n_TOF Report

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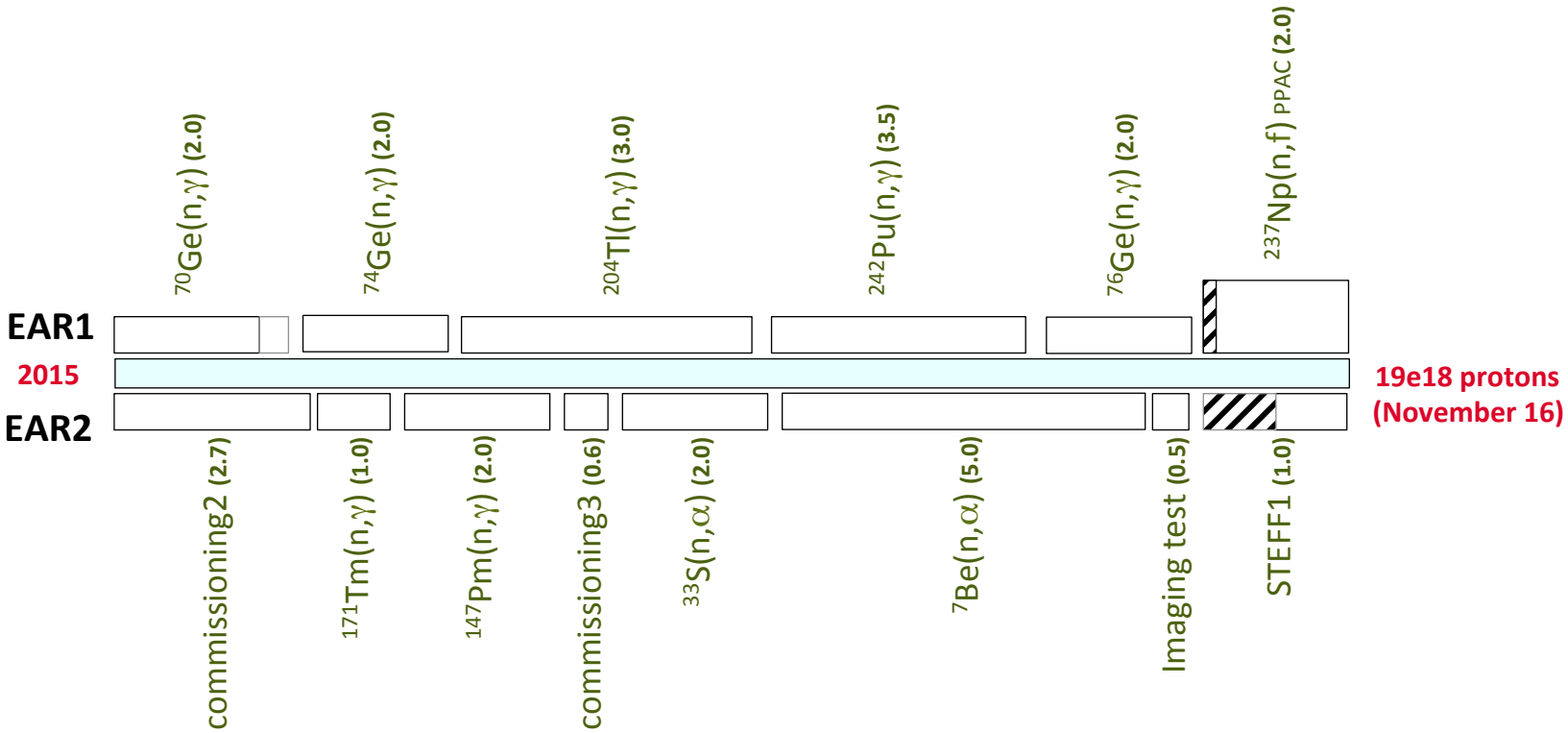
