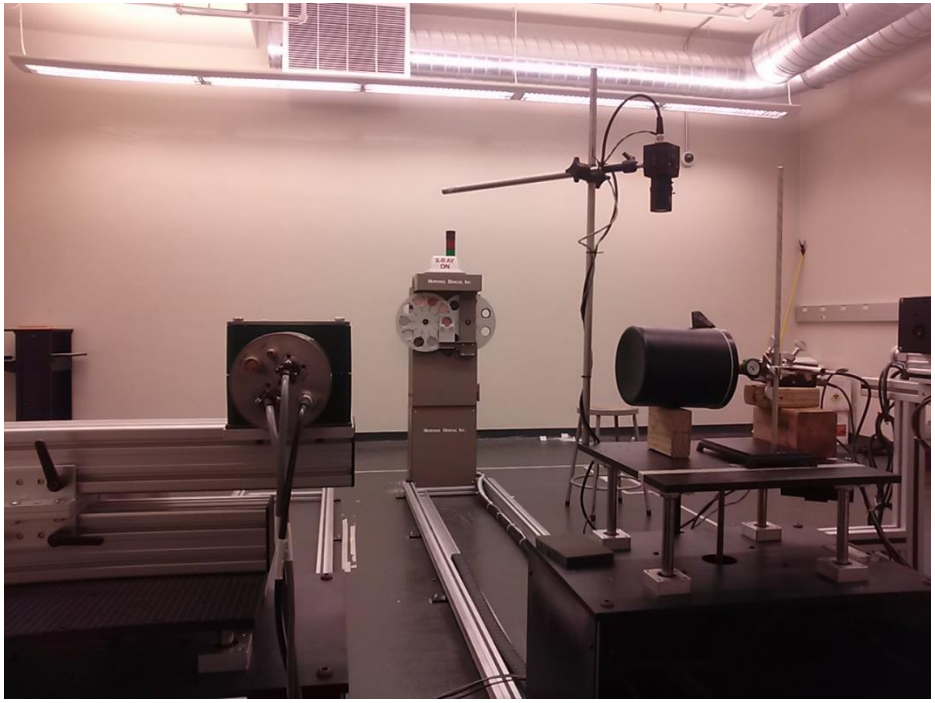
Research Infrastructure

- *Mixed Field Dosimetry Lab*
- *Environmental Radioactivity Lab*
- *Nuclear Instruments Lab*
- *Aerosol Lab*
- *Animal Care Facility*

