

ION Beam therapy:

Clinical, Scientific and Technical Challenges

18 - 20 January 2016

Post Graduate Centre, Queen Elizabeth Hospital, Birmingham, UK

Organising committee:

Phil Allport, Professor of Particle Physics, University of Birmingham, UK

Rob Edgecock, Professor of Accelerator Science, University of Huddersfield, UK

Stuart Green, Head of Medical Physics, University Hospital Birmingham, UK

Carol Johnstone, Director, Particle Accelerator Corporation, USA

Hisham Mehanna, Director, Institute of Head and Neck Studies and Education, University of Birmingham, UK

Sponsored by:





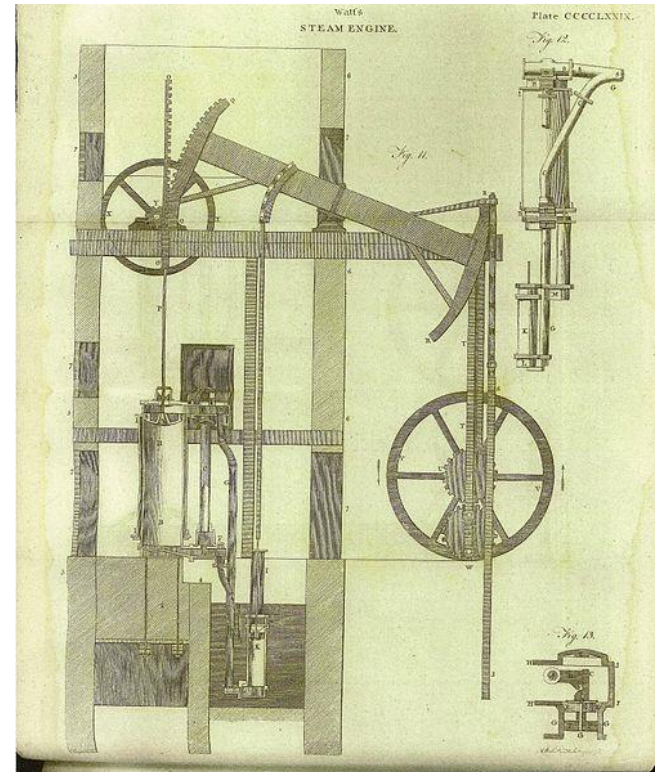
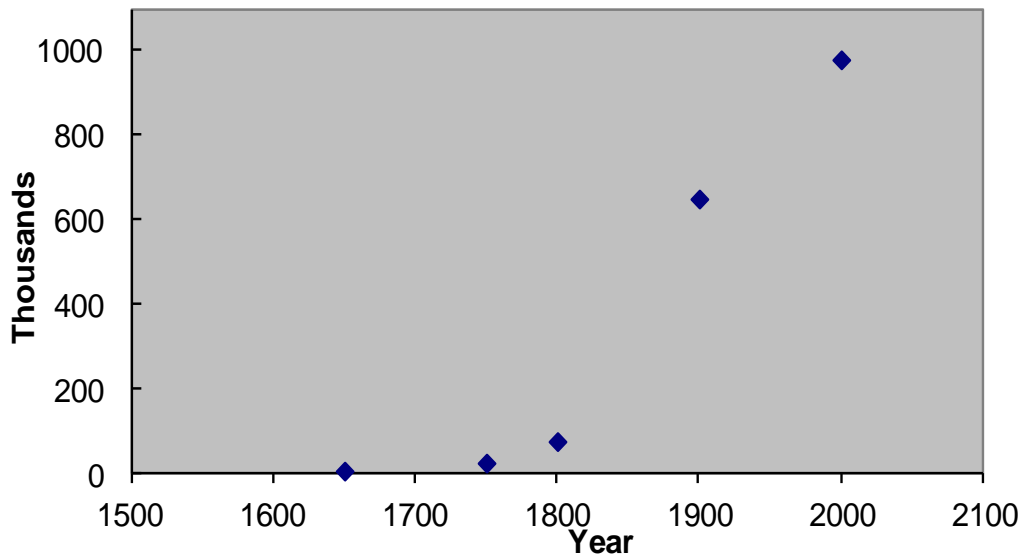
Welcome !