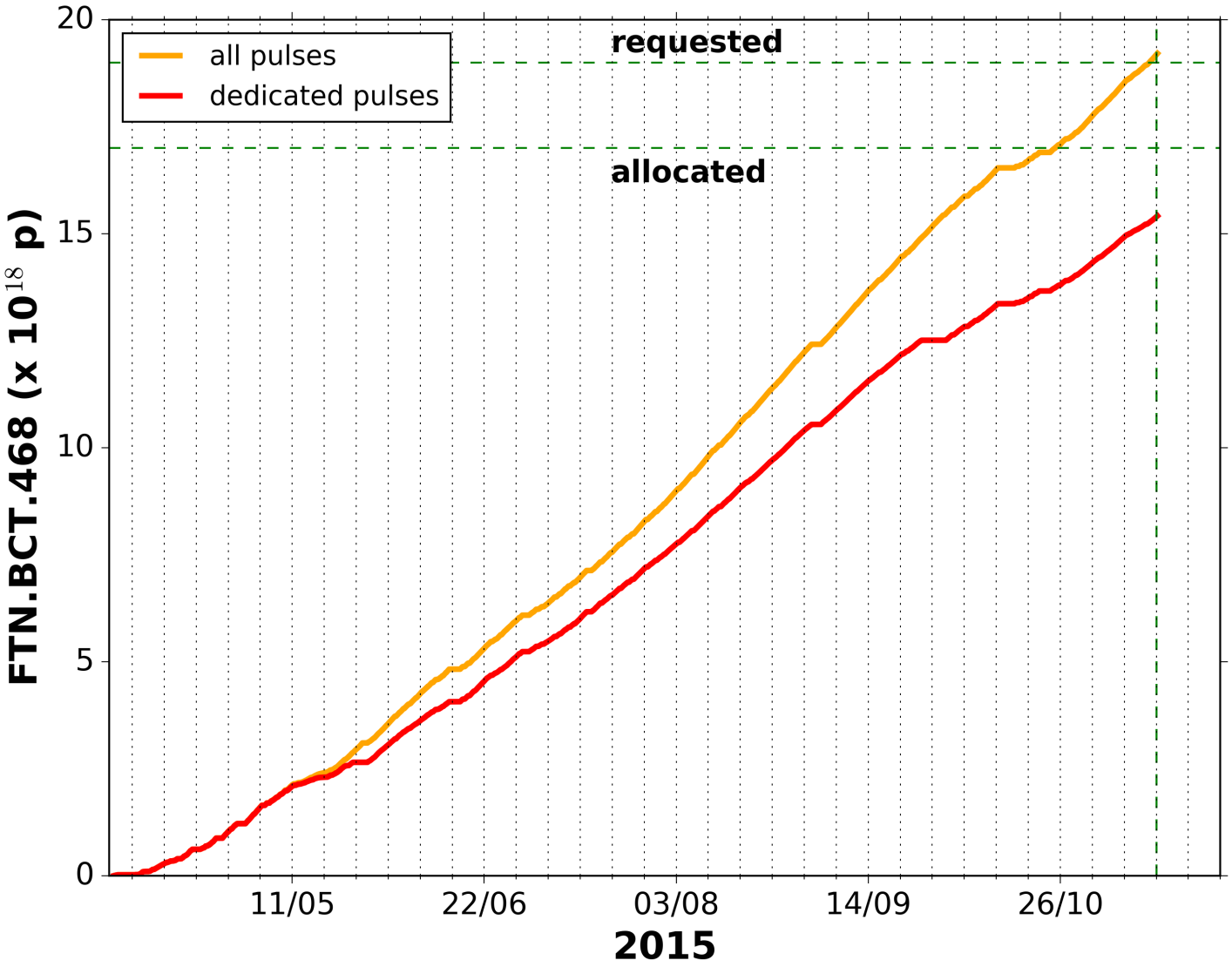
n_TOF Physics Coordinator