Mixed Field Irradiation Facility

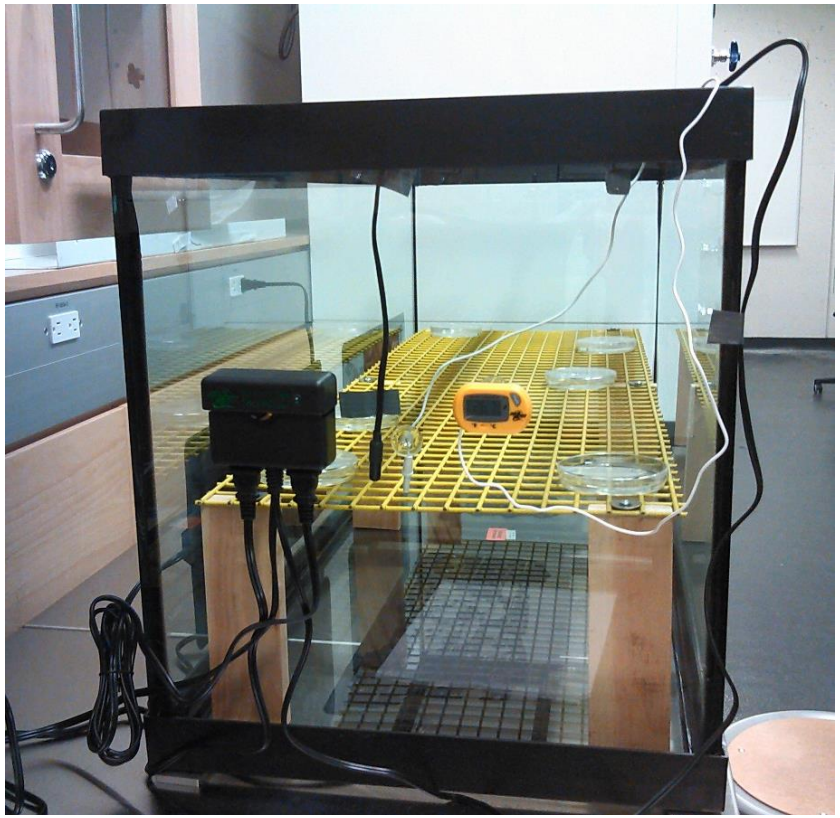


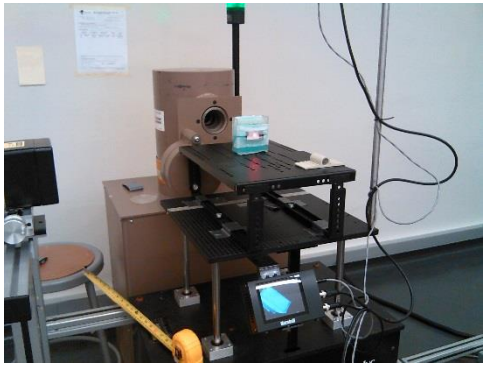
- *G10 ^{137}Cs irradiator*
- *P385 Neutron Generator*
- *ISO Narrow Band Series X-ray Generator*

Benefit to industry: *Instrument testing; neutron and photon dosimetry compliance*

Animal Care Facility

- *To study effects on non-human biota (fish)*
- *REB, AUP and OMAFRA approved!*
- *In conjunction with mixed field irradiation facility*

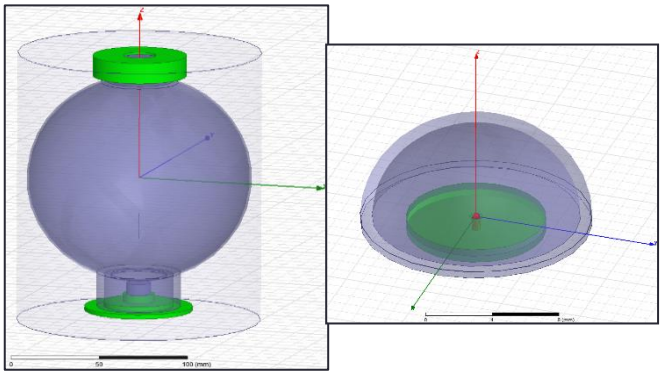




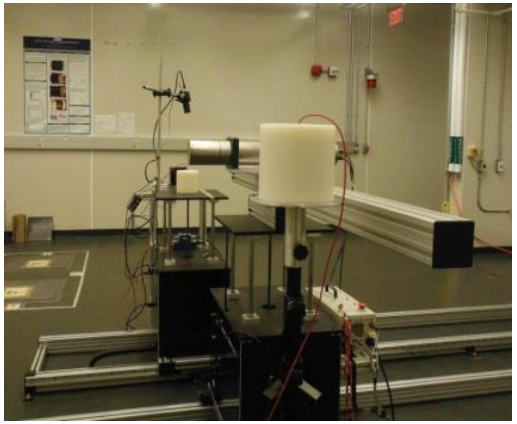
Benefit to industry: *Effects on reference animal & plant (RAP) studies; demonstrate environmental release pathway endpoints*

Technical progress – instrumentation

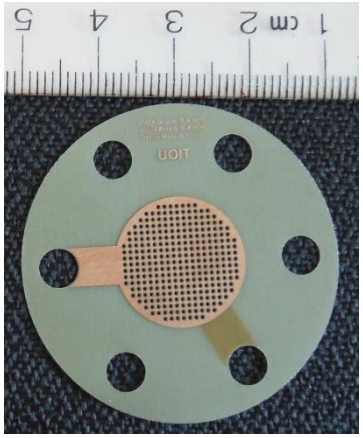
Designing TEPCs for manufacturing simplicity (Poster) - MASc student David Broughton

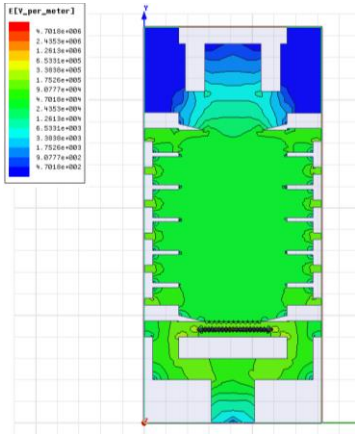


Mapping neutron fields (Poster) – Takumi Hatakeyama (Fukui University of Technology, Japan)



