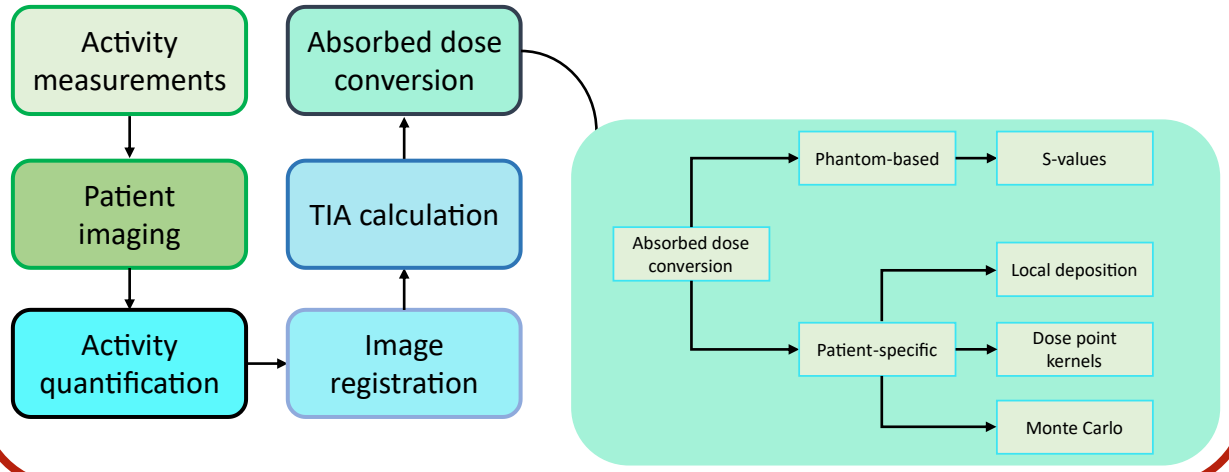
Motivation:

- Lack of standardized methods that convert time-integrated activity to absorbed dose
- Experimental data are needed to validate dose calculation platforms



Approach:

- Printed circuit board (PCB) ion chamber used to measure absorbed dose to air per unit activity

$$\dot{D}_{air}(l) = \frac{1}{A_o}\frac{\left(\frac{\bar{W}}{e}\right)_{air}}{\rho_o \pi r^2}\frac{I}{l}\left(k_{pol}k_{recom}k_{TP}k_{elec}\right)$$

$\dot{D}_{\mathrm{air}}$: Absorbed dose to air

A_o: Radioactivity

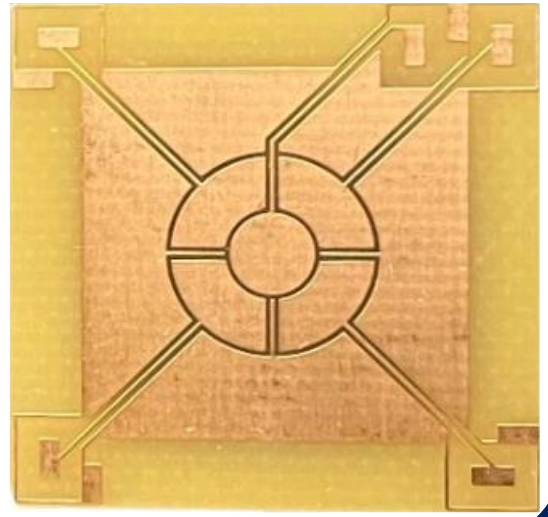
$\left(\frac{\bar{W}}{e}\right)_{\mathrm{air}}$: Mean energy to create an ion pair

ρ_o: Air density at standard pressure and temperature

r: Radius of the cavity

I: Ionization current

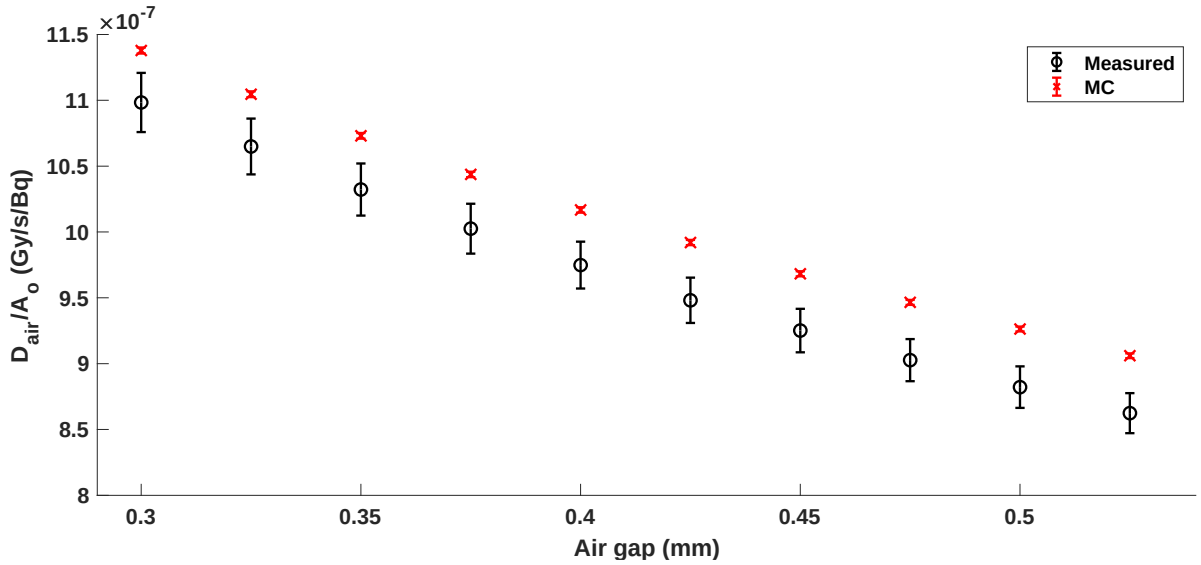
l: Air gap between the source and the collector



Results:

- GEANT4-calculated absorbed dose to air per unit activity (^{210}Po source)
- Experimental data agreed with Monte Carlo within 5%

Component of uncertainty	Type A (%)	Type B (%))
Net current	0.13	
Current repeatability	1.70	
Air density correction		0.10
Recombination correction		0.10
Average energy per ion pair		0.20
Air collection volume		0.40
Radioactivity		1.00
Combined uncertainty (k=1)	2.04	
Combined uncertainty (k=2)	4.08	



Ash Khan (akhan49@wisc.edu)