

# MUON RADIOGRAPHY AT LANL

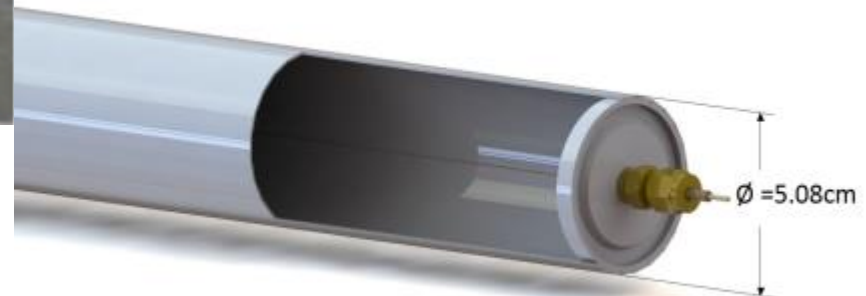
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# Our detector: the Mini Muon Tracker

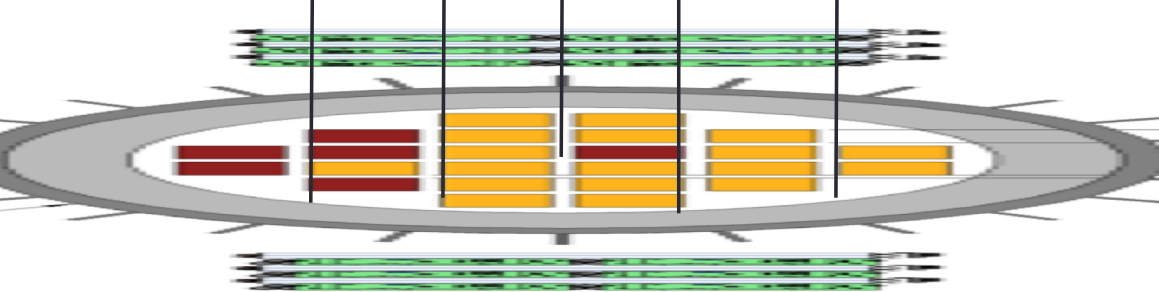
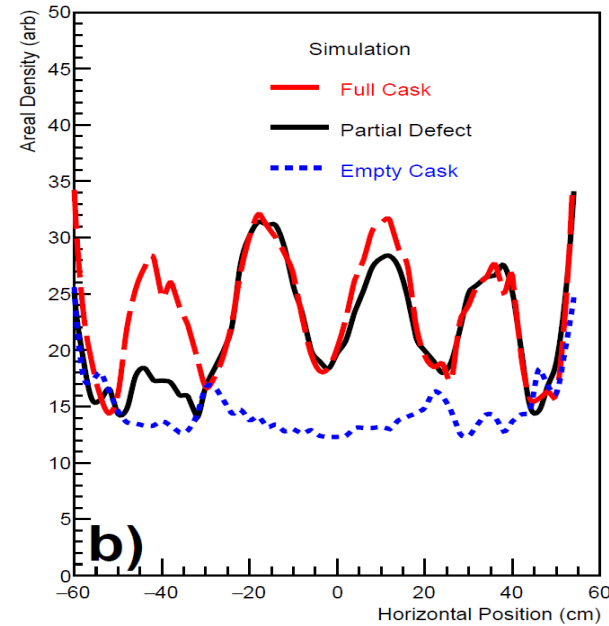
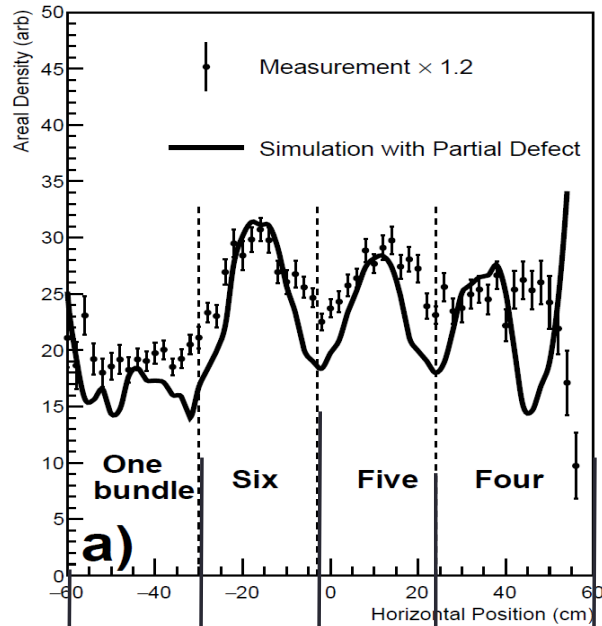
 $\mu$ 