CEA Saclay
On leave at CERN

Measurements performed in 2015



2015 proton information



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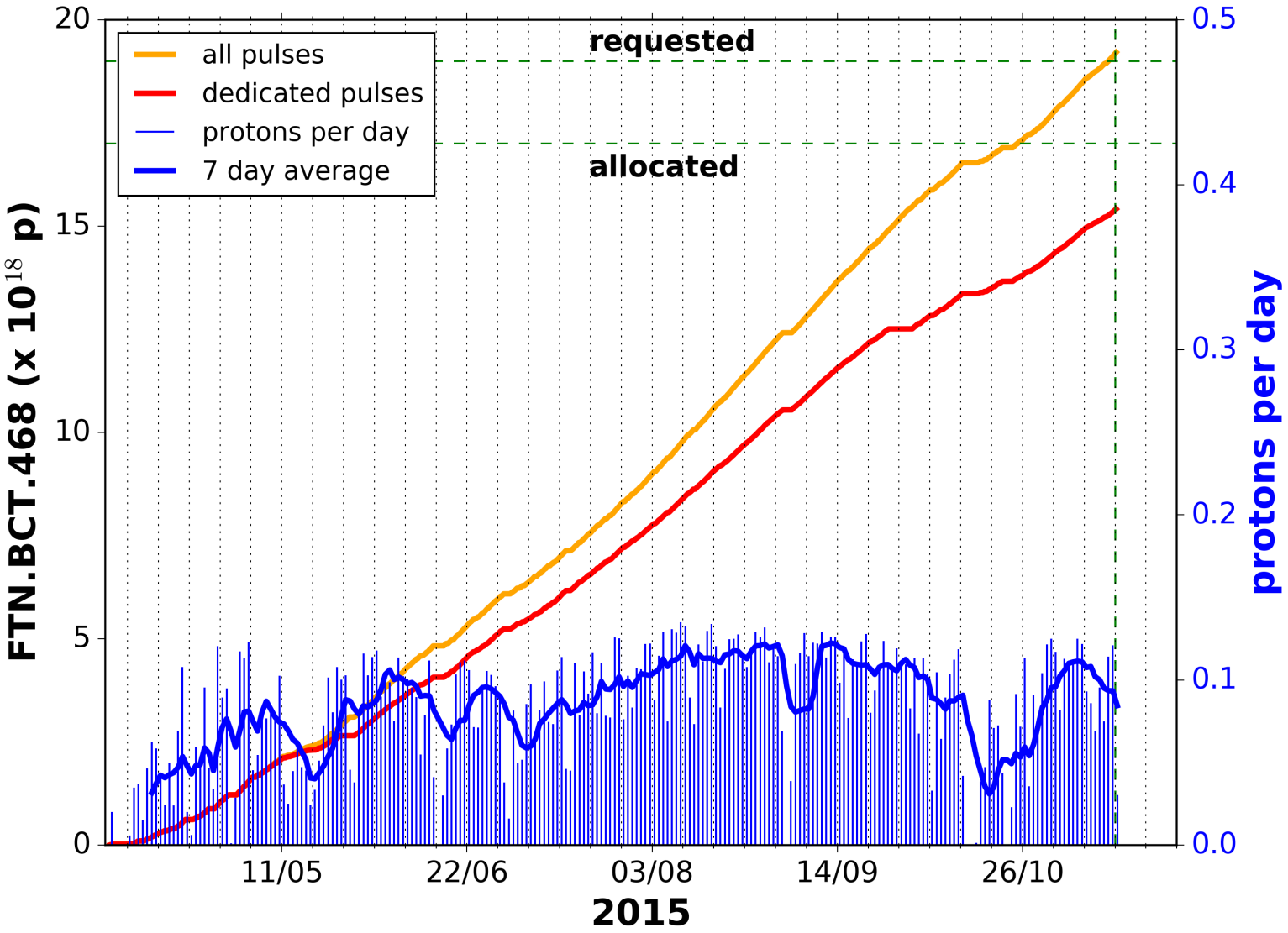

Measurements performed in 2015

EAR1

- ^{70}Ge(n,γ)
- ^{74}Ge(n,γ)
- ^{204}Tl(n,γ)
- ^{242}Pu(n,γ)
- ^{76}Ge(n,γ)
- ^{237}Np(n,f)

EAR2

- commissioning
- ^{171}Tm(n,γ)
- ^{147}Pm(n,γ)
- ^{33}S(n,α)
- ^{7}Be(n,α)
- imaging
- ^{235}U(n,f)FF STEFF

- EAR2 commissioning 2014: focus on feasibility of fission (n,f) → ^{240}Pu(n,f)
- EAR2 commissioning 2015: focus on feasibility of capture (n,γ) and (n,cp)

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^{7}Be(n,α)

- Primordial ^{7}Li problem:
  Predicted primeval abundance of ^{7}Li factor 2-4 less than observed.

