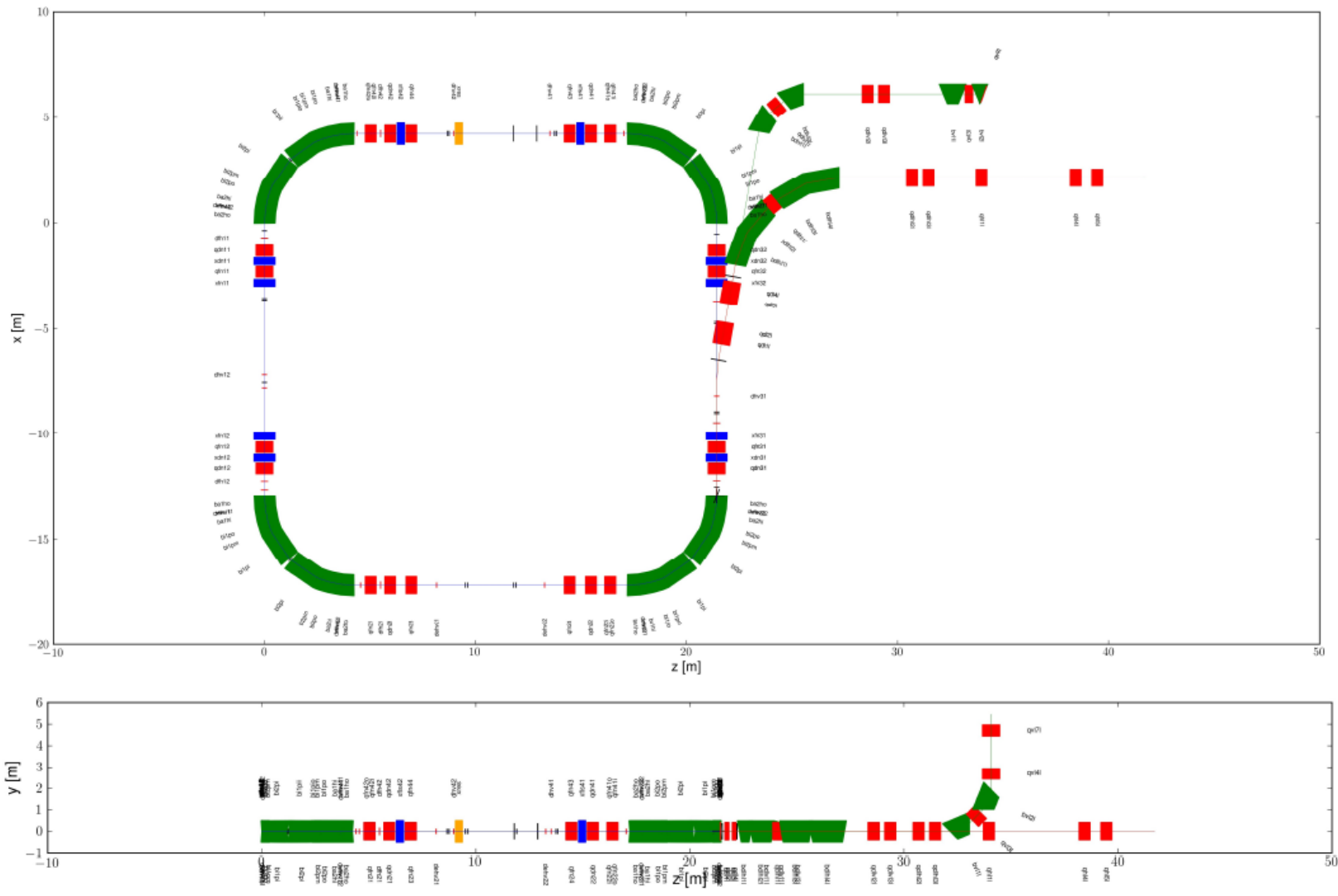


Comments on a biomedical beamline facility at CERN

Ken Peach

CERN, 25th June 2012

- What beamline
- What beams
- What facilities
- What experiments
- Summary



Daniel Abler

Ions	Priority Rating /5	Why	Anticipated Issues
Protons	5	Clinical	
(molecular ion) H ₂	2	Correlated particle experiments Experiments -Spatial distribution Variation in response	
Helium $_{2}^{2+}$	5	Possibly clinical	
Helium $_{2}^{+}$	4	Stable and possibly clinically relevant	Deuterium contamination
D	4 (if clean), 0 (if not)	Radiobiologically interesting, not clinically useful	Neutron contamination Cost
Li $_{3}^{6+}$	4	RBE greater than P Fragmentation tail shorter, less dose deposited past the distal edge	Specialised ion source