- 576 tubes
- Sample placed between 2 supermodules
- Trackers size: 120 cm x 120 cm x 60 cm
- Trackers weight: ~800 lb/supermodule



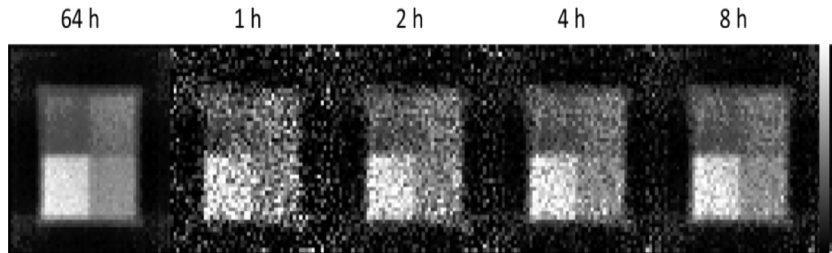
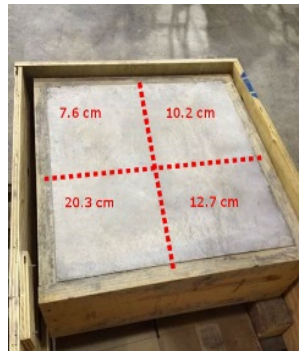
Gas mixture: 47.5% Ar, 42.5% CF<sub>4</sub>, 7.5% C<sub>2</sub>H<sub>6</sub>, 2.5% He  
Al tubes, gold-plated anode wire, 30- $\mu$ m diameter

# Monitoring spent fuel casks



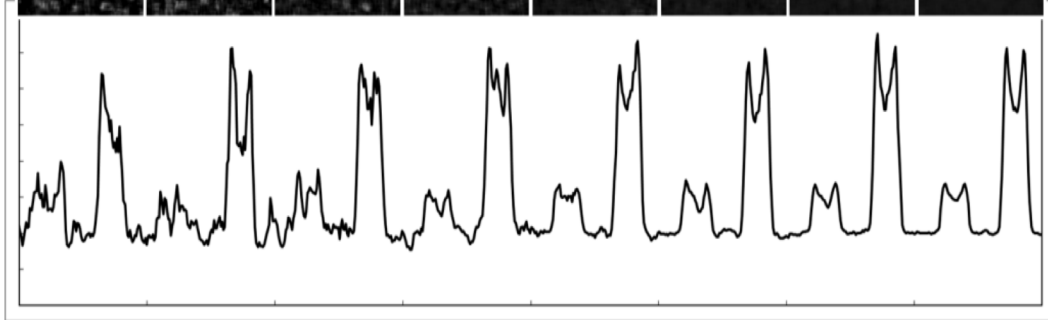
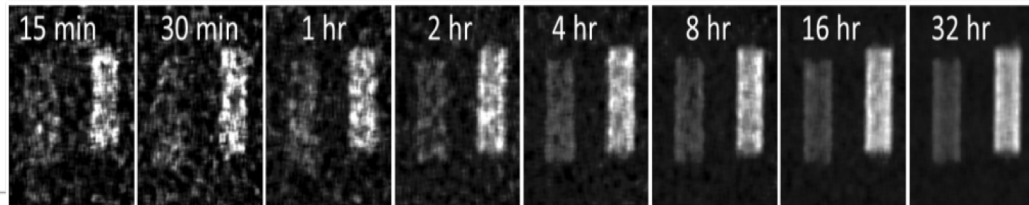
- Durham, J. M., et al., J. Nucl. Mater. Manag. 44, (2016)
- Poulson D. Et al., Nucl.Instrum.Meth. A842 (2017) 48-53
- Durham, J. M. et al., Phys.Rev.Applied 9 (2018) no.4, 044013 (2018)