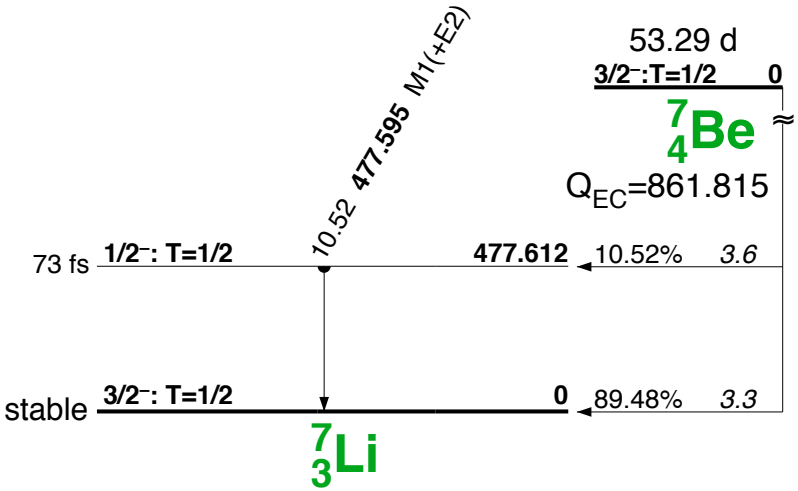
- Majority primordial ^{7}Li originates from electron capture of ^{7}Be

  $^{7}Be \xrightarrow{EC} {}^{7}Li$ ($T_{1/2}$ = 53.2 d)

- Possible other sources of destruction of ^{7}Be:

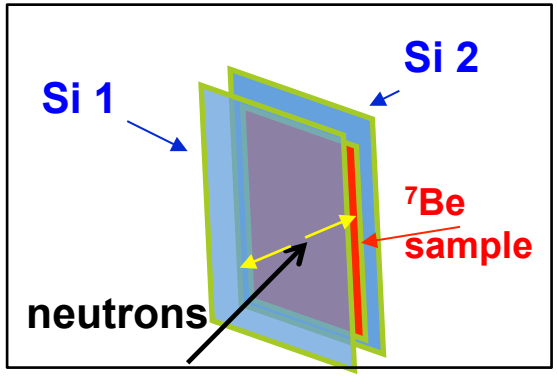
  $^{7}Be + n \rightarrow p + {}^{7}Li$ (Q = 1.6 MeV)

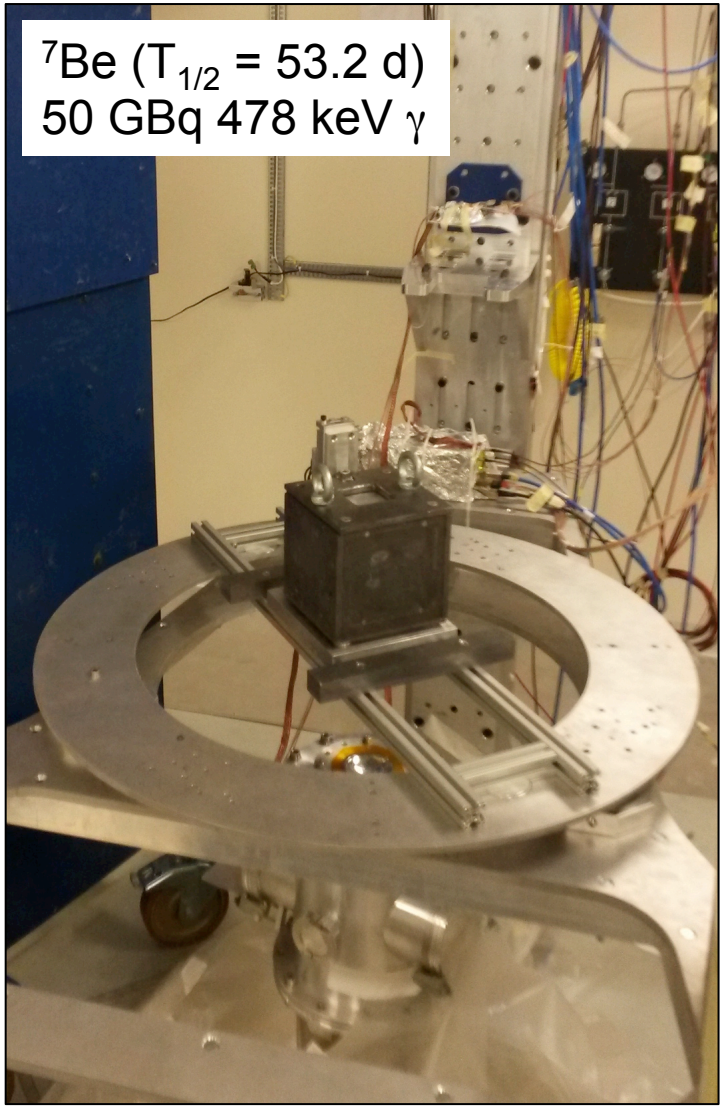
  $^{7}Be + n \rightarrow \alpha + \alpha$ (Q = 19 MeV)