B $_{5}^{10+}$	2	Potentially clinical Fragmentations more than Li, better than C	Specialised ion source
C $_{6}^{12+}$	5	Clinical	
N $_{7}^{14+}$	3	Radiobiological Studies	
O $_{8}^{16+}$	4	Possibly clinically relevant Radiobiological Studies	
Ne $_{10}^{20+}$	3-4	Comparison to present radiobiological studies	
(non inclusive, any available) Ne-Fe	1	To analyse radiobiological trends across the ions	
Ca $_{20}^{40+}$	1	Intermediate Biologically important trace element	Specialised ion source
Fe $_{26}^{56+}$	3	Radiobiological interpolation	Specialised ion source

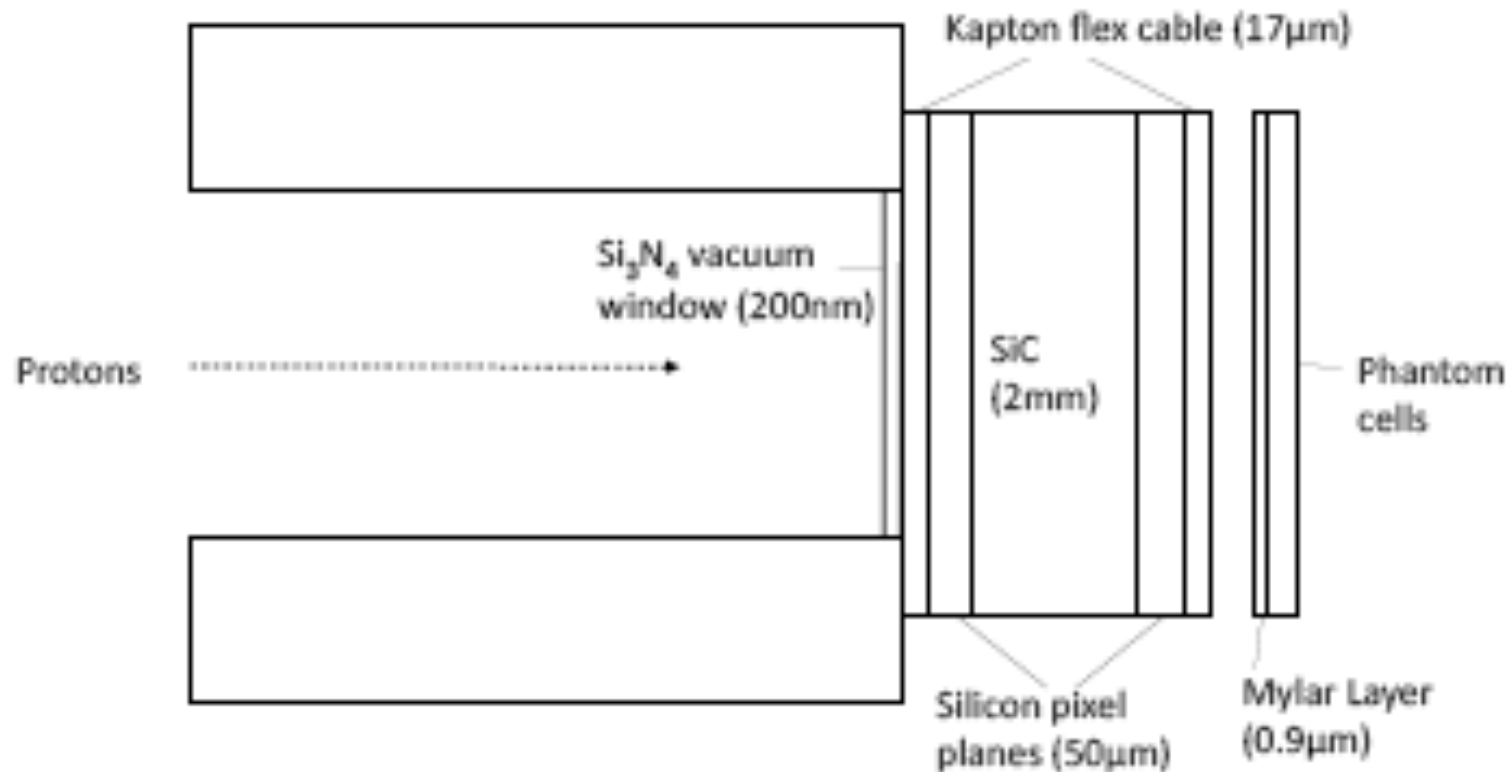
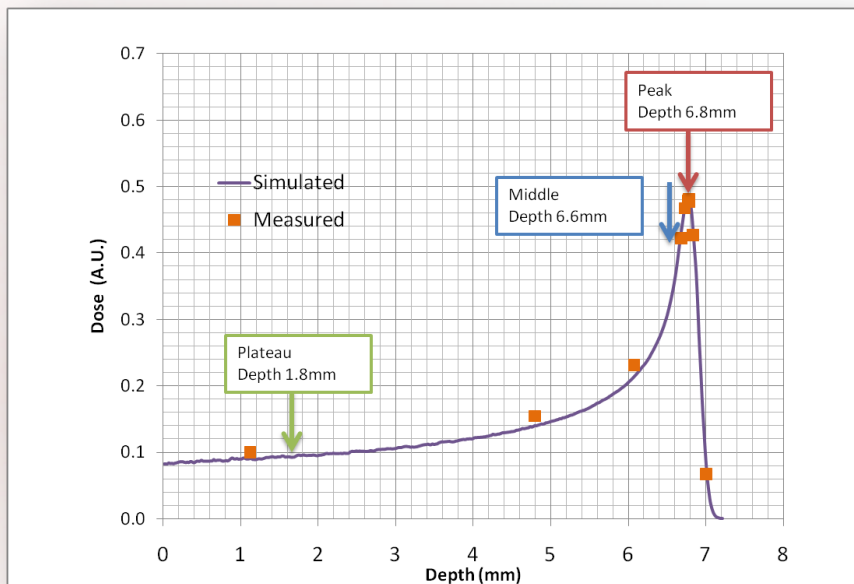


