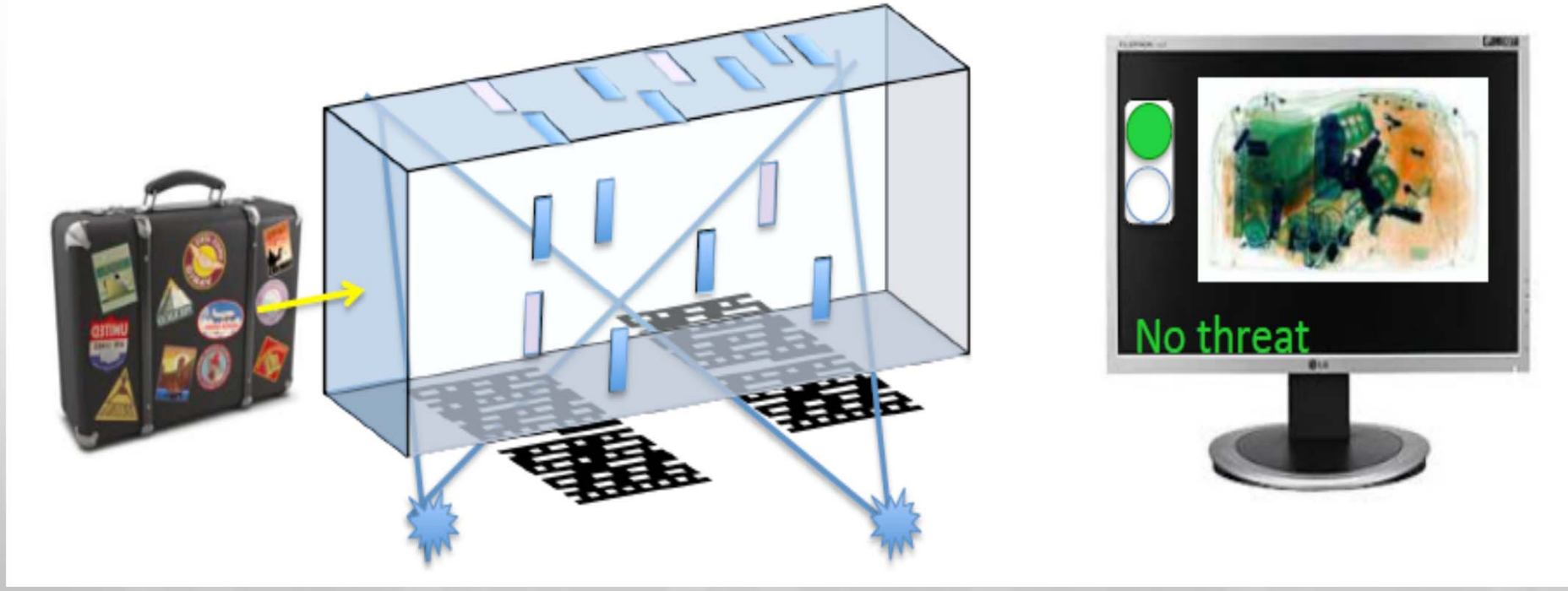
- TSA wants to increase threat detection capability and lower false alarms by 50% by 2020
- CZT XRD tomography may become a complimentary technology for maintaining a high detection probability with low FARs while adding new threat classes
- XRD scanners may work as stand-alone units or be combined with AT/CT equipment as an add-on.
- Redlen has developed CZT radiation detection platform that enables XRD. It is ready to be deployed!

Motivation

- Transmission-based imaging systems (AT/CT) are the cornerstone of checkpoint screening.
  - high-resolution
  - multi-dimensional images
  - mass and density based threat detection
- Sufficient for detecting some classes of threat materials
- NOT sufficient to identify some types threats
  - home-made explosives (HMEs) and liquids and gels (LAGs) whose density/Zeff properties can't be differentiated from stream of commerce with sufficient accuracy to guarantee safety with an acceptably low false alarm rate (FAR)
  - This weakness in differentiation capability has very much slowed the addition of detectable new threat types

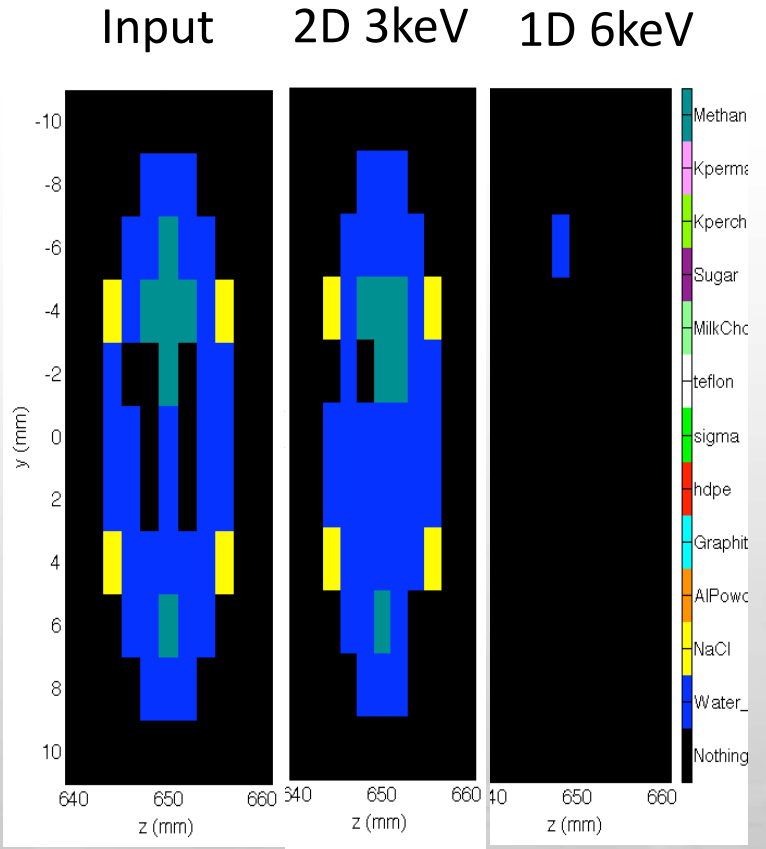
CZT XRD Technology

- Use coded aperture – 100x sensitivity gain
- Use state-of-the-art CZT detectors – material classification
- Use state-of-the-art software and algorithms – throughput