Multiplication in Gas Electron Multipliers (presentation) – Dr. Gloria Orchard PDF



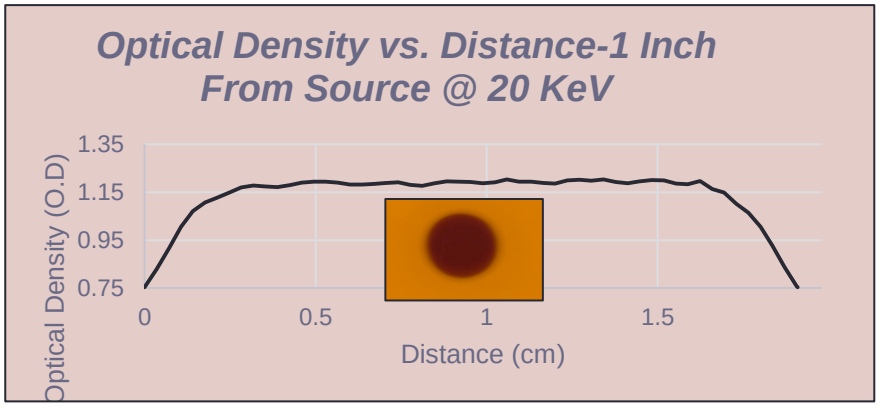


Electron Mobility Spectrometer

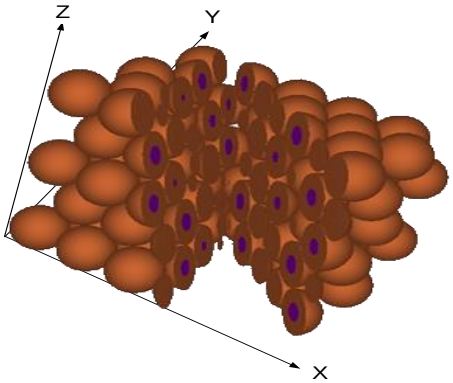
Benefit to industry: *improved NPP dosimetry and monitoring*

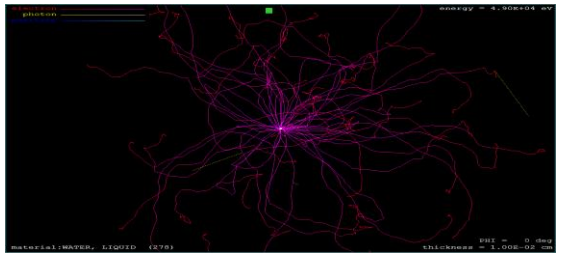
Technical progress – Radiation Quality

Low energy X-ray beam surrogate for tritium radiation biology (poster) – MASc student Karanvir Virdi



Modelling low dose low energy beta exposures in organized tissue – MEng graduated student Tim Mahilrajan





Benefit to industry: *fundamental data to address regulatory issues concerning tritium occupational exposures and tritium in the environment*

Technical progress – external dosimetry

Goal is to obtain more accurate contact dosimetry estimates for sealed sources, that better match observed physical symptoms

The surface electron and gamma components of the contact dose rate, for a sealed $^{137}CsCl$ source will each be measured experimentally. A large magnet will be used to bend the surface electrons away from the gamma dose measurement.

Simulations using Monte Carlo radiation transport code PHITS will also be used to aid in experimental design and compare with experimental results.

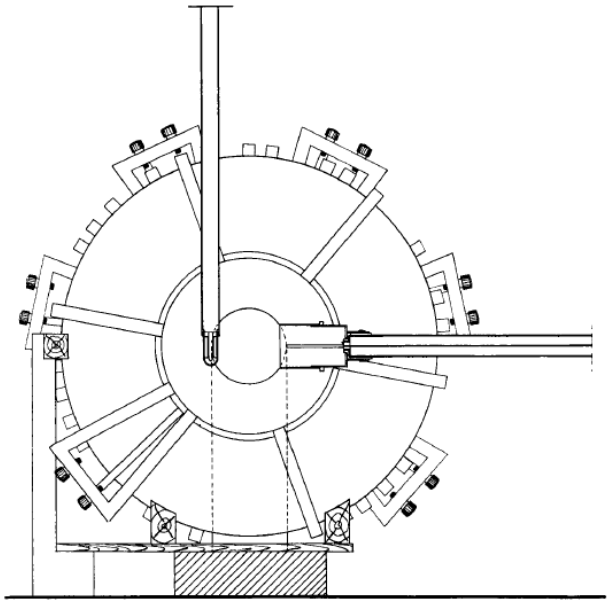
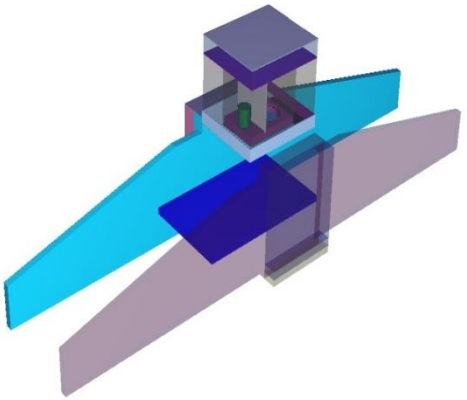


