

Particle Accelerators and Beams Group

Why, What, When ?

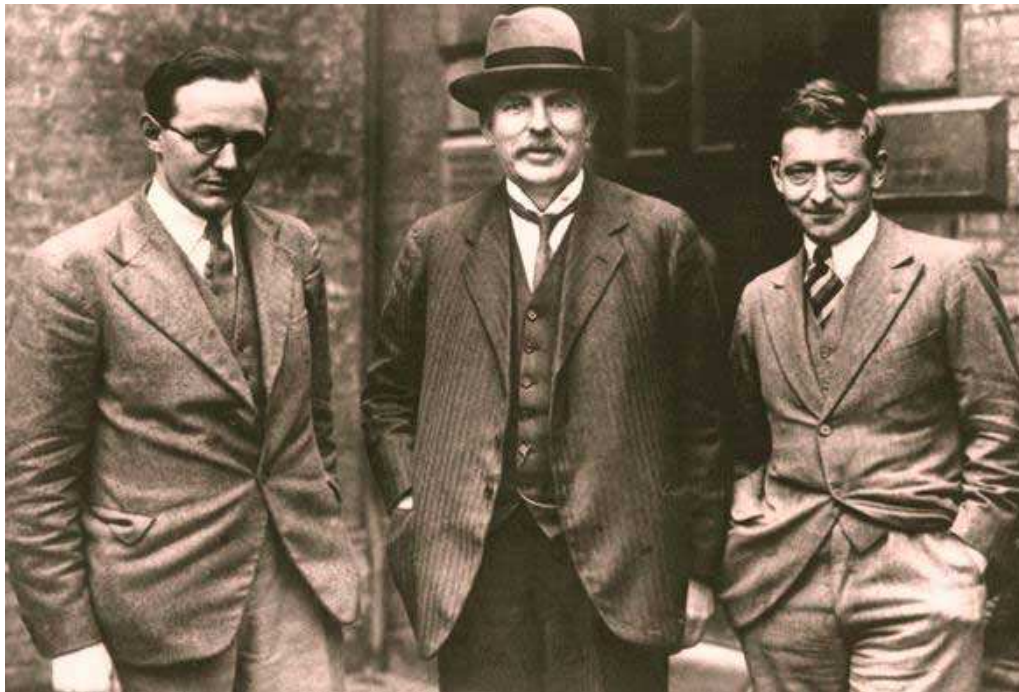
Mike Poole

(ASTeC)

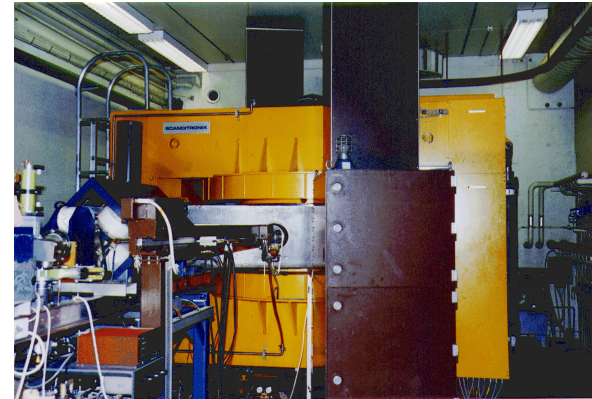
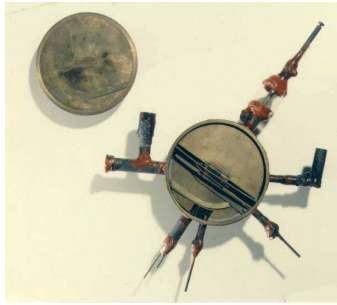
Accelerator Origins

Cockcroft & Walton - Cambridge (1932)

- splitting the atom
- birth of particle accelerators



Evolution



Recent Background

- **Study of generation, acceleration and manipulation of charged particle beams**
- **Established professional community in decline in Laboratories and (especially) universities (ie R&D capability)**
- **Creation of ASTeC in 2001 was first step in recognition**
- **Major investment initiated in 2004 (LC-ABD, UK-NF, CI, JAI)**
- **Growth period and successful UK international reputation**

EMERGING THREATS !!!

Accelerator Physics Challenges

- **Classical electrodynamics - Maxwell (mainly !)**
 - **Lorentz forces: Deflection and acceleration**
- **Single particle dynamics**
 - **transport, stability, nonlinear dynamics - tracking & differential algebra**
- **Multi-particle dynamics**
 - **collective effects, wake fields, space charge, coherent instabilities**

Analytic modelling + Computer simulation (Start-to-End)

Production Manipulation Transport Delivery Injection Acceleration Extraction

Experimental verification (Commissioning !)

Accelerator Technologies

Sources -	electron guns photoinjectors ion sources
Magnets -	EM / SCM / PM DC / AC / Pulsed harmonic / periodic power supplies
RF System -	structures power sources
Cryogenics -	magnets RF
Vacuum -	UHV modelling diagnostics pumping
Diagnostics -	fast high precision non-interactive
Geodesics -	alignment feedback
Radiation -	losses shielding personnel safety
Dumps -	spallation targets collimators
Engineering -	mechanical electrical civil
Controls -	advanced process control

NB **fs and nm regimes**

Purpose of a New Group

- Professional Recognition and Focus
- Community Spirit
- Promotion of Subject Standing - and Standards
- Encourage Discussion and Collaboration
- Benefit from IOP Underpinning
- Representation
- Education and Dissemination

Applications

- **Particle physics**
 - LHC upgrades ILC/CLIC NF SuperB
- **Nuclear physics**
 - HIE-ISOLDE FAIR
- **Light sources**
 - NLS XFEL diamond
- **Neutron sources**
 - ESS ISIS
- **Medical**
 - Therapy diagnostics
- **Energy/Environment**
 - Fission driver transmutation

Interim Committee

- **Temporary steering team in place - met in February**
- **Formal elections at 2009 AGM on 3 July**

Mike Poole	(Chairman)
Ken Long	(Secretary)
Phil Burrows	(Treasurer)
Dan Faircloth	
Allan Gillespie	
Brian McNeil	
Hywel Owen	
Susie Sheehy	(Co-opted Student)

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Plans

- **Recruit members (via MyIOP)**
- **Major launch event - 3 July (London)**
- **Half day meetings (Sept - Dec tbc):**
 - **Novel accelerating solutions**
 - **Proton accelerator opportunities**
- **Summer school (2010)**
- **Directory of Activities/Expertise**
- **Affiliated to N&PP Division (and others)**
- **Explore reciprocity with other Groups**

HEPP Links

- **Strong cross-membership interests**
- **Mutual programme plans**
- **Maximise information flow**
- **Optimise political influences**
- **Assist in development of new Group**

Your invitation to join new PAB Group