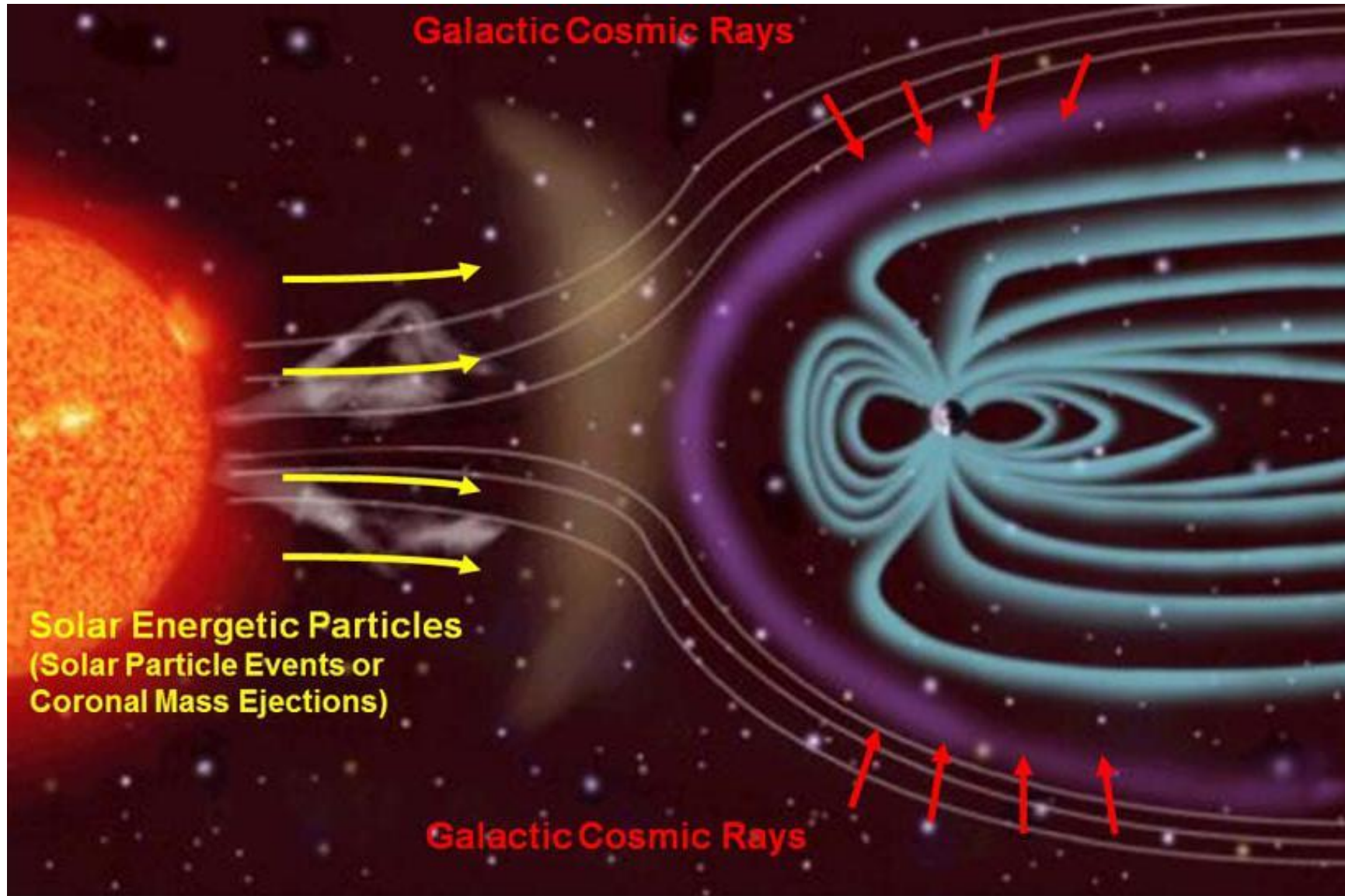


Accelerators for Space Research at ANSTO

Dr Simone Richter

