

Overview of the Work of the NPL Neutron Metrology Group

The 4th IRMF Comparison of the
Calibration of Neutron Area Survey Monitors

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- **Provides well-characterised neutron fields**

Broad range, i.e. radionuclide sources:

Cf, Cf(D₂O), Am-Be, Am-B, Am-F, Am-Li
(thermal distribution, Realistic Field facility)

Monoenergetics: ~8 keV – 6 MeV, 14 MeV – 19 MeV

- **Characterises neutron fields**

Emission rates (Mn Bath facility), Anisotropy (long counters),
Workplace fields, inc. in-flight (spectrometry, microdosimetry)

- **Performs R&D to validate, improve & expand on the above**

- **Provides services / advice relating to the above**

Neutron Metrology Theme has 6 Projects

3.1 Radionuclide-based

3.2 Accelerator-based

3.4 Comparisons & demonstration of equivalence

Fluence
Standards

3.3 Neutron Spectrometry

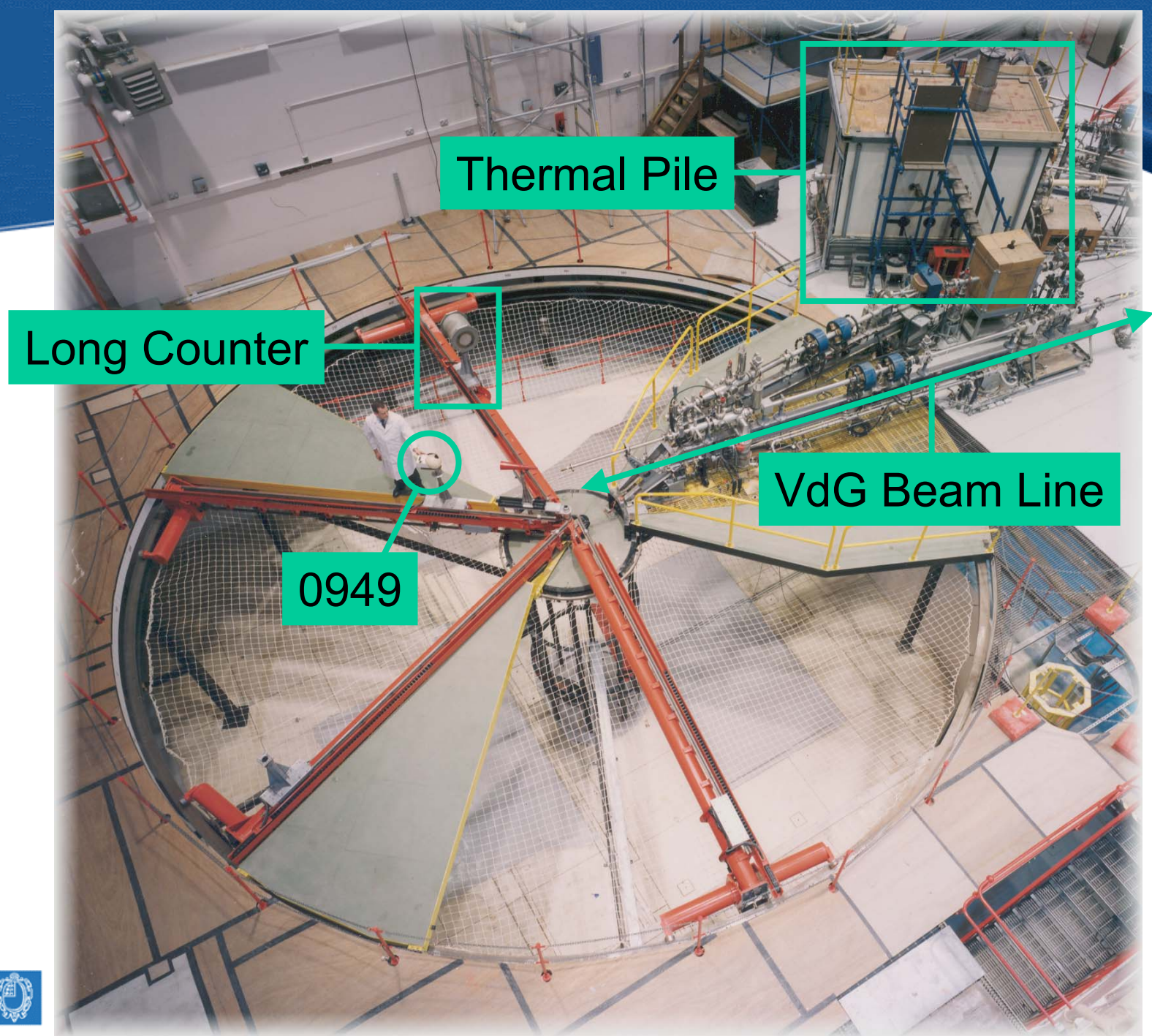
3.5 Neutron Dosimetry

Applications

3.6 Van de Graaff

Facility

NMG
Low Scatter
Facility



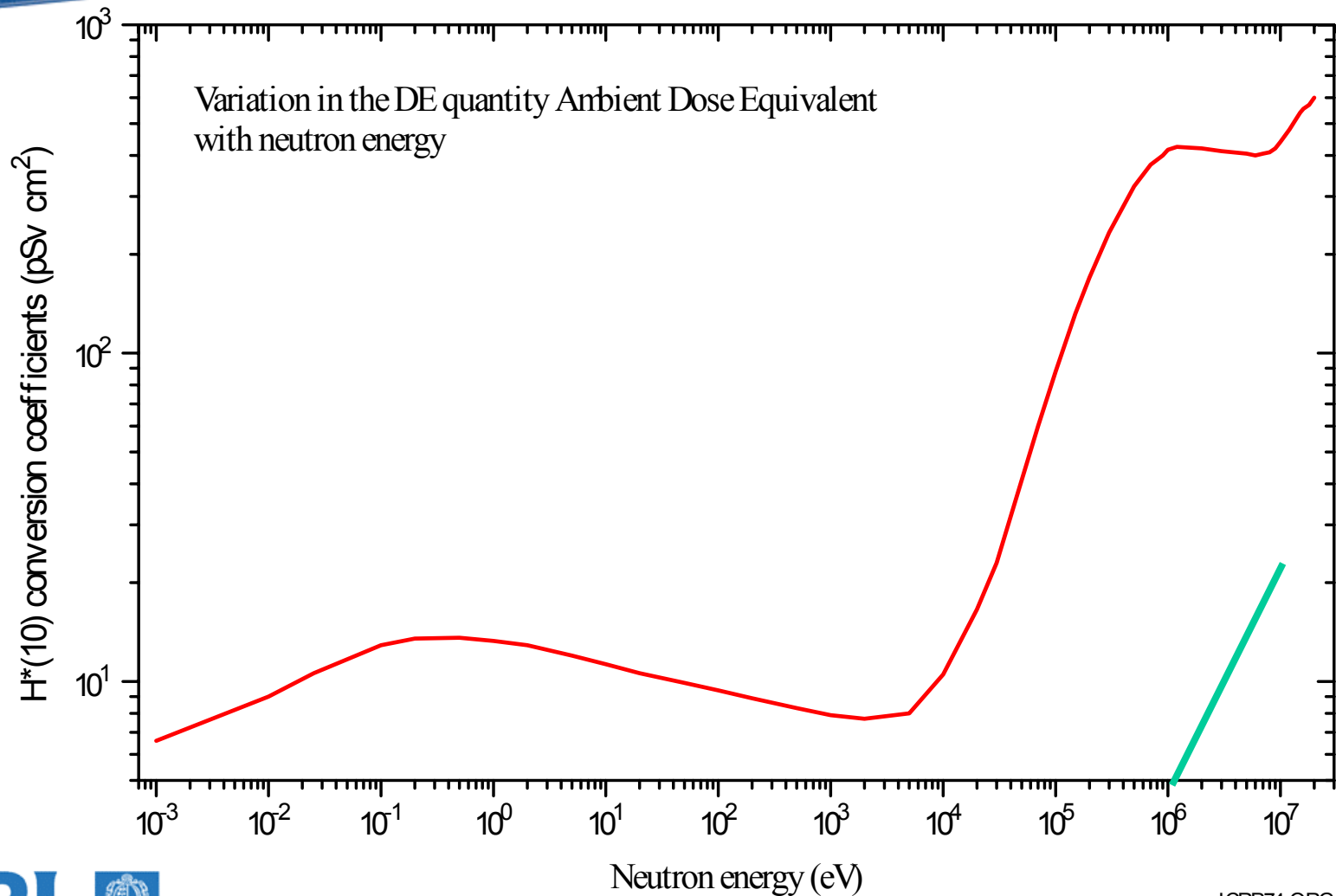
Thermal Pile

Long Counter

VdG Beam Line

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Tissue Sensitivity to Neutrons



- Photon doses associated with neutron sources