- to Birmingham
- to the University of Birmingham
- to the University Hospital Birmingham

Birmingham

- the second largest city in the UK

Birmingham population



Source - Wikipedia

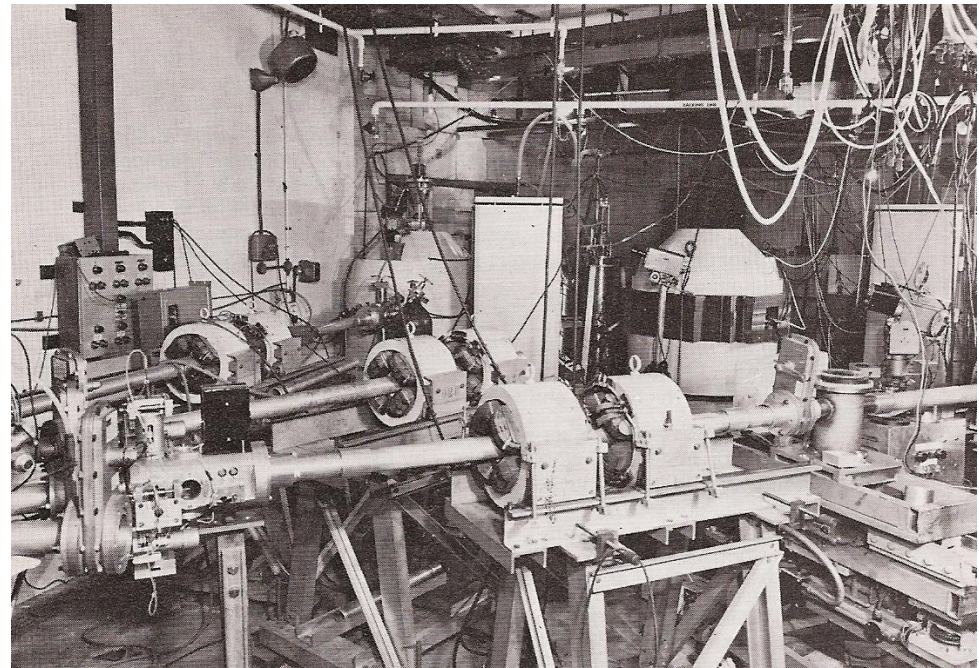
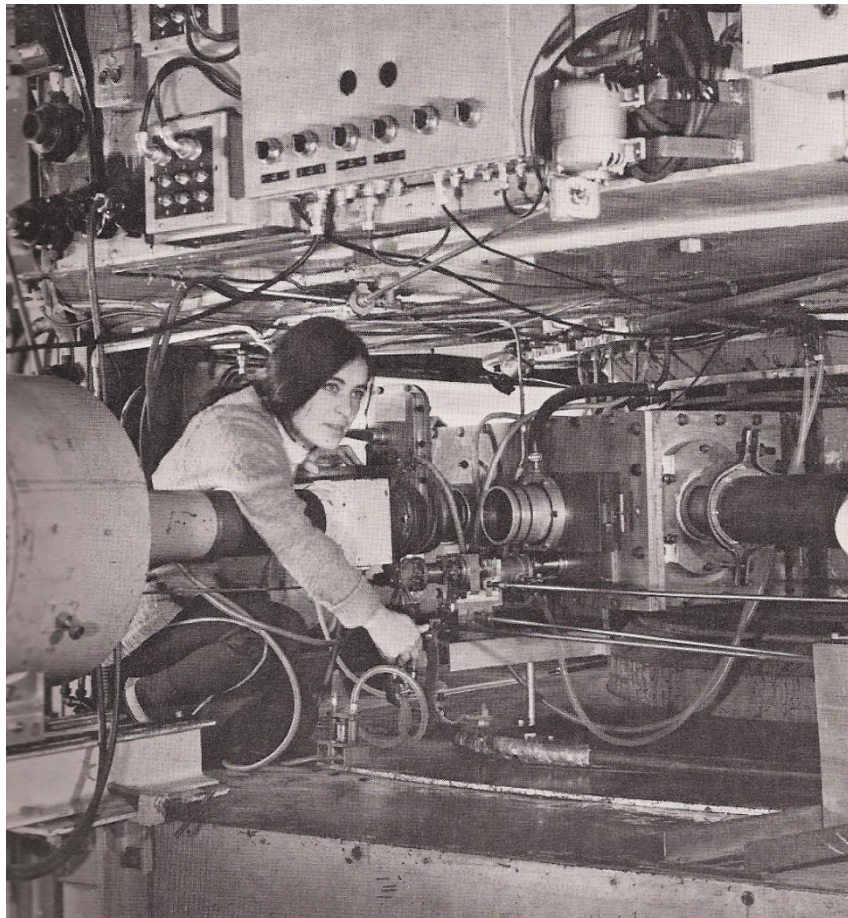
Between 1775 and 1800 James Watt and Matthew Boulton made 450 steam engines in their Birmingham factory