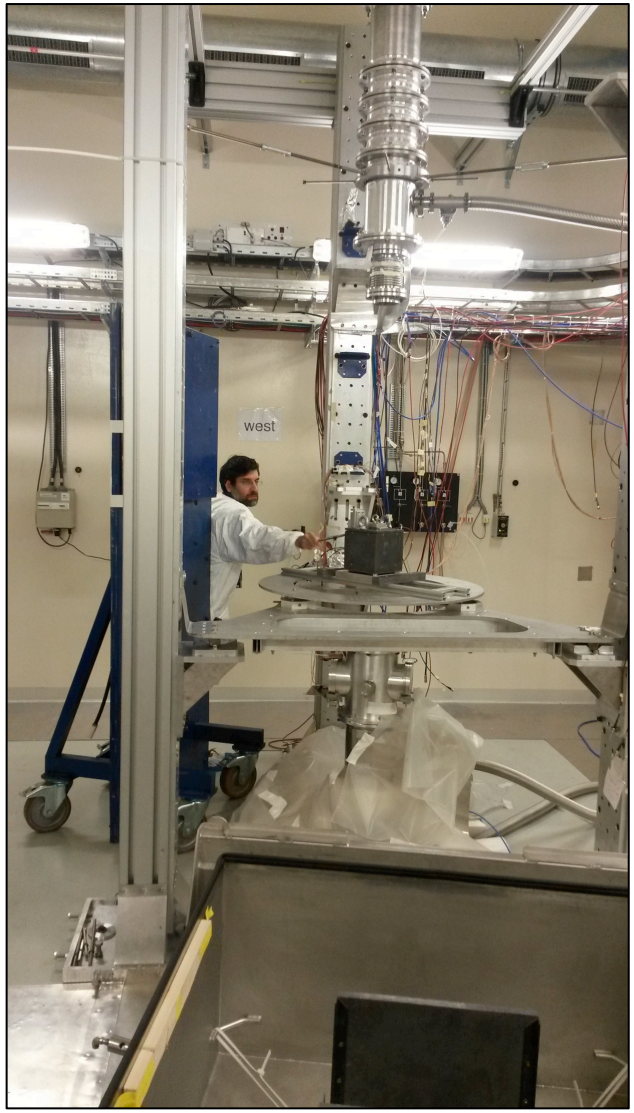


^{7}Be(n,α) EAR2 2015

^{7}Be(n,α): in-beam detector

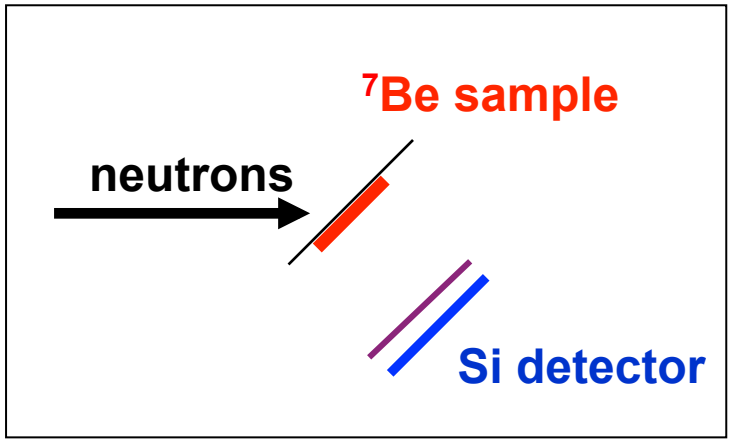






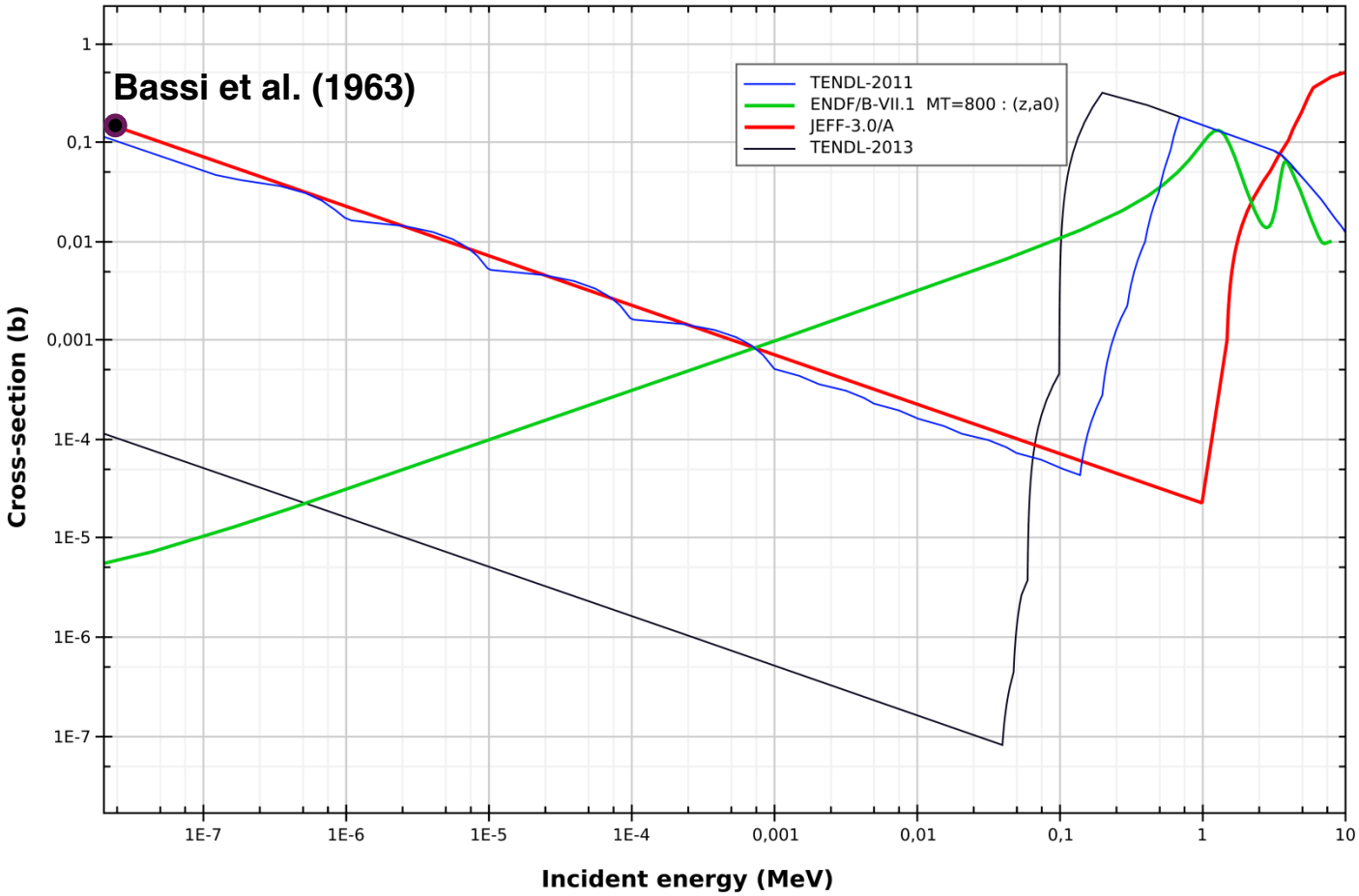
^{7}Be(n,p) EAR2 for 2016

^{7}Be(n,p): off-beam detector:



- 100 ng of ^{7}Be (material from water cooling of SINQ spallation source at **PSI**)
- Offline mass separation required at **ISOLDE,** starting from 100 GBq of $^{7}BeNO_3$
- Implantation on Al backing