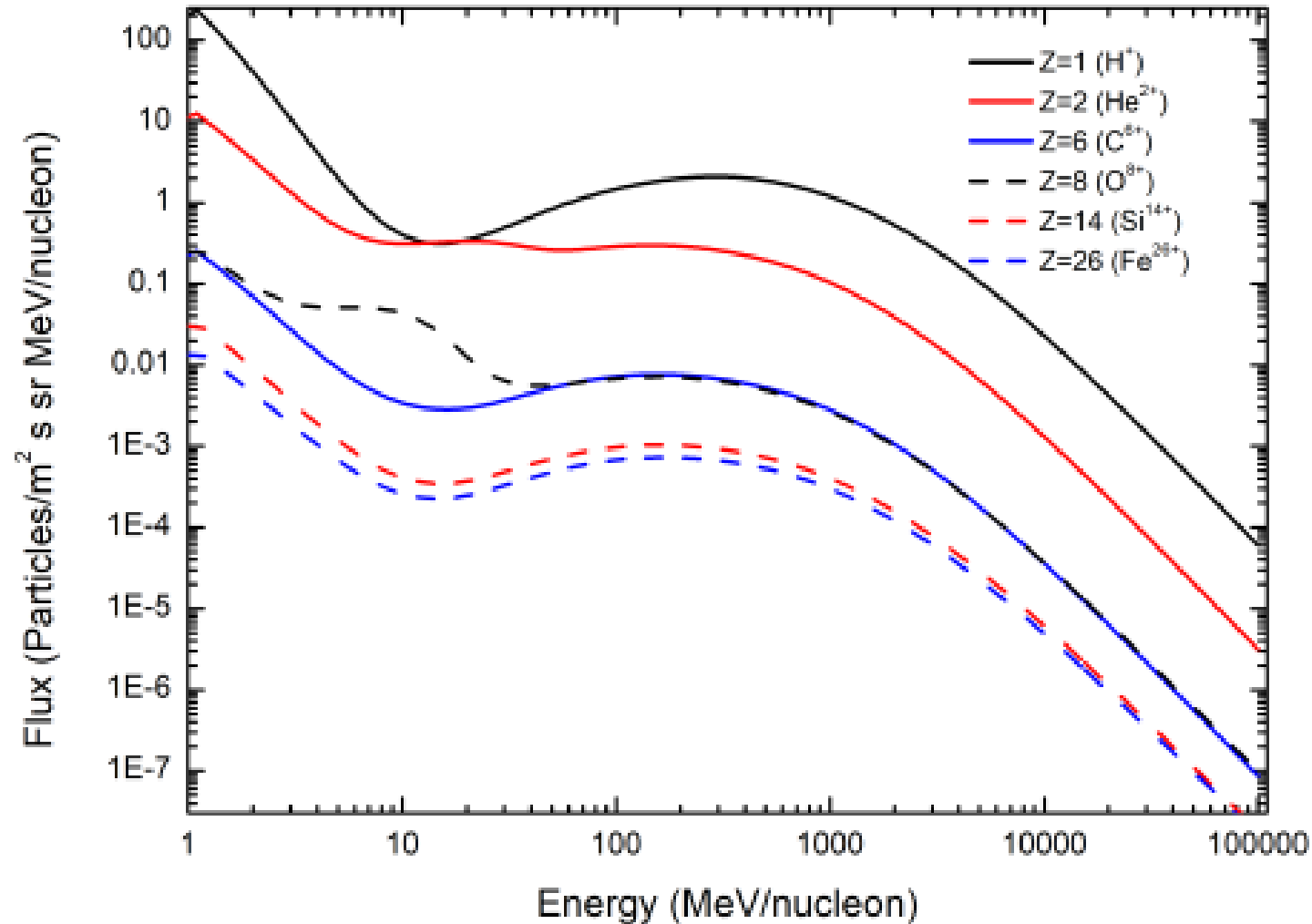
Group Executive Nuclear Science & Technology

