INL/MIS-24-79171-Revision-0

X-ray Security Imaging on Personal Dosimetry

July 2024

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http://www.inl.gov

Prepared for the
U.S. Department of Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517

X-ray Security Imaging on Personal Dosimetry

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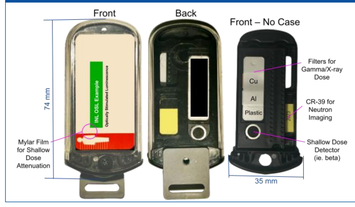
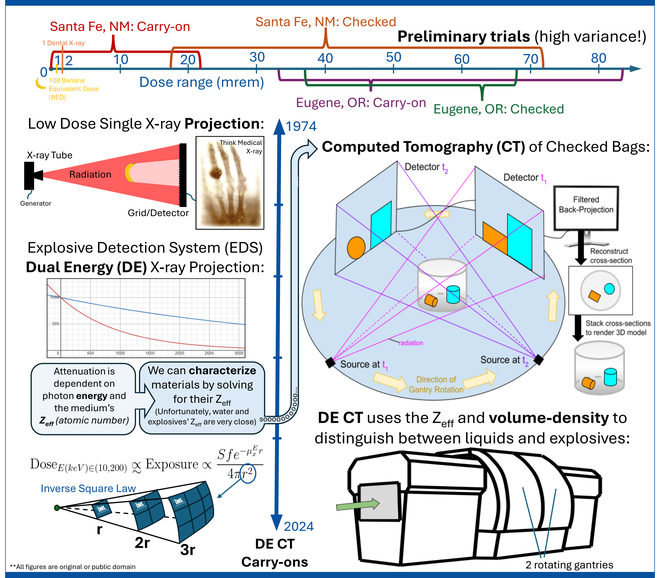
Abstract



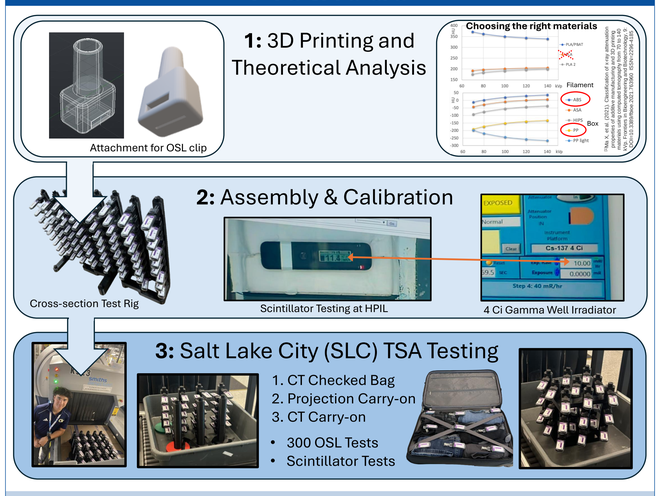
Federal regulations mandate that **personal dosimetry devices — like optically stimulated luminescence (OSLs) — must be worn** by all US Department of Energy (DOE) and associated radiation workers to track their occupational dose. Unfortunately, the inadvertent passage of **OSLs through x-ray security scanners can compromise their validity**. With the advent of high energy, advanced resolution security technology used in airports, this once insignificant issue now requires that Radiological Control (RadCon) be able to accurately discern non-occupational dose to effected OSLs. This presentation will discuss the principles, methods, and, rather interesting, models for **establishing the corrective dose estimates at the Idaho National Laboratory (INL), and its implication across the DOE.**

Introduction



**All figures are original or public domain

Methods

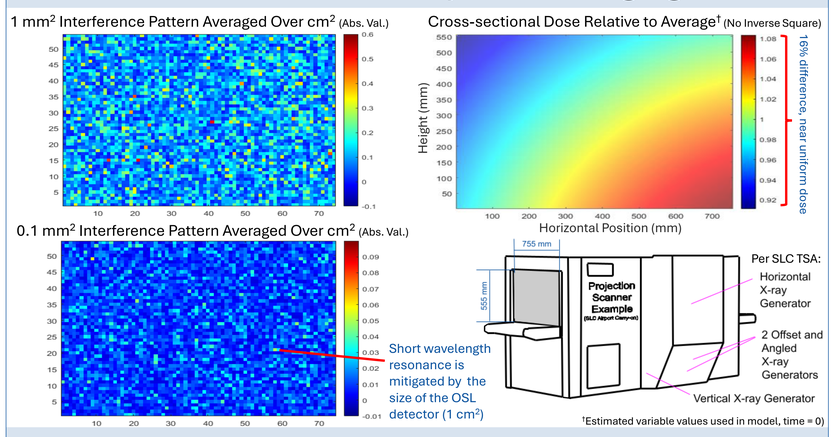


Acknowledgements

U.S. DEPARTMENT OF ENERGY
Transportation Security Administration
SLC INTERNATIONAL