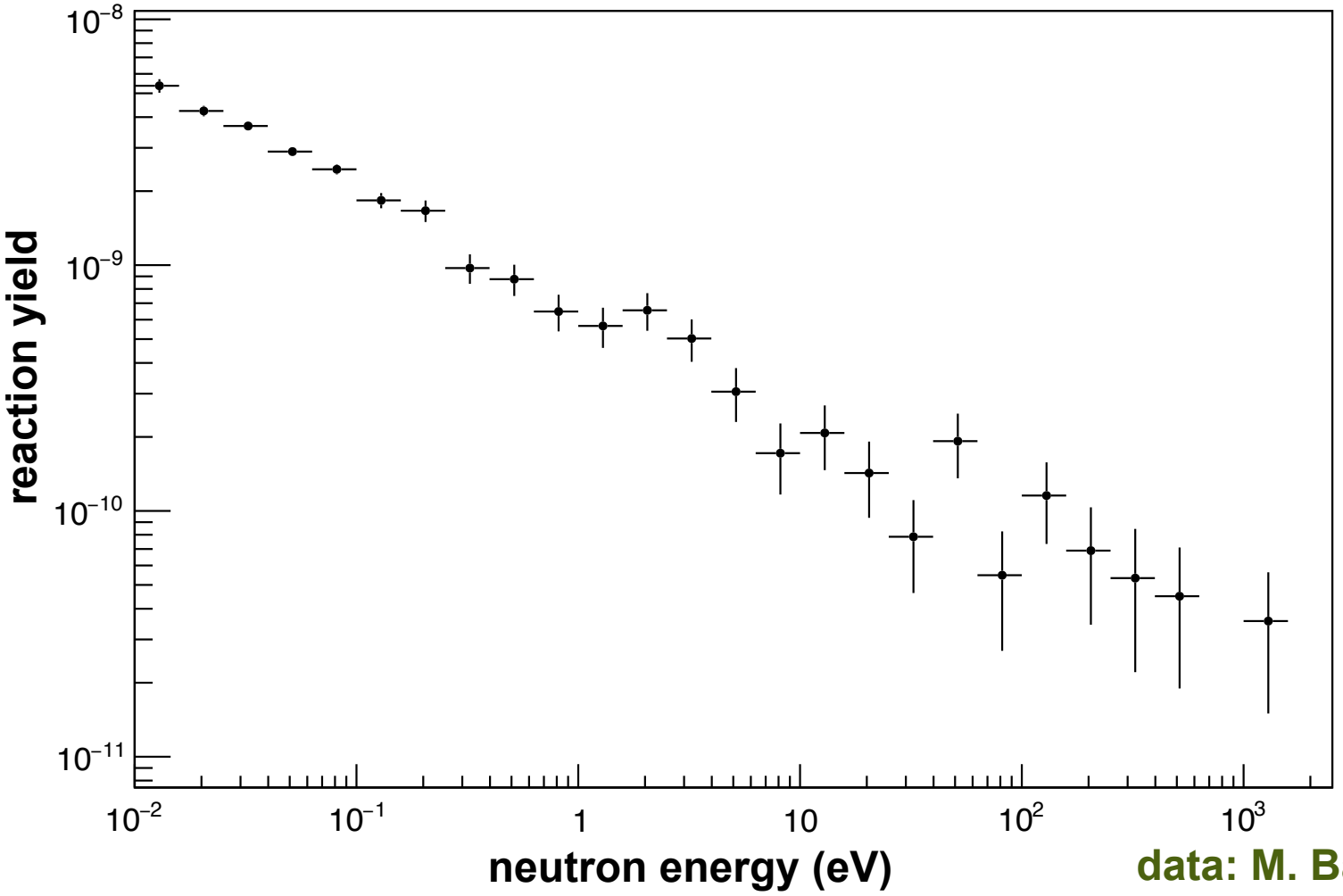
- Only one direct measurement at thermal energy



