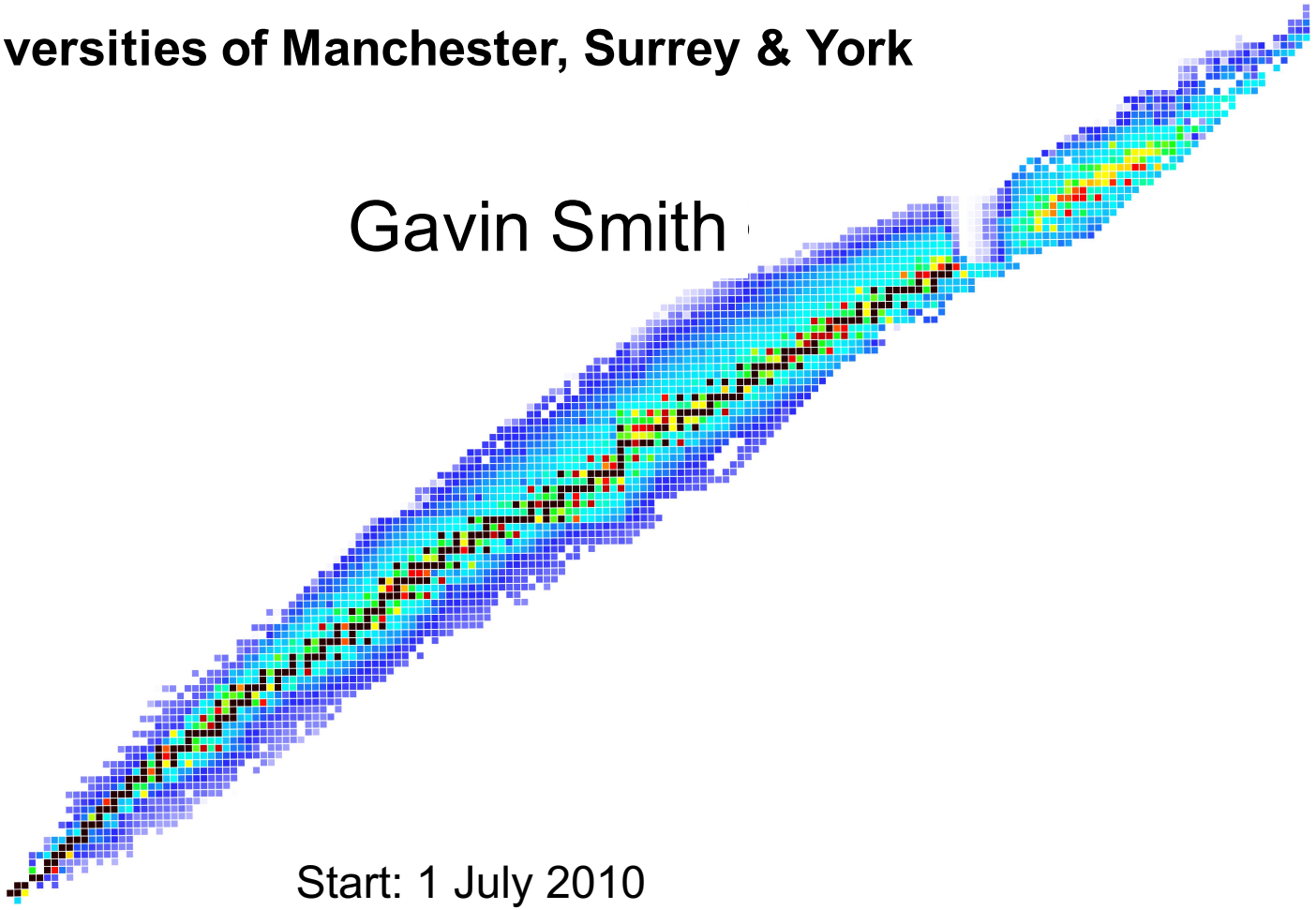
MANCHESTER 1824

The University of Manchester

EPSRC grant for *Nuclear data: fission yields, decay heat and neutron reaction cross sections*