28. October 2020

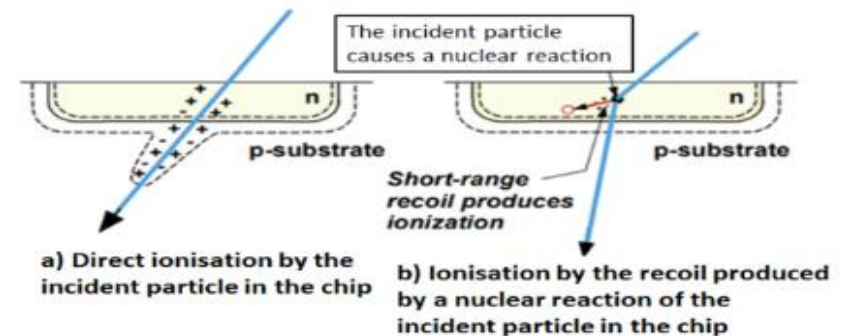
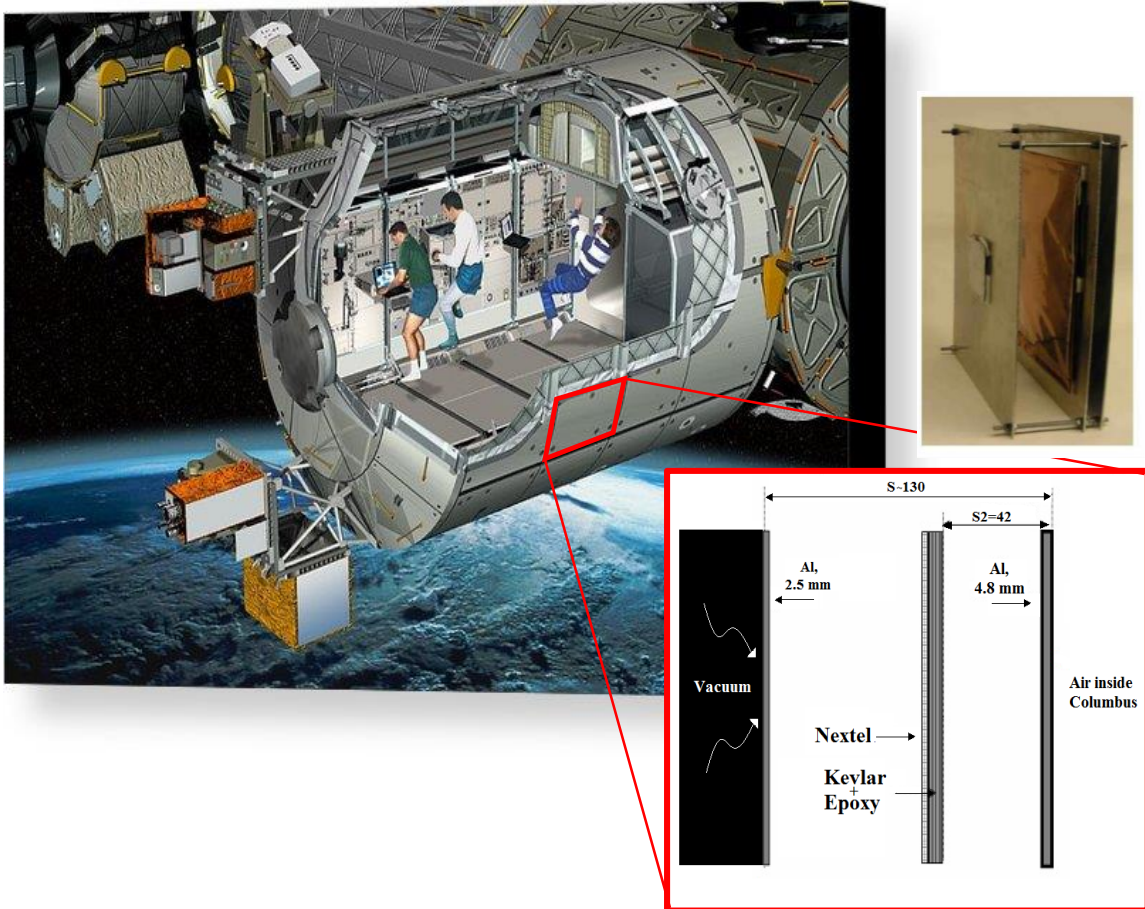


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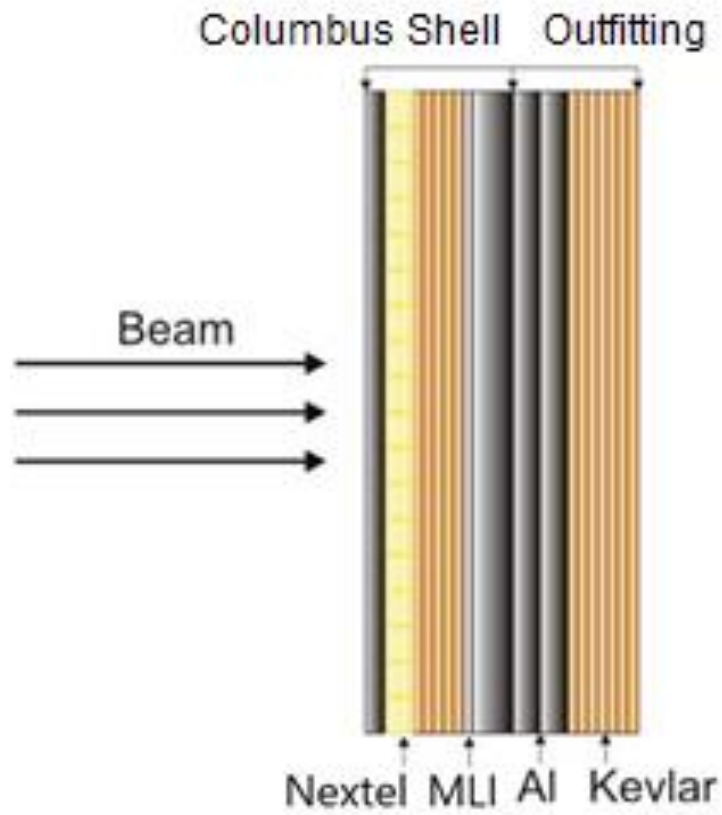
Galactic Cosmic Radiation