# Monitoring Industrial Infrastructure



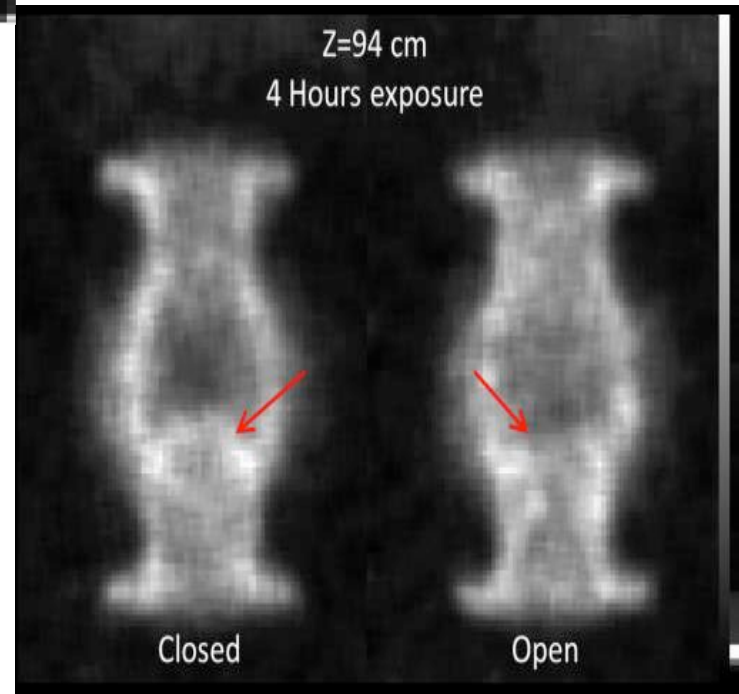
Concrete degradation

50 cm



Corrosion in pipes