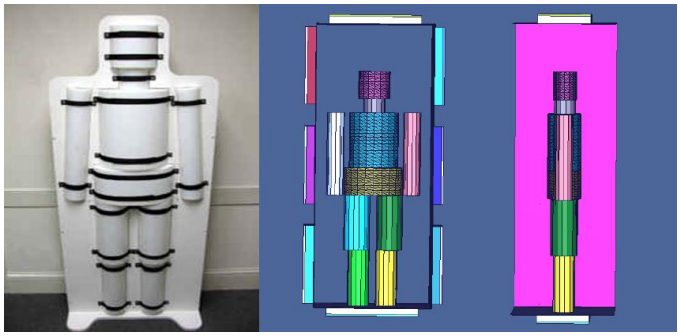
Fig. 1 b. Vertical section through the electromagnet.

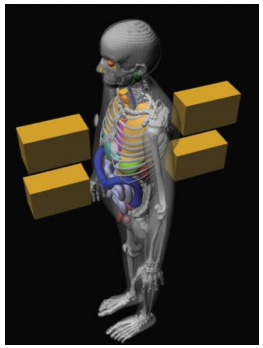
Benefit to industry: *Improved contact dose estimates for gamma sources that are metal encapsulated.*

Technical progress – internal dosimetry

Modelling and calibration of whole-body monitors







Monte Carlo (MCNP) simulations of whole body counters and phantoms to improve calibration and interpretation of response