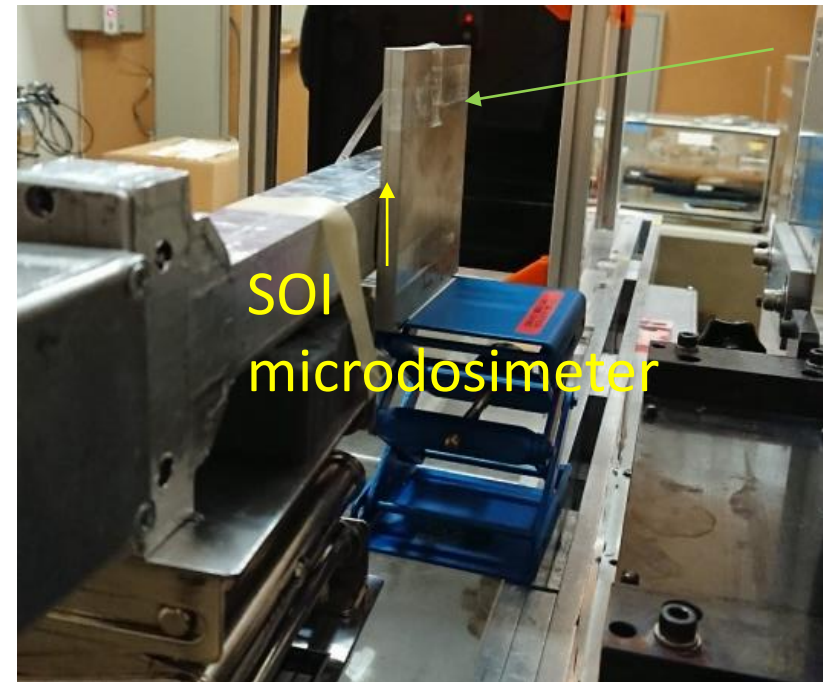
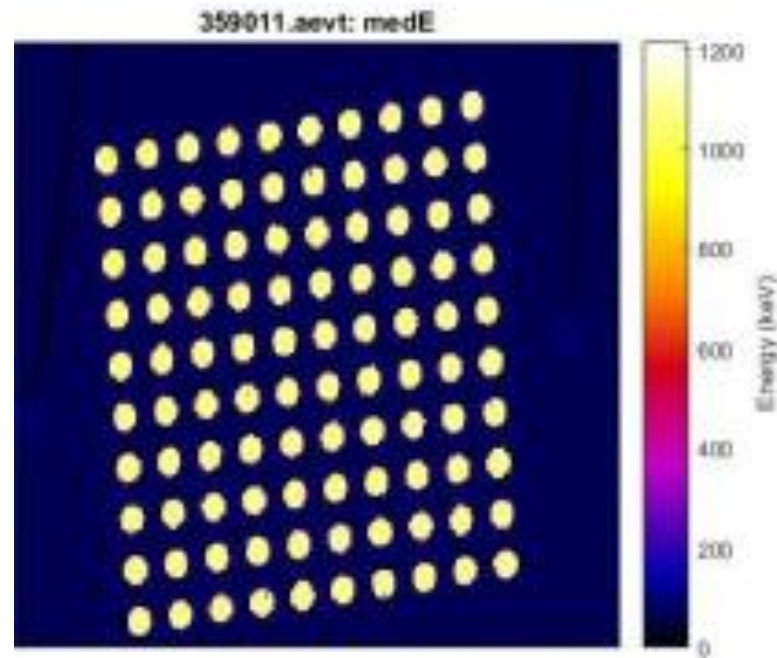
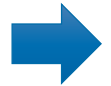
Effects of Cosmic Radiation on Humans, Materials and Devices