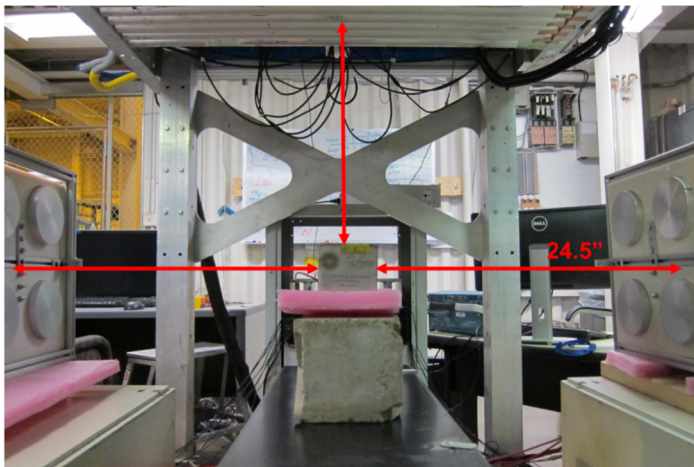
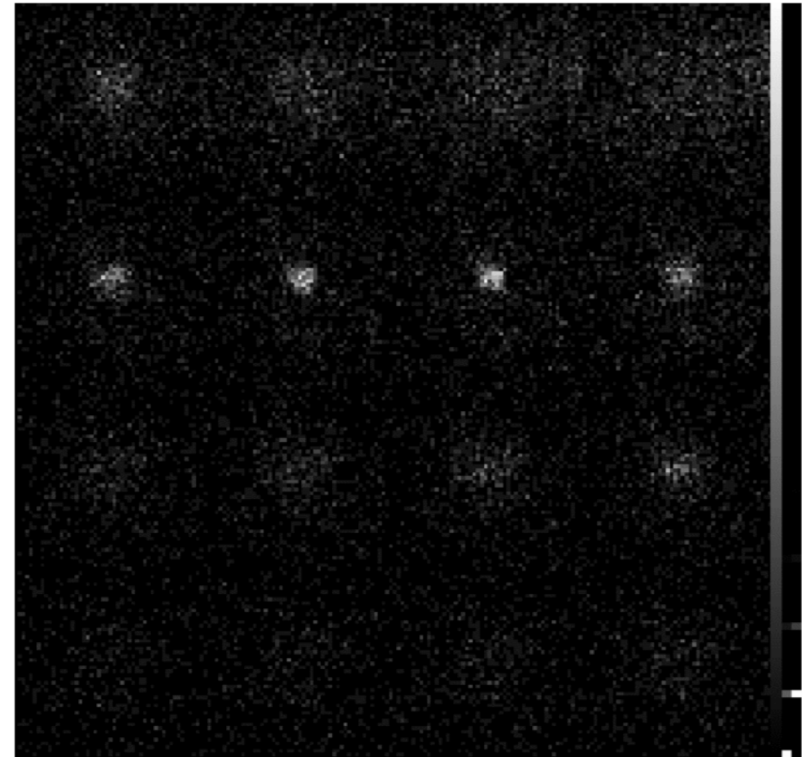
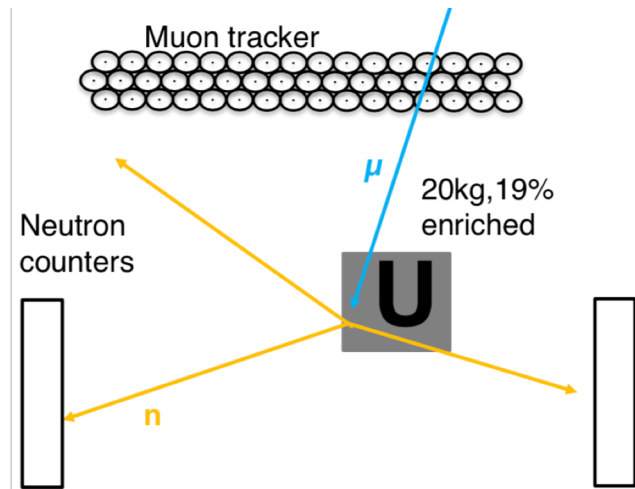
4.1 mm vs 13.3 mm thick pipes