Universities of Manchester, Surrey & York

Gavin Smith



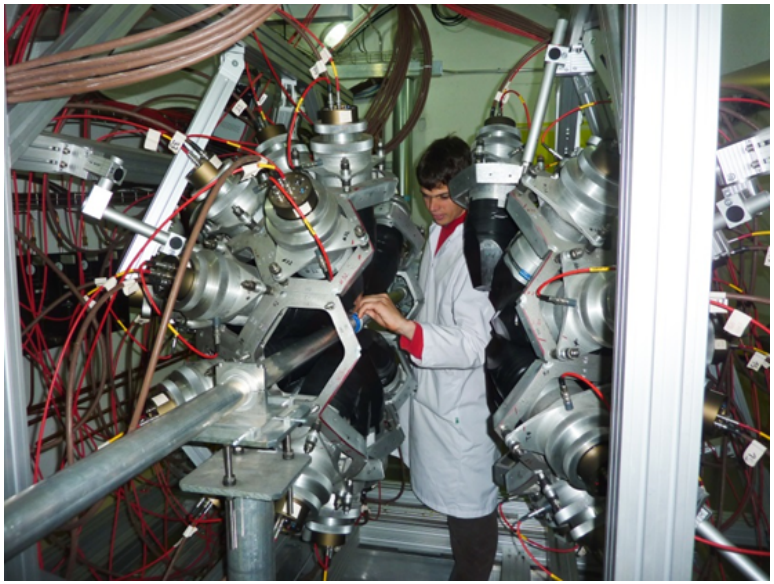
Start: 1 July 2010

End: 30 June 2014 → Extended to 31 July 2015

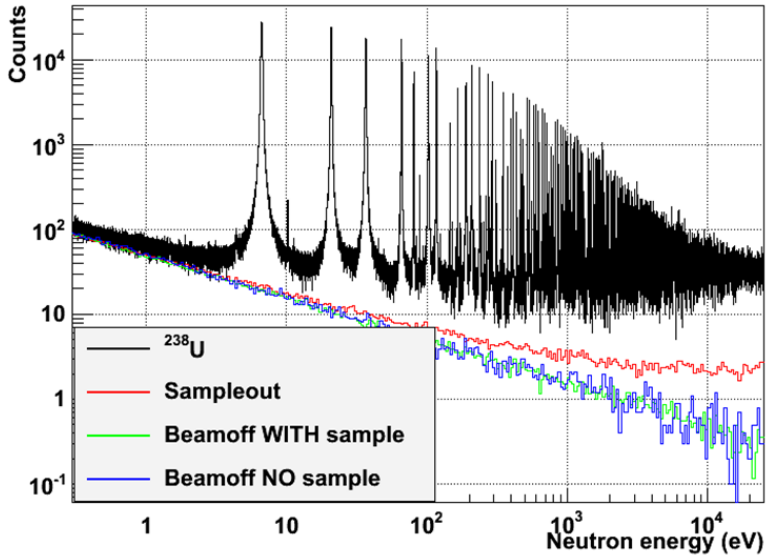
Strand 1 *Neutron capture cross section measurements at nTOF, CERN*
Gavin Smith, Jon Billowes (Manchester) David Jenkins (York)

PhD studentship (York) - Mark Vermeulen – Completed 2015
NDA Bursary (Manchester – Toby Wright – Completed 2014 (PDRA Manc)
Subscription to nTOF Collaboration (Manchester & York)

NEA request to measure ^{238}U(n,γ) cross section with 2% accuracy from 100 eV to 25 keV



Hands on work at the n_TOF facility, CERN measuring a ^{238}U sample



University involvement:

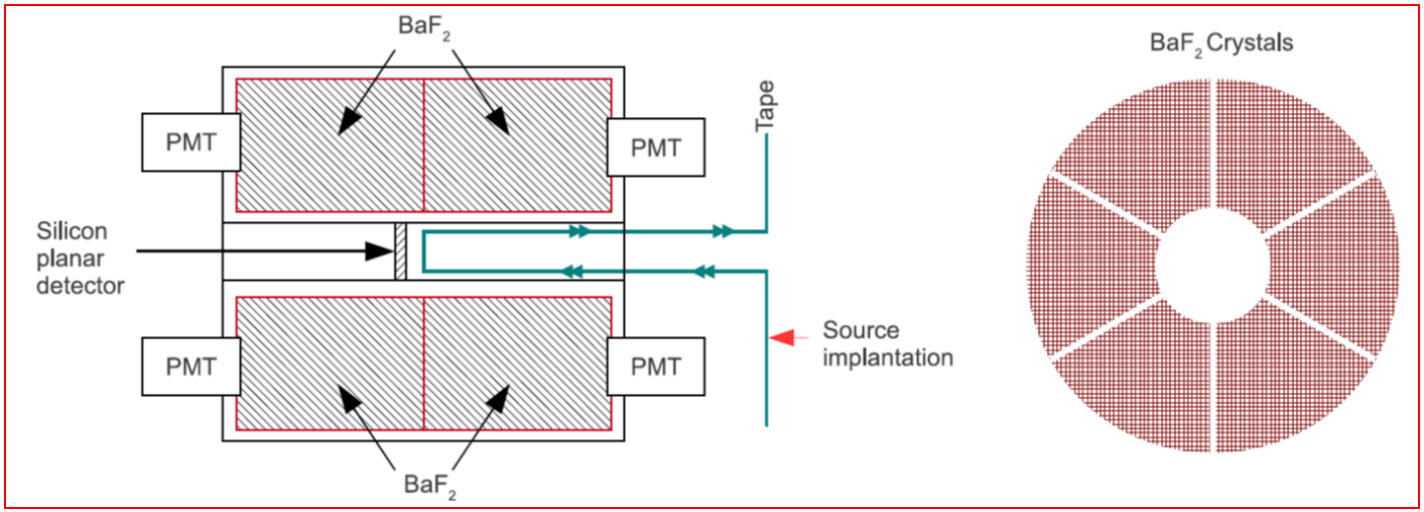
- **Manchester** – ^{238}U(n,γ) measurement (above)
- **York** – ^{236}U(n,γ) measurement

" High-precision Measurement of the 238U(n,γ) Cross Section with the Total Absorption Calorimeter (TAC) at n_TOF, CERN", Nuclear Data Sheets 119, 26-30 (2014)

Strand 2 *Decay heat measurements of fission fragments with a TAS*
Paddy Regan, Zsolt Podolyak (Surrey), Gavin Smith (Manchester)

PhD studentship (Surrey) - Simon Rice – Completed 2014 (now AWE)

Decay heat measurements for "Priority 1" nuclides identified by WPEC:
^{101}Nb, ^{105}Mo, ^{102,104,105,106,107}Tc, ^{86}Br, ^{91}Rb, and ^{94}Sr



TAS:
Total
Absorption
Spectrometer

Unique features of Jyväskylä Accelerator Laboratory, Finland:
- "IGISOL" ion source – provides even refractory elements in 1 ms
- Penning trap – can separate isobars (and even isomers) by exact mass and deliver to TAS detector

Strand 3 *Neutron fission cross sections and yields with STEFF at GANIL*
Gavin Smith (Manchester), Paddy Regan, Zsolt Podolyak (Surrey)

STFC studentship (Manchester) - Andy Pollitt - Completed 2013 (ILL)
EPSRC (Nuclear FiRST) - Lizzie Murray - Completed 2015
EPSRC (Nuclear FiRST) - Robert Frost
EPSRC (Nuclear FiRST) - Stuart Warren
EPSRC (Nuclear FiRST) - James Ryan