Realistic multi-layer structure of the Columbus module's wall



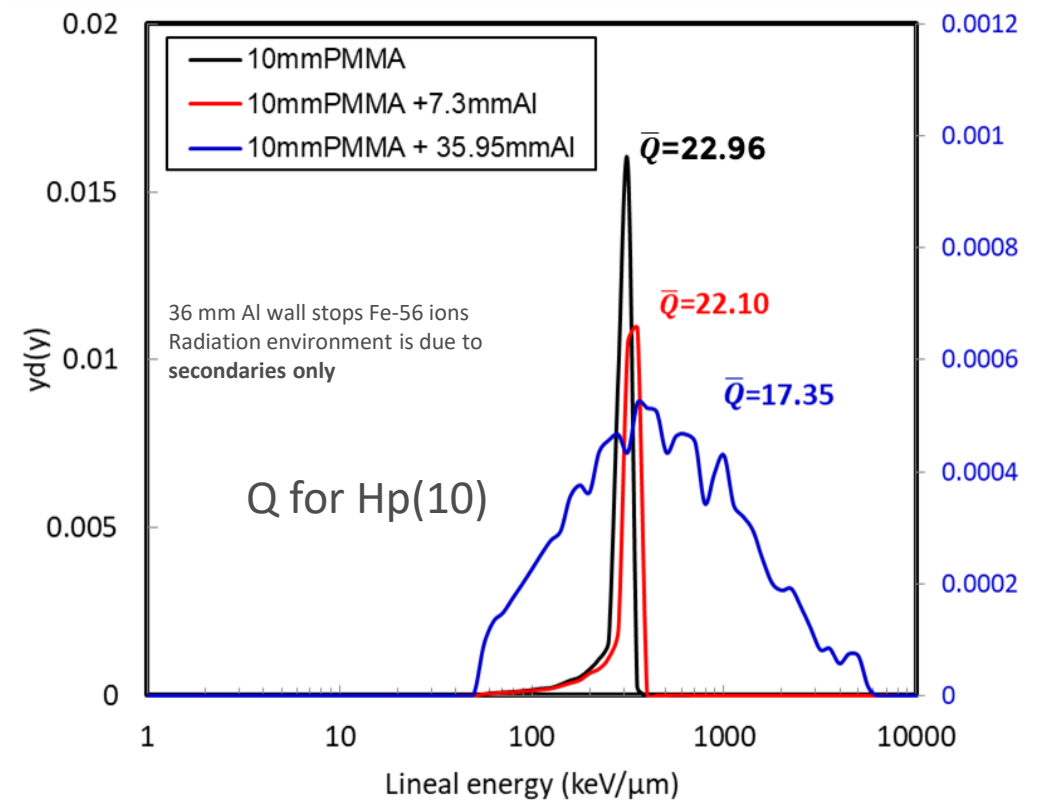
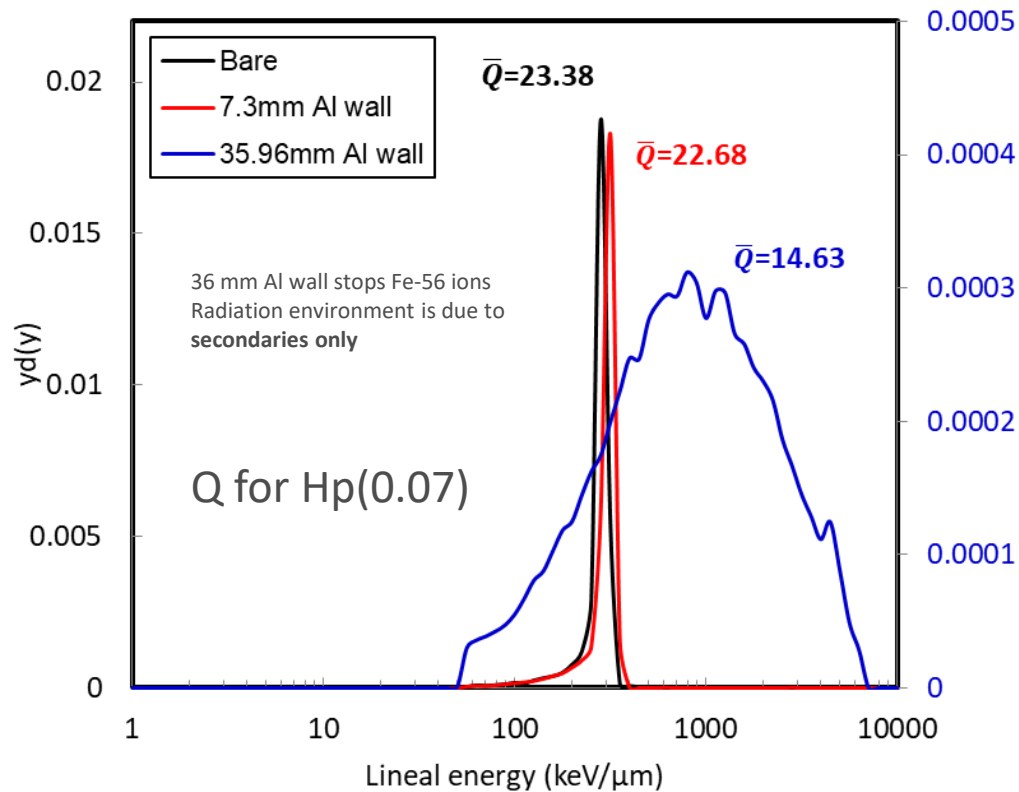
Portable microdosimeter for personal use