History of accelerators at Birmingham

- **60" Nuffield cyclotron**
(1948-1999) **10MeV p, 40MeV α**

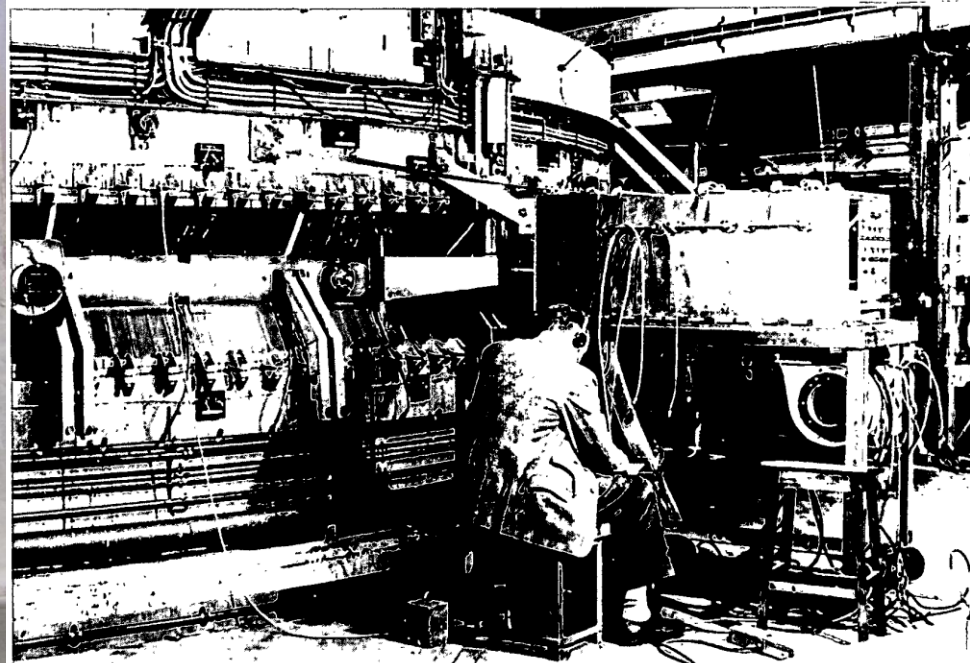
- **Radial Ridge Cyclotron**
(1960-2002)