MASc students
Edna Sacay* (Poster)
Hannah Graham (Poster)
Chris Bellman*

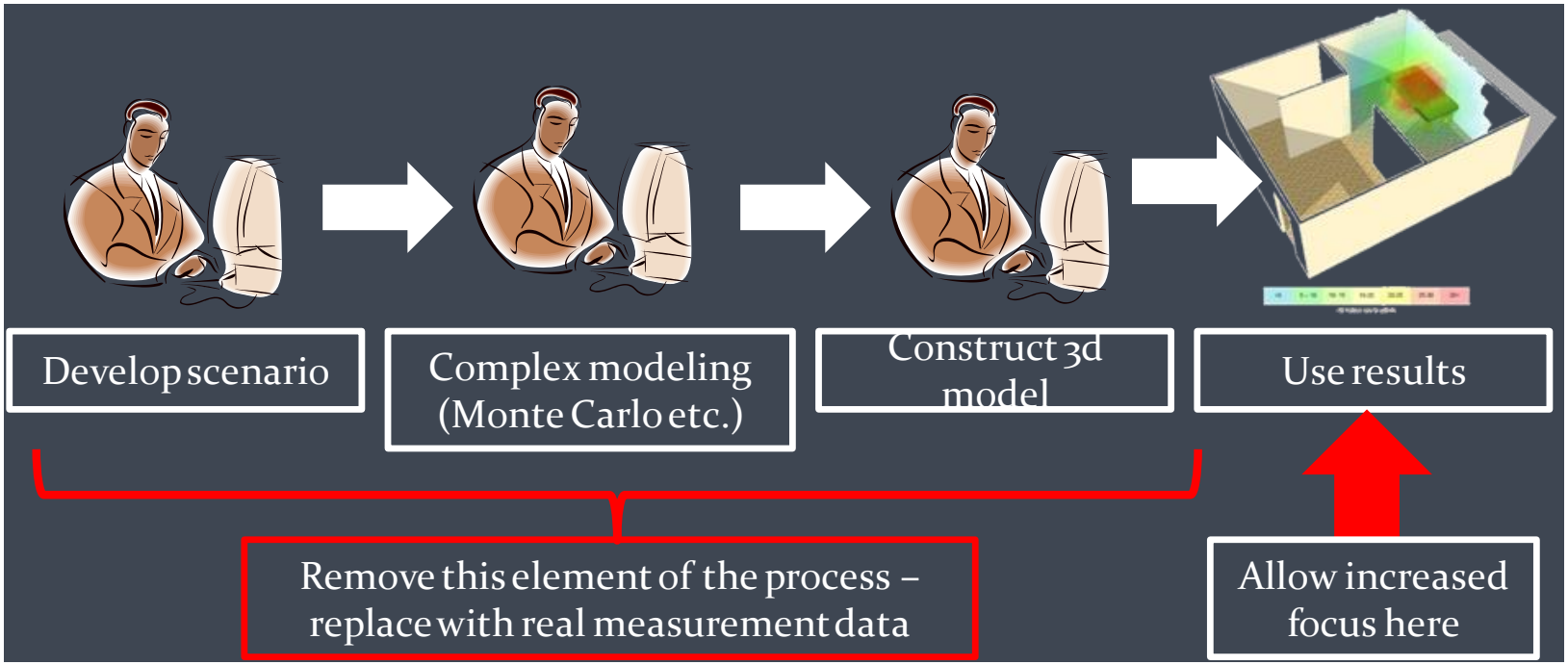
*Graduated in 2014

Benefit to industry: *Whole body counting is an essential radiation protection practice in NPP; we are working directly with COG, OPG and CNL to optimize calibration and use of in-service WBC at OPG stations.*

Technical progress – advanced visualization

Current research is to develop methods to take field measurement data and construct 3d radiation field models without requiring specialist knowledge

Make 3d radiation field visualization more accessible and practical

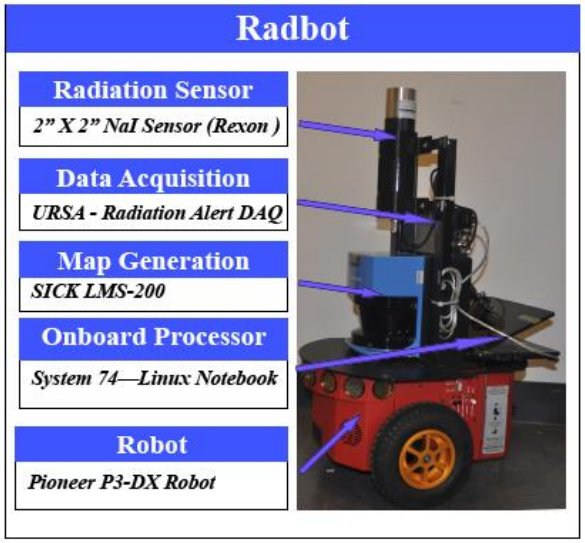


PhD Student – Joe Chaput

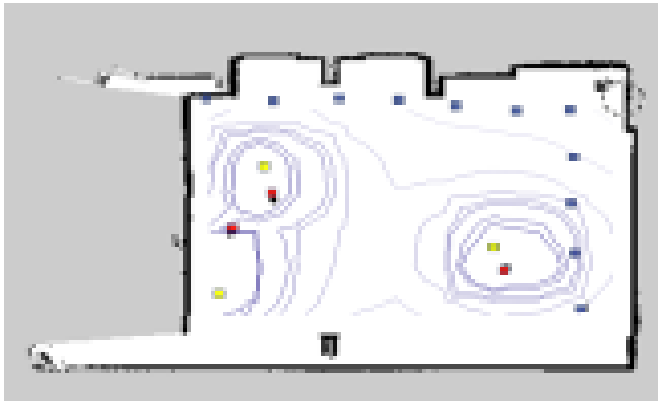
Benefit to industry: *improved ALARA for routine operations, outages, etc*

Technical progress – radiation mapping

Automated mapping of radiation fields and hot spot localization



Robot, equipped with radiation detectors and simultaneous location and mapping equipment is capable of fully mapping a room in space, correlating and identifying the location of hot spots.



PhD Student – Robin McDougall co-supervised w/ Scott Nokleby
MASc Student – Mike Hosmar co-supervised w/ Scott Nokleby

Benefit to industry: *dose reduction and automation of ALARA*