- Improved dosimetry of Solar Particle Events at aircraft altitudes
- Measurement of photoneutron production around LINACs
- Better characterisation of neutron dosimeter responses
- Improving knowledge of neutron sources and detection systems

IRMF Comparison of the Calibration of Neutron Area Survey Monitors

IRMF Comparisons of the Calibration of NASMs

- **First three Comparisons consisted of**
 - Two source types ($^{241}\text{Am-Be}$, ^{252}Cf)
 - Five dose equivalent rates (from $\sim 2 \text{ uSv h}^{-1}$ to $\sim 5 \text{ mSv h}^{-1}$)
 - Two area survey monitors (1 spherical, 1 cylindrical)
- **Participants**
 - AEA Technology (RWE Nukem), BAE Systems,
 - DRaStaC (DRMS), NPL, NRPB (HPA),
- **Results**
 - Satisfactory (although 3rd comparison worse than others!)

4th IRMF Comparison of the Calibration of NASMs (2006)

- **Calibrations**

Two source types ($^{241}\text{Am-Be}$, ^{252}Cf)

Five dose equivalent rates (from $\sim 2 \text{ uSv h}^{-1}$ to $\sim 5 \text{ mSv h}^{-1}$)

Two area survey monitors:

Spherical: NMS017 (BAE Systems)

Cylindrical: **BIOREM FHT 752H (RIVM, NL) ??**

Plus N-EPD(s)?

- **Participants**

RWE Nukem, BAE Systems, DRMS, NPL, HPA, **RIVM?, ???**

- **Thoughts?**