- (axially injected polarised beams) **12MeV d, 24 MeV α ,
33MeV ^3He**

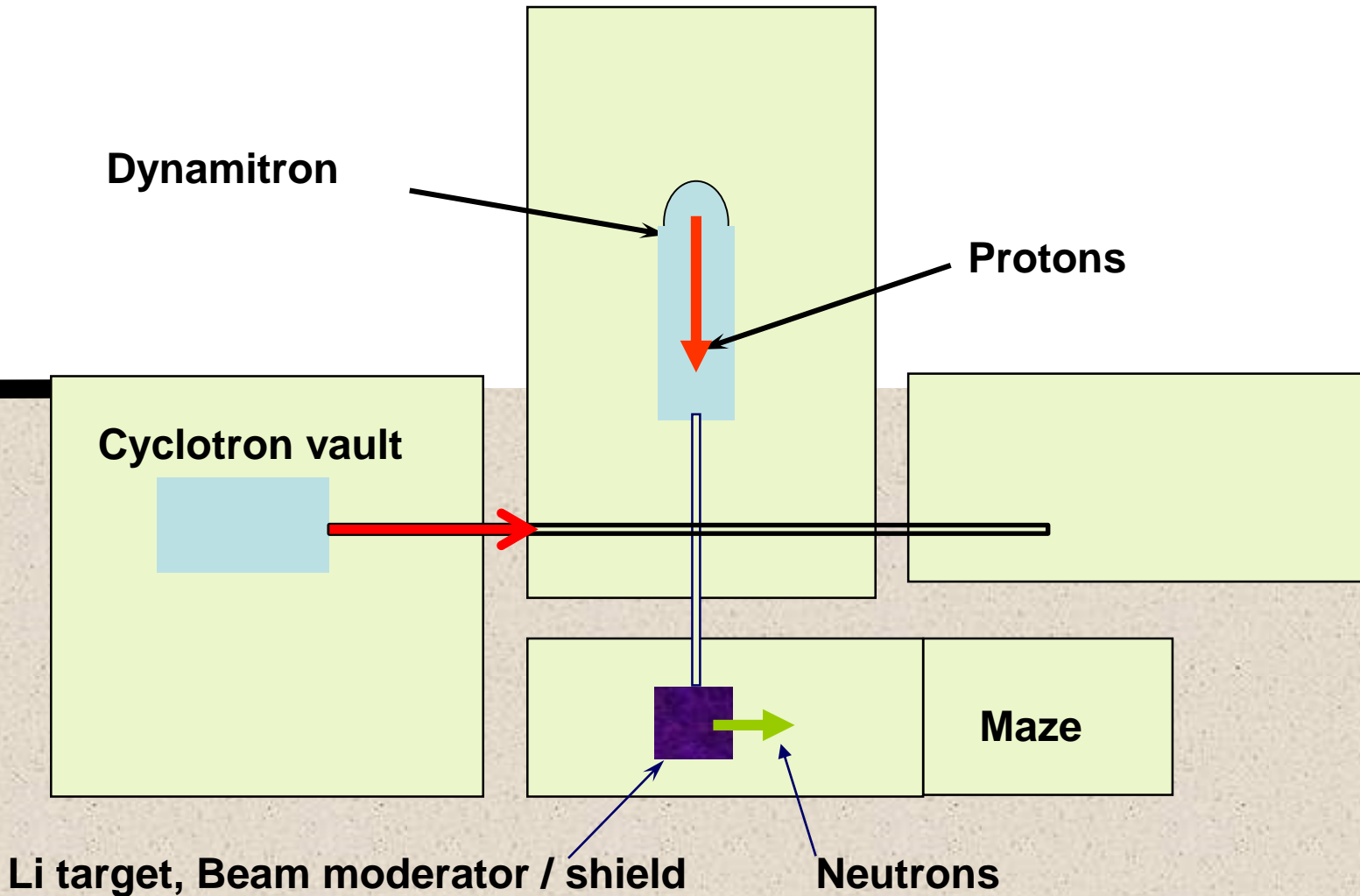


History of accelerators at Birmingham

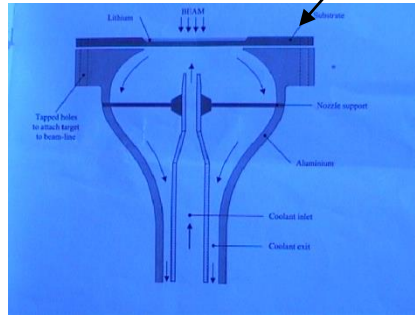
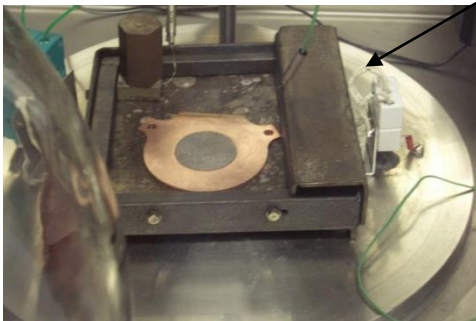