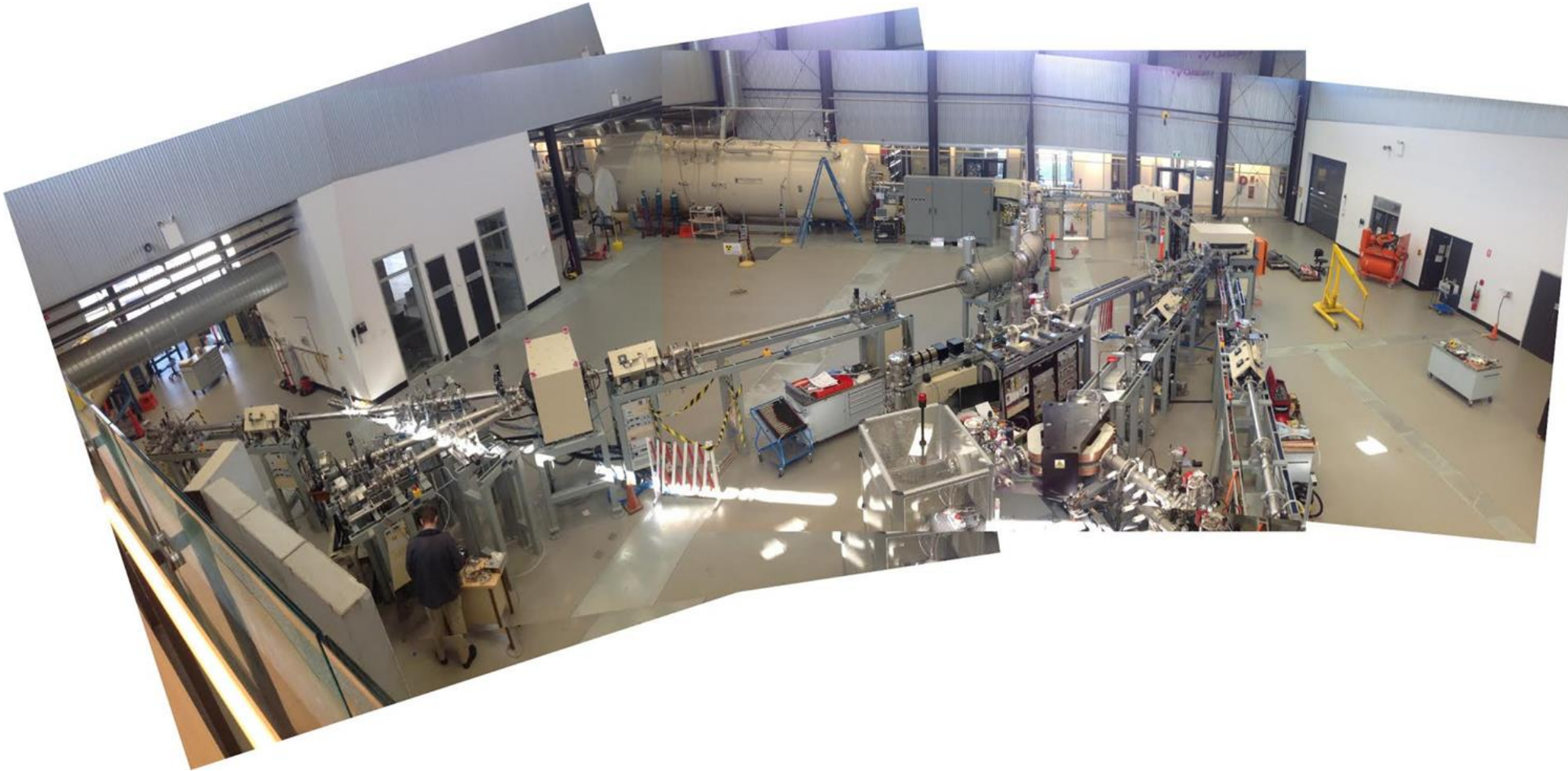
7.3mm Al plate

500MeV/u ⁵⁶Fe

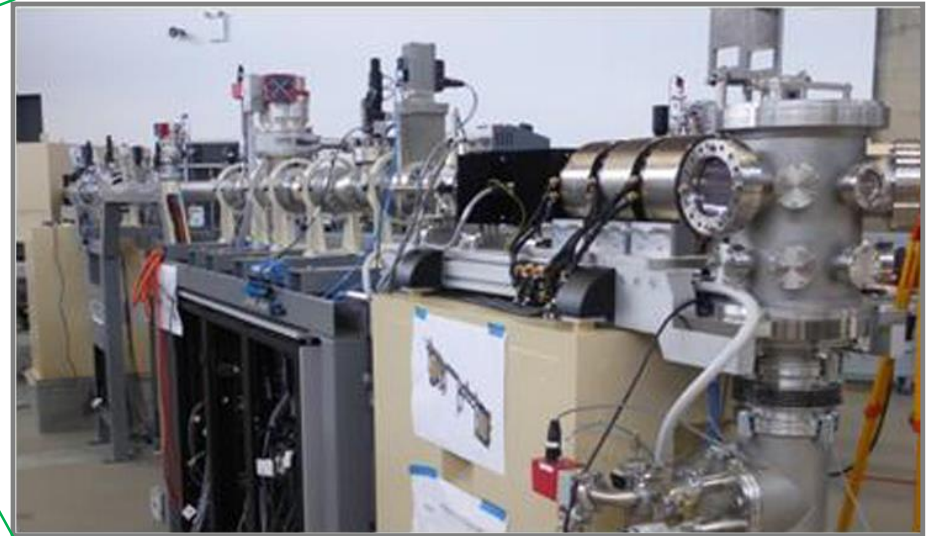
Portable microdosimeter for personal use