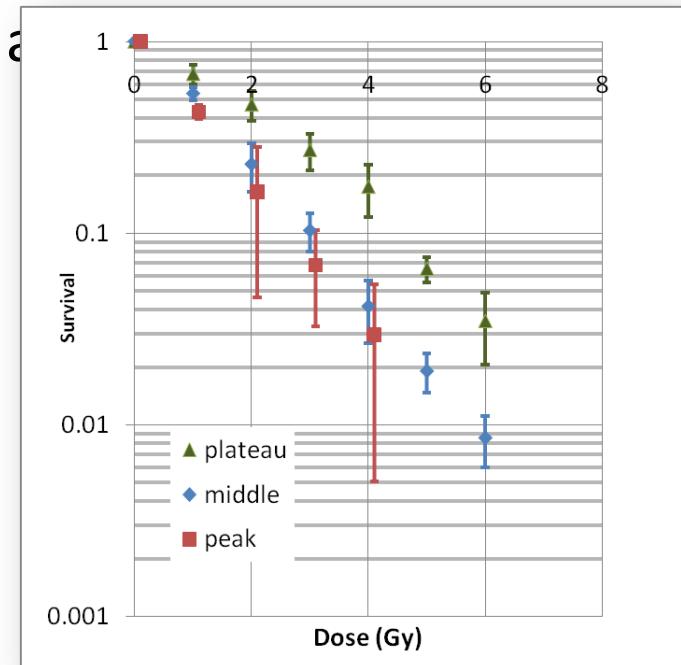
Figure 10: Diagram of Endstation Setup. Apparatus has cylindrical symmetry.

- Need the appropriate biology infrastructure
 - At the end station
 - Multiple samples
 - Remote manipulation and monitoring
 - Environmental control
 - Nearby
 - (sample cultivation, preparation and analysis)
 - *In vivo?*
 - Perhaps eventually

- Two modes
 - Responsive to proposals
 - Dedicated campaign on key biomedical parameters
 - Difference cell lines (normal & a



Ai Nagano (PTCRI) – private communication



- Opportunity to develop a dedicated facility
 - Flexible beams (ions and energies)
 - Appropriate facilities
 - Sustained programme
 - Understand enough to move confidently from iso-dose to iso-effect
 - Also understand the dynamics of fractionation
 - For different cell types and ion species