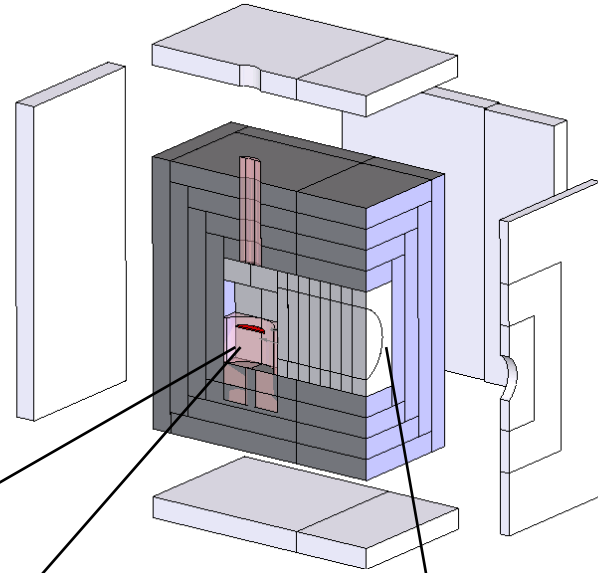
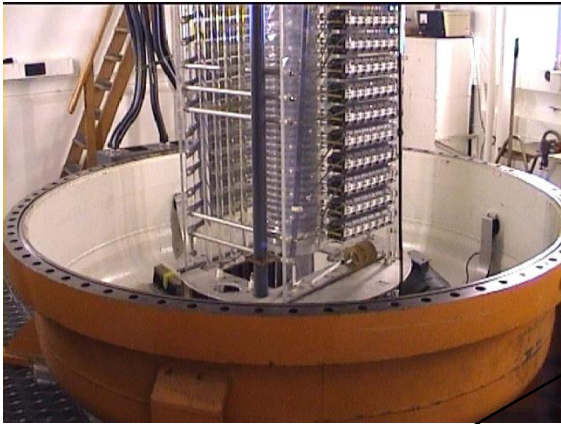
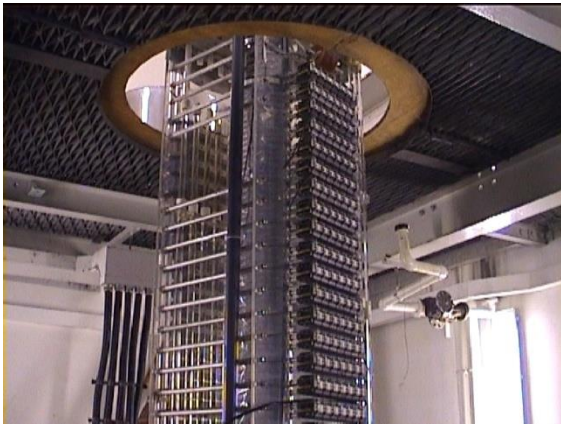
- 1 GeV Proton synchrotron (1953-1967) (overtaken during construction by Brookhaven Cosmotron)