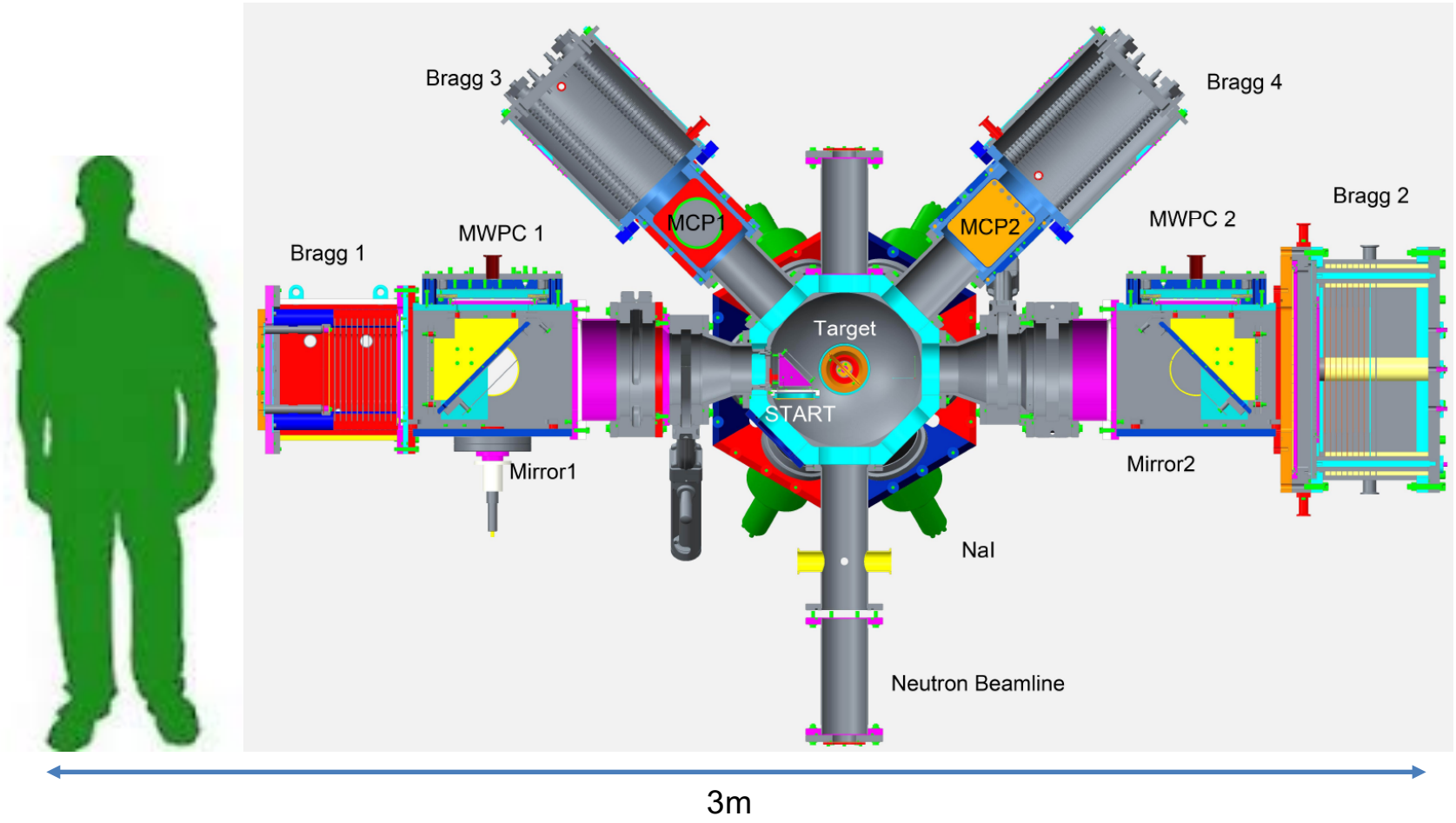
Toby Wright – PDRA based at CERN (FP7) Now Manchester PDRA

Construction and upgrade of STEFF (Spectrometer for exotic fission fragments) for deployment at GANIL Neutrons for Science Facility (NSF)

NSF has been delayed, but a higher neutron flux facility now available at CERN n_TOF - Class A Lab.

The STEFF ^{235}U experiment approved by CERN – Run 15/10/2015

STEFF configuration for Experimental Area 2



Future beyond EPSRC grant?

Manchester

- STFC is providing some T&S, technical support, and 50% of n_TOF subscription (first time STFC has supported this area of applied nuclear physics)
- FP7 project and group funds provides PDRA support

York

- No funding so far

Surrey

- STFC providing some T&S and some PDRA support (shared) for further reactor decay heat measurements.

- NDA Bursary (2014) for fission fragment decay data (student recruited)

- NPL links (with Paddy Regan, Gavin Lotay) in decay heat spectroscopy

Research Council Support

- Agreed between EPSRC/STFC that Nuclear Data falls within STFC remit

- Global Challenges Network+ Application (under consideration by STFC)