Centre for Accelerator Science



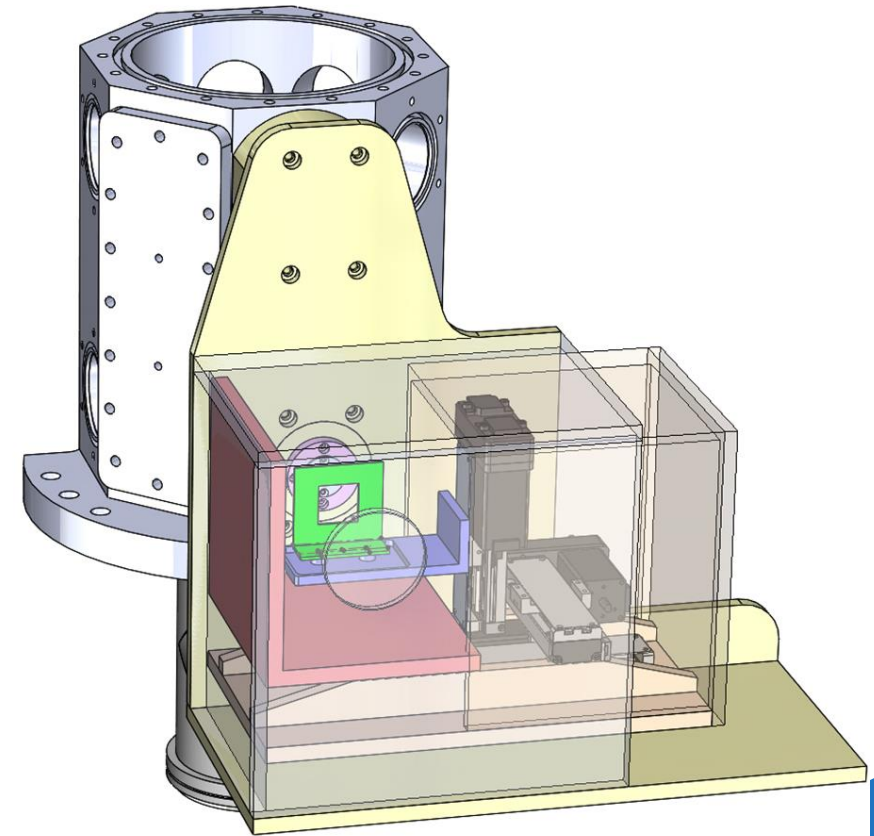
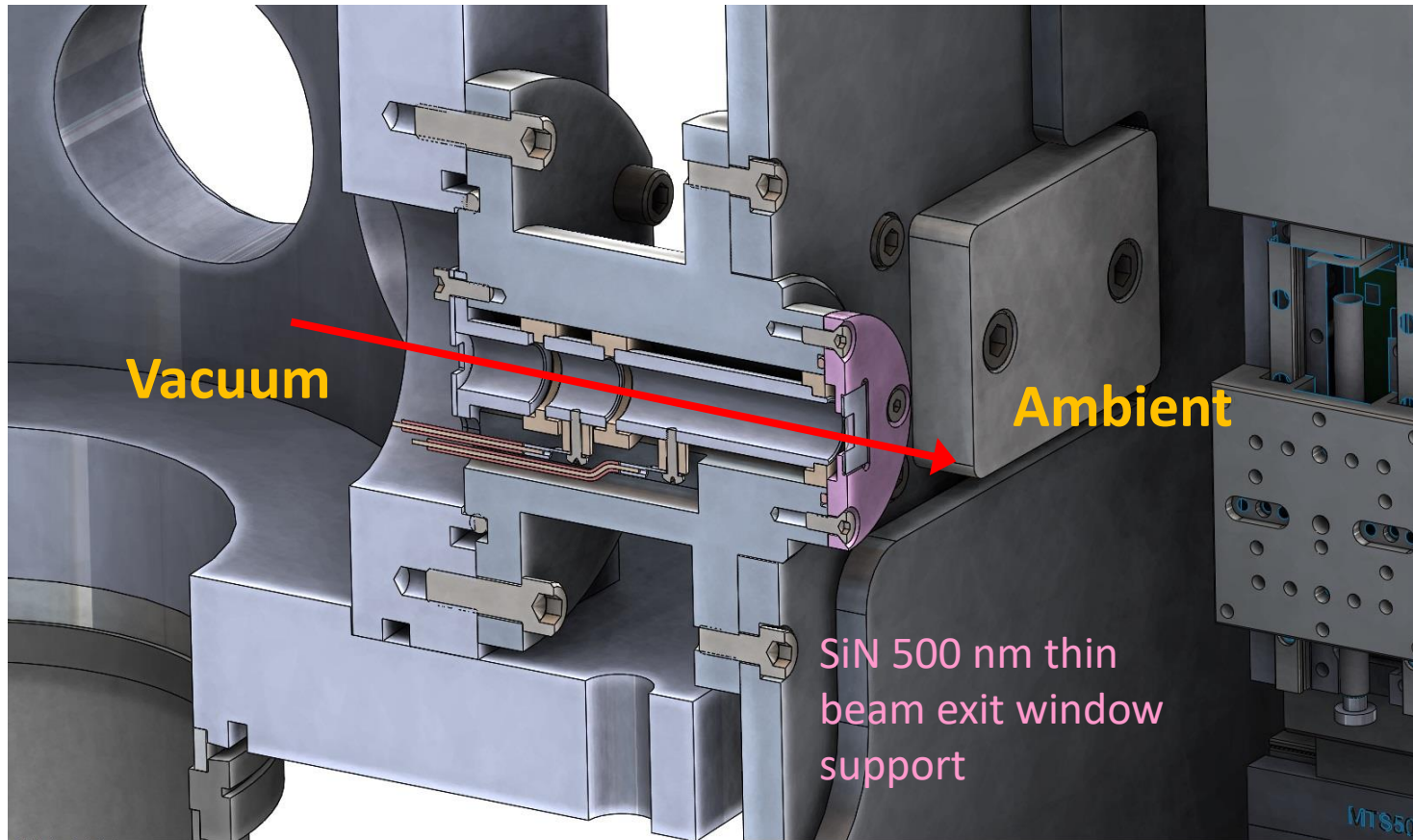
SIRIUS Mprobe for IBIC microscopy