Present Accelerator Facility: UoB Medical Physics Building



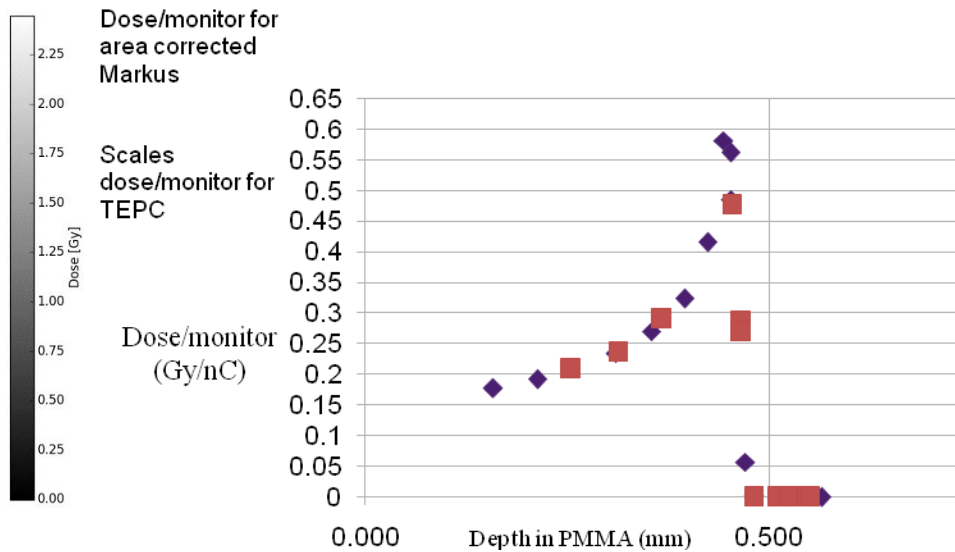
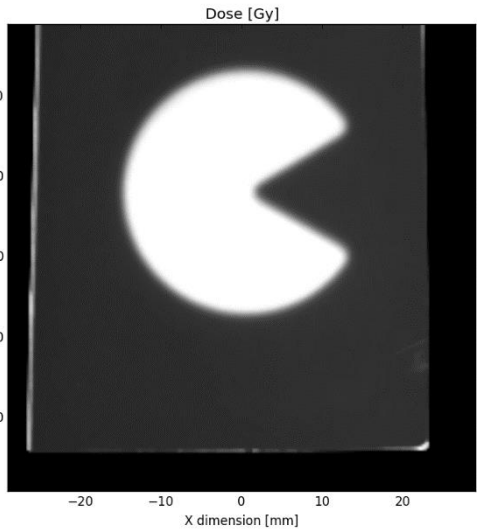
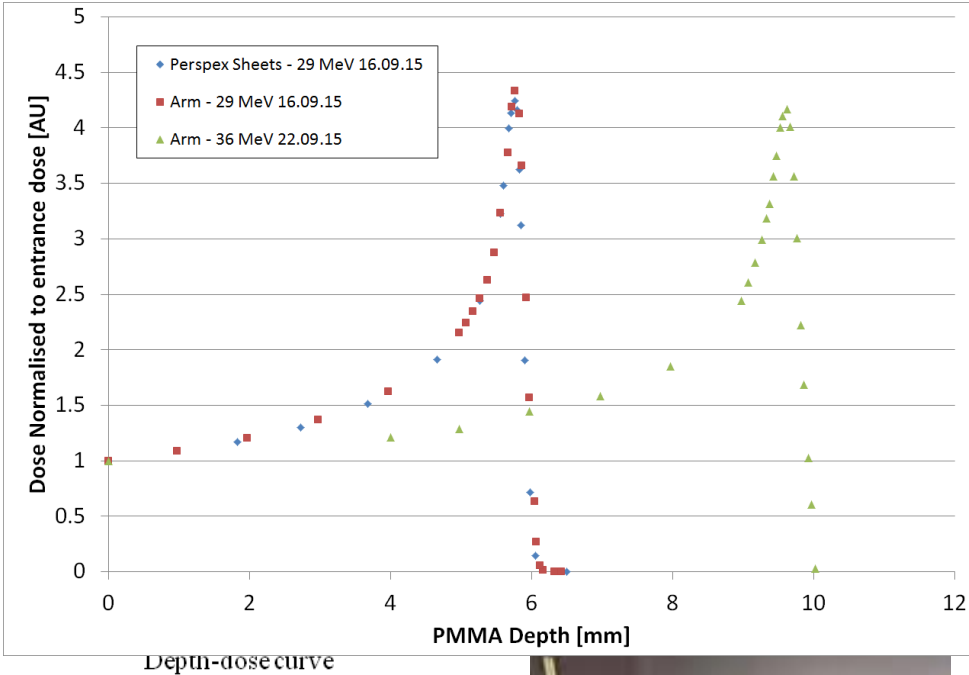
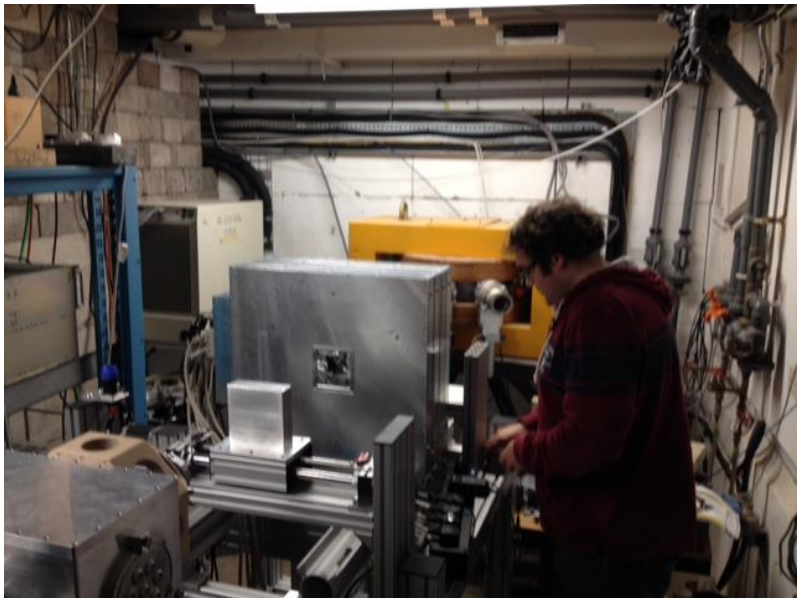
Dynamitron: 3MeV p, d @ ~1 mA