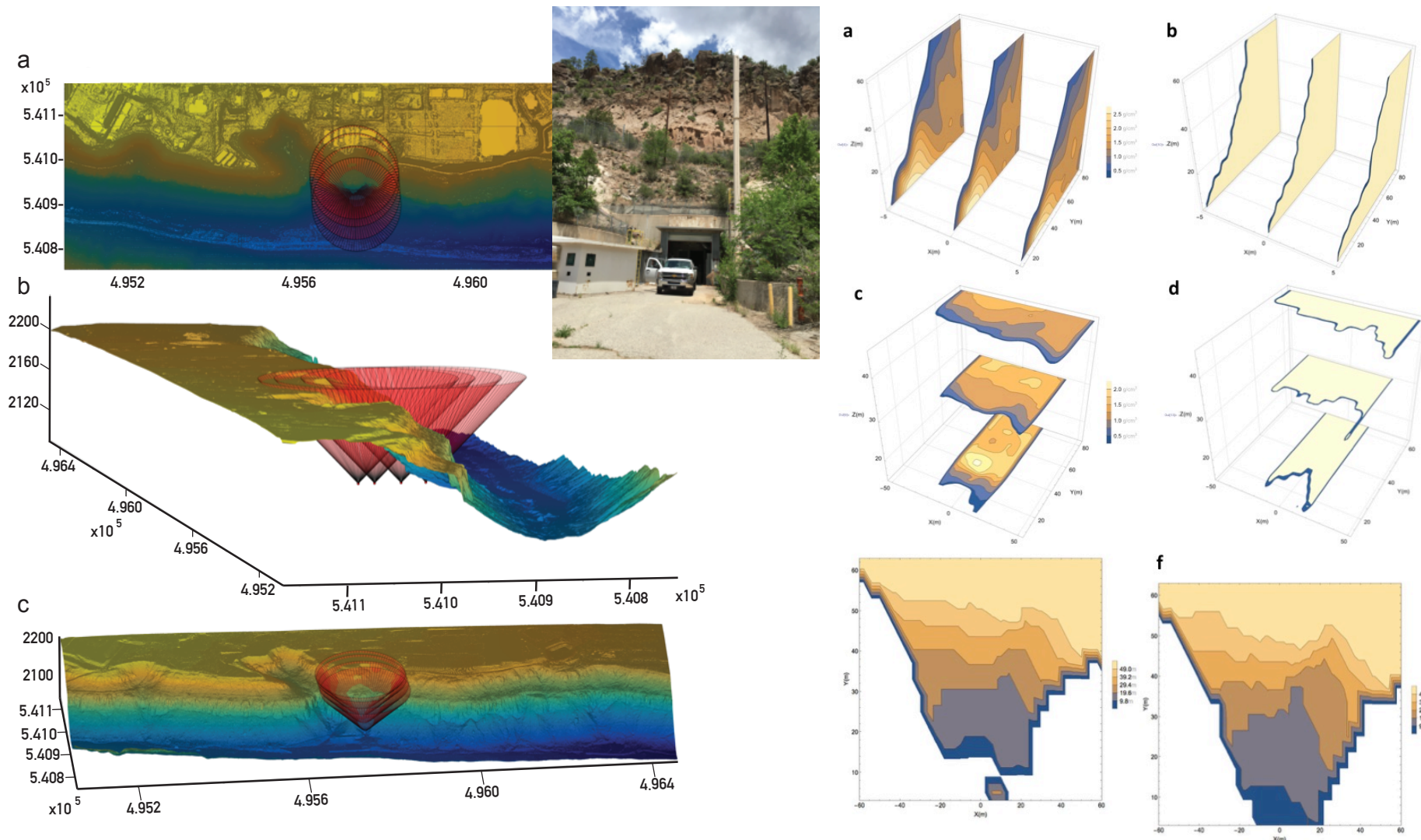
Valve status



# Imaging special nuclear material

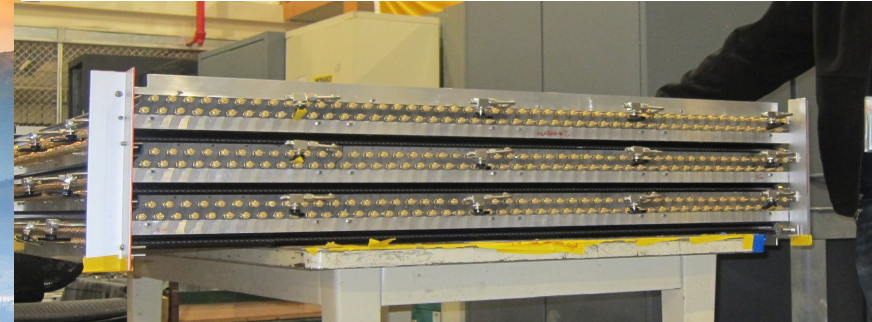


# Imaging a mesa





# Imaging the dome of Santa Maria del Fiore



Internal moving area

Scaffolding

Internal cables for support and placement

External

Internal

Volume that could be imaged

DAQ computer and ancillary systems

- C Blasi et al 2018 IOP Conf. Ser.: Mater. Sci. Eng. 364 012072
- Guardincerri, E. et al. *Phil. Trans. R. Soc. A* **377**: 20180136