ANTARES Heavy Ion Mprobe Beamline



Ion Beam Extraction from Vacuum into Enclosed Ambient



Possible beam scenarios @ CAS

Target Ion Beam Current	100 pA – 1 nA			
Ion Type and Energy Range	Carbon	C	up to 3 MeV/u	
	Oxygen	O	up to 3 MeV/u	
	Hydrogen (Protons)	H	up to 5 MeV/u	
	Helium	He	up to 3 MeV/u	
Maximum End of Ion Range	Energy	Ion	Water	Air
	36 MeV	C	60 µm	60 mm
	42 MeV	O	45 µm	45 mm
	5 MeV	H	354 µm	354 mm
	12 MeV	He	148 µm	148 mm
Delivered Dose	1 Gy – 1 kGy			
Dosage at Maximum Beam Current and Energy	Energy	Ion	Current (nA)	Dose kGy/cm ² /sec
	36 MeV	C	1.0	1.452
	42 MeV	O	1.0	2.333
	5 MeV	H	1.0	0.141
	12 MeV	He	1.0	0.405

Understanding high LET and radiation exposure

Maximum Dose Rates for 6mm Diameter Beam

Ion	Energy (MeV)	Range (μm)	Charge	Current (nA)	Beam Dia (mm)	Dose Rate kGy/sec	Dose Rate MSv/hr
H	5	354	1	1	6	0.500	3.60
He	12	148	2	1	6	1.434	10.33
C	36	62	4	1	6	5.134	36.97
O	42	45	4	1	6	8.252	59.41

Thank you!
Questions