Neutron source is $> 1 \times 10^{12} \text{ s}^{-1}$ (1 mA proton current at 2.8 MeV)
Needs upgrade to 4-5 mA for clinical use

Scanditronix MC40 cyclotron (2004 –

< 39 MeV p, d 6-19.5 MeV d, 12-39 MeV α , 36-54 MeV ^3He



University Hospital Birmingham

- QEHB opened in Summer 2010
- >1million patients will be seen this year
- 8,800 staff supporting approx 1,380 beds
- 100 bed critical care unit
- Largest solid organ transplant service in Europe
- Centre for Defence Medicine
- Major trauma centre
- Genomic medicine centre

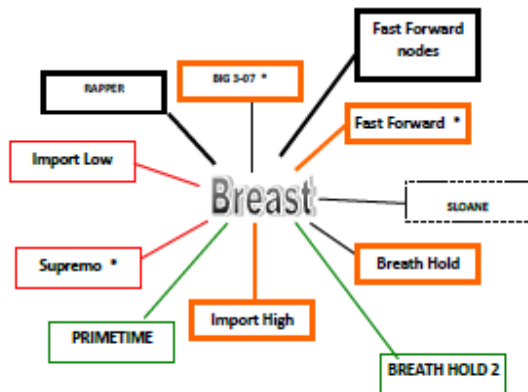
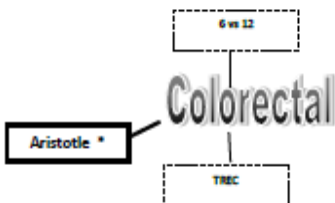
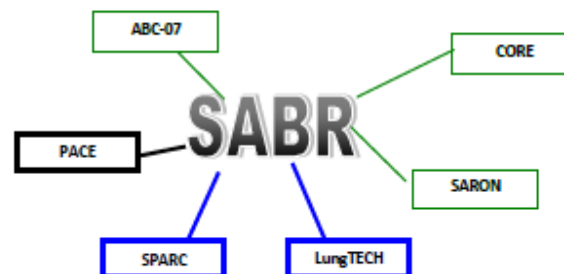
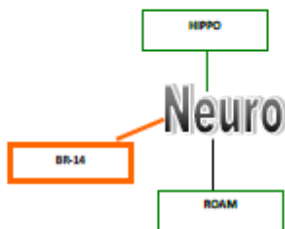
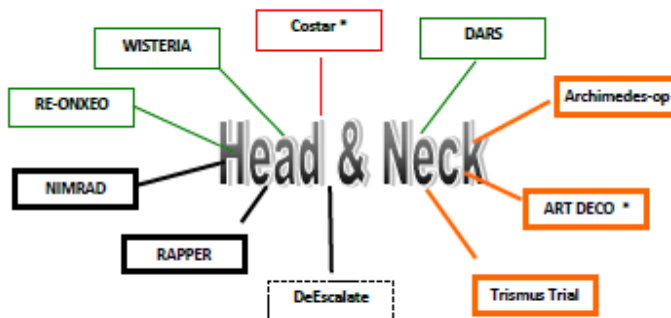
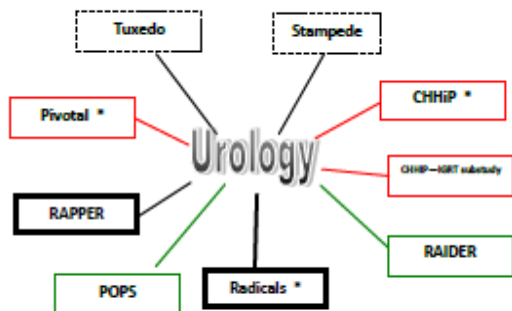