CZT Detectors for XRD

- A key prerequisite requirement for XRD tomography technology is excellent spectroscopic ER of the detectors used in the scanner:
  - CZT Detectors fulfil the requirements for next-generation systems at checkpoints due to their very good energy resolution (2-3keV) at RT
  - Some scanners were certified using HPGe detectors (which has superior energy resolution to that of CZT) but required liquid cooling resulting in much higher systems costs



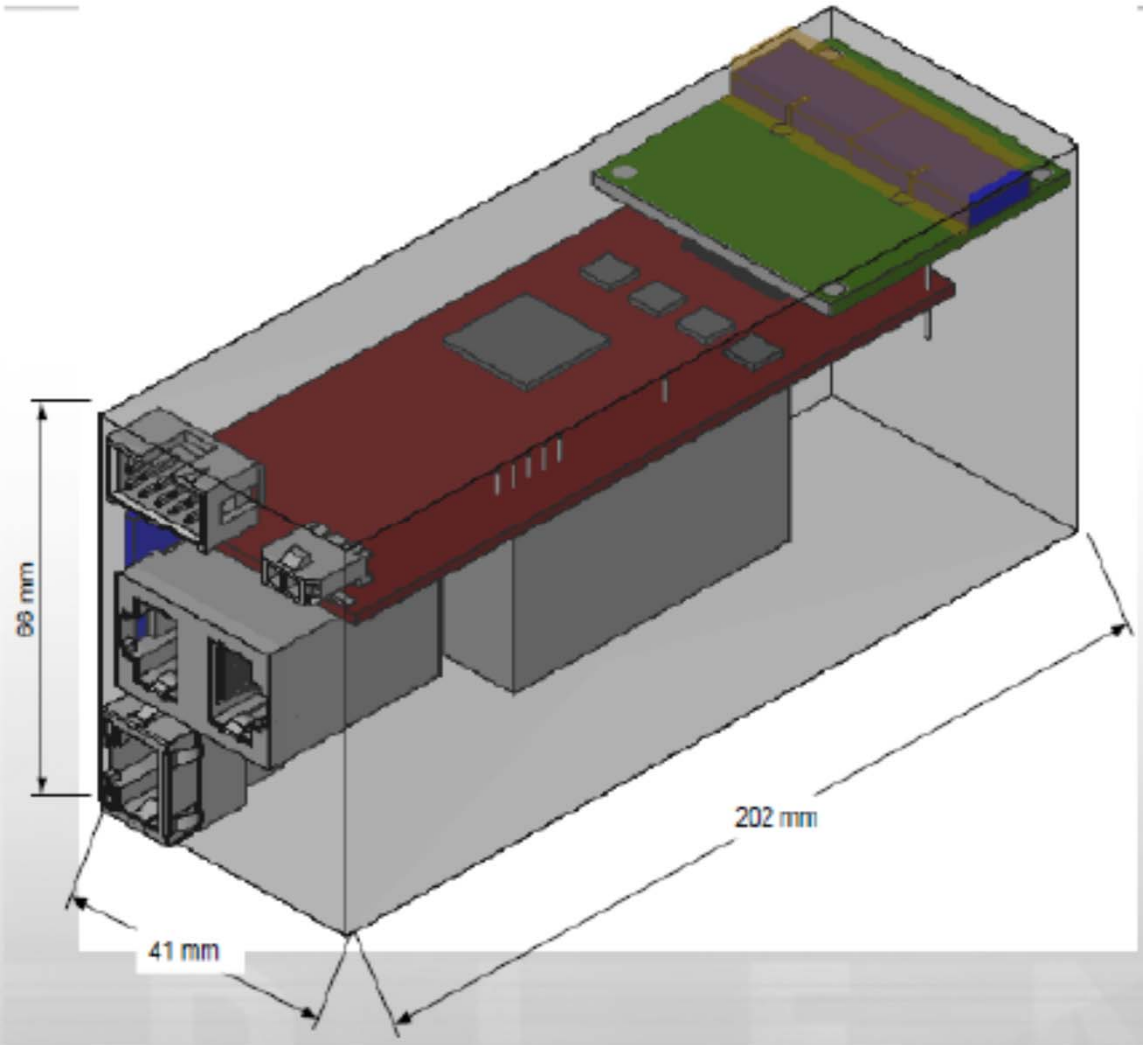
XRD CZT Detector Module

Main Characteristics:

- 10 kcps/mm2 count rate
- 2-3keV Energy Resolution
- Heat sink/shield

Interfaces:

- +12V/GND
- Built-in -600V HV supply
- JTAG (firmware, debug)
- 100Mb/s Ethernet
- Command/Event Port
- +5V EIA-485 Frame Clock
  Module Sync/daisy chain



Key Redlen Contributions

- Developed highly integrated detector technology platform (CZT + electronics)
- Applied the technology in XRD tomography to demonstrate scanner functionality
- Redlen aims to provide CZT technology platform as a building block for all OEMs that are interested in building XRD scanners
- Redlen is pursing application of CZT technology in medical imaging CT that can be leveraged in baggage scanning CT