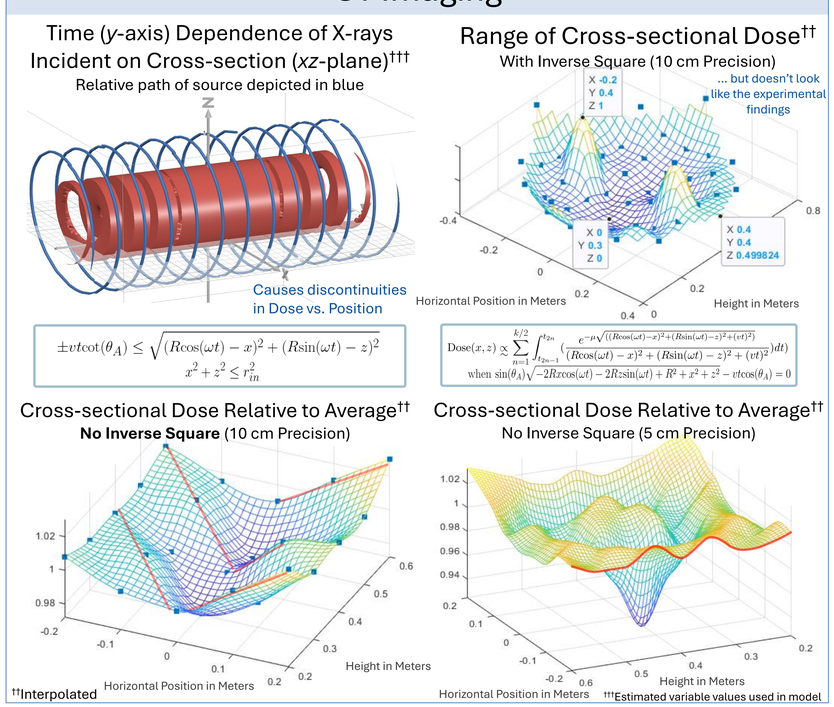
Theoretical Predictions

Resonance and Projection Imaging



†Estimated variable values used in model, time = 0)

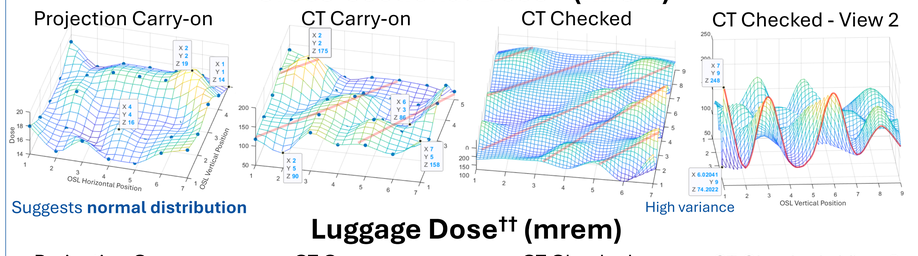
CT Imaging



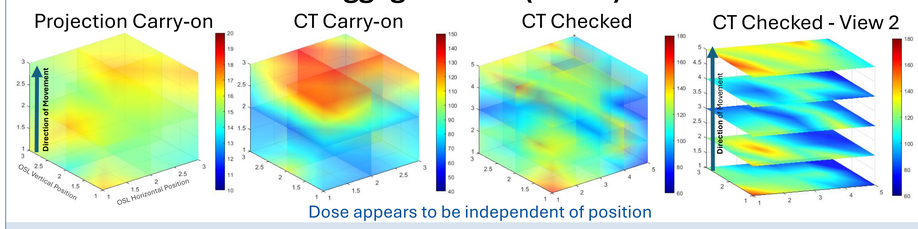
††Interpolated
†††Estimated variable values used in model

Experimental Findings

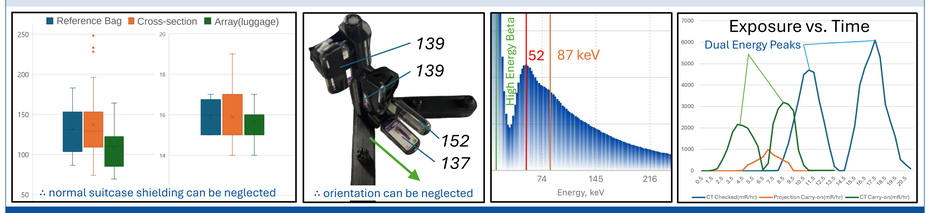
Cross-sectional Dose†† (mrem)



Luggage Dose†† (mrem)

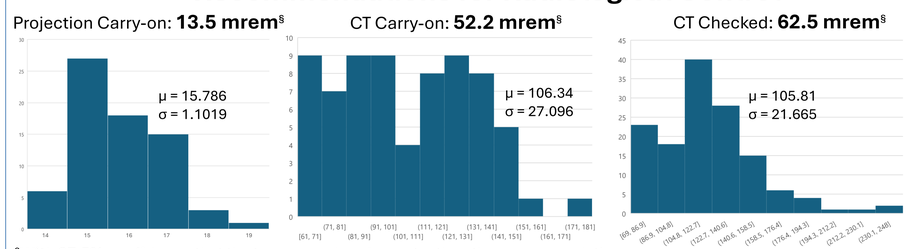


Attenuations, Orientations, Energy Spectra, & Exposures Tests



Conclusion

Recommendations for Radiological Control



§**With 97.5% confidence** that the true mean dose is greater than the recommendation

Limitations and Future Works

Additional Airports & Scanners

Proprietary and Security Concerns

Shallow Dose Variance in CT

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