UHB radiotherapy

- Specialist centre for
 - brain tumour treatment (including Cyberknife SRS)
 - paediatric radiotherapy (with Birmingham Childrens Hospital)
 - sarcoma (with Royal Orthopaedic Hospital)
 - head and neck cancer (with 2 x TomotherapyHD)
- Delivers approximately 70,000 fractions per year to 4,500 new patients
- 9 accelerators overall, plus HDR....
- IMRT currently at around 42%
- SABR CtE centre (all sites commissioned)
- All original physics work on the fff mode for Elekta Versa (Jason Cashmore)



Radiotherapy Studies December 2015



- Open & Recruiting
- Closed and in Follow Up
- In Setup
- On hold / awaiting approvals
- Dashed line = we provide RT support
- * = also provide cross-site support

Birmingham's Institute of Translational Medicine

- £24m investment on the Edgbaston Campus.
- 50% funded by central government, 50% by Birmingham health partners (UoB, UHB and Birmingham Childrens Hospital).
- Will generate 600 jobs by 2018 and up to 2000 high value jobs long term



Birmingham Centre: environment



Particle Therapy, Technology and Clinical Applications. Views of the Future of Radiotherapy?



Venue: The British Institute of Radiology,
36 Portland Place, London, W1B 1AT

Tuesday 19 & 20 Wednesday May

This meeting is designed to showcase the present and future technology for particle therapy, and provide some clinical presentations of experience with the currently available technology.



The Cyclotron Trust

Stuart Green



History and current Trustees

- **The Trust was established in 1981 to support plans to replace an old, sub-optimal cyclotron which had treated patients with fast neutron therapy at the Hammersmith Hospital in West London.**
- **The Trust has widened the scope of its interests to reflect technical developments in particle therapy.**
- **President:** Sir Nicholas Bonsor Bt
- **Trustees:** Mr Richard Packard (Chairman), Dr Yen-Ching Chan, Mr Kevin Dean, Dr Dan Ford, Professor Stuart Green, Mr Brian Hayes , Baroness Neville-Jones DCMG , Professor Ivan Rosenberg, Professor Susan Short, Professor Karol Sikora, Dr Ed Smith, Dr Margaret Spittle OBE
- **Director:** Don Grocott
- **Registered Charity: 281930**

Overseas Fellowship programme

- Sponsorship of the Royal College of Radiologists/Cyclotron Trust Travelling Fellowships.
- 18 travelling fellowships had been completed to six different proton centres, five in the USA and one in Europe.
- The Trust is enormously grateful to the hosts at
 - University of Florida Proton Therapy Institute, Jacksonville, Florida (8 fellowships),
 - Massachusetts General Hospital, Boston (4),
 - University of Texas MD Anderson Cancer Centre, Houston (3),
 - West German Proton Centre, Essen (1),
 - Northwestern Medicine Chicago Proton Center (1) and
 - The Roberts Proton Therapy Center, University of Pennsylvania (1).

Developments in the Fellowship Programme

- Recently broadened remit to include candidates from Medical Physics. In the current round, many applications are for joint fellowships which include a clinical oncologist and a medical physics colleague planning to travel together.
- Preference is now being given to candidates who plan to visit centres with heavier ion facilities.

Proton treatment outcomes collection

- Since 2008, the NHS has funded children and adults with certain tumour types to receive proton beam therapy via the Proton Overseas Programme
- The outcome and toxicity data from NHS patients referred to proton therapy overseas were not being collated.
- The Trust has funded a Clinical Oncologist (part time) to analyse the outcome and toxicity data on the patients treated to enable clinicians to learn from this UK experience.
- At the time of the Trust's initiative, a total of 402 patients had been referred overseas.