data: M. Barbagallo

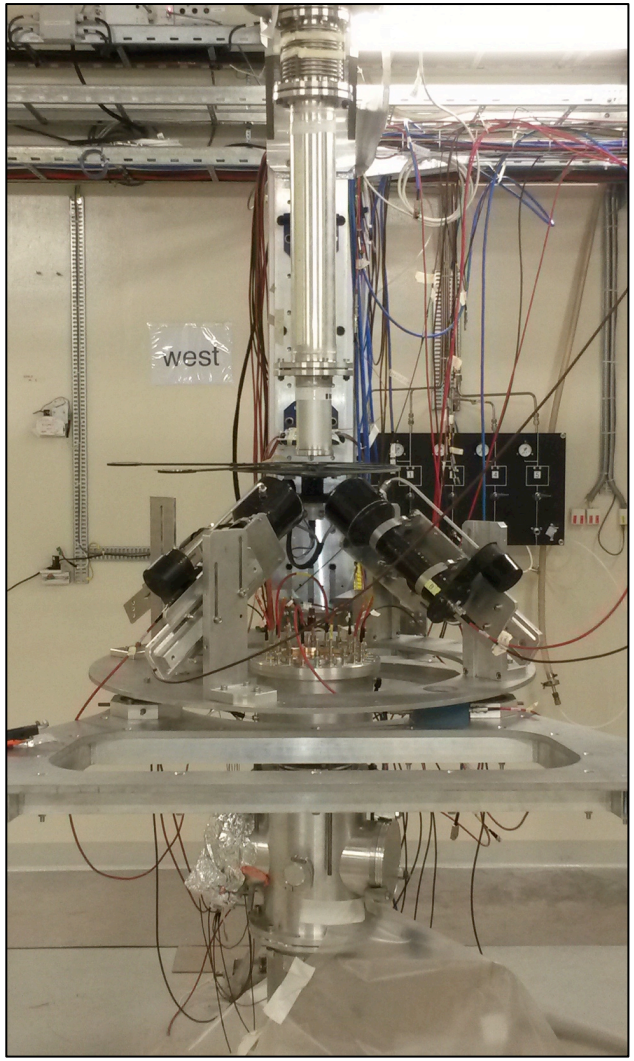
^{7}Be(n,α) preliminary results

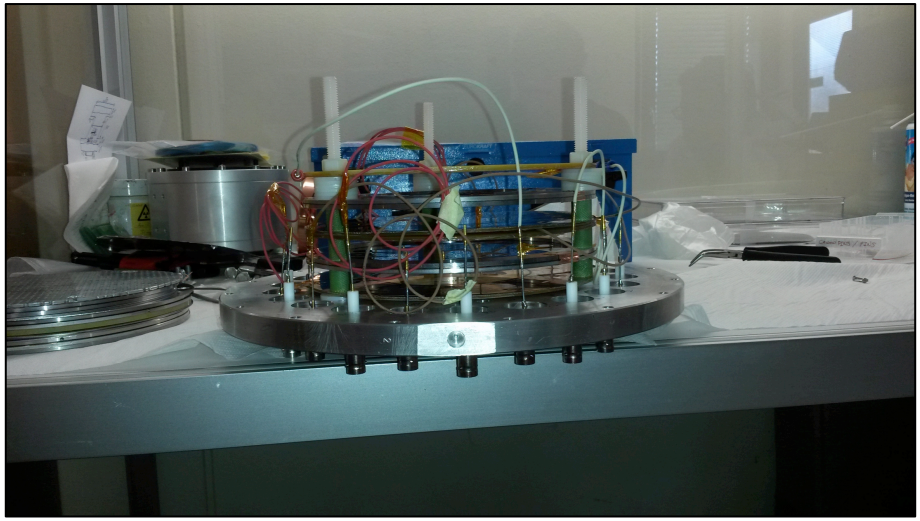
- 1/v cross-section shape confirmed
- absolute value thermal close to Bassi value (tbc)

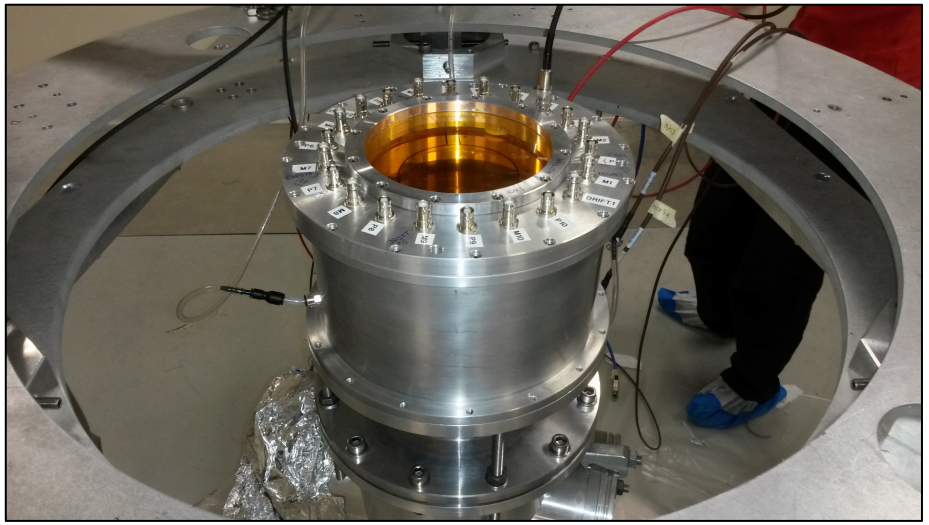


data: M. Barbagallo

^{33}S(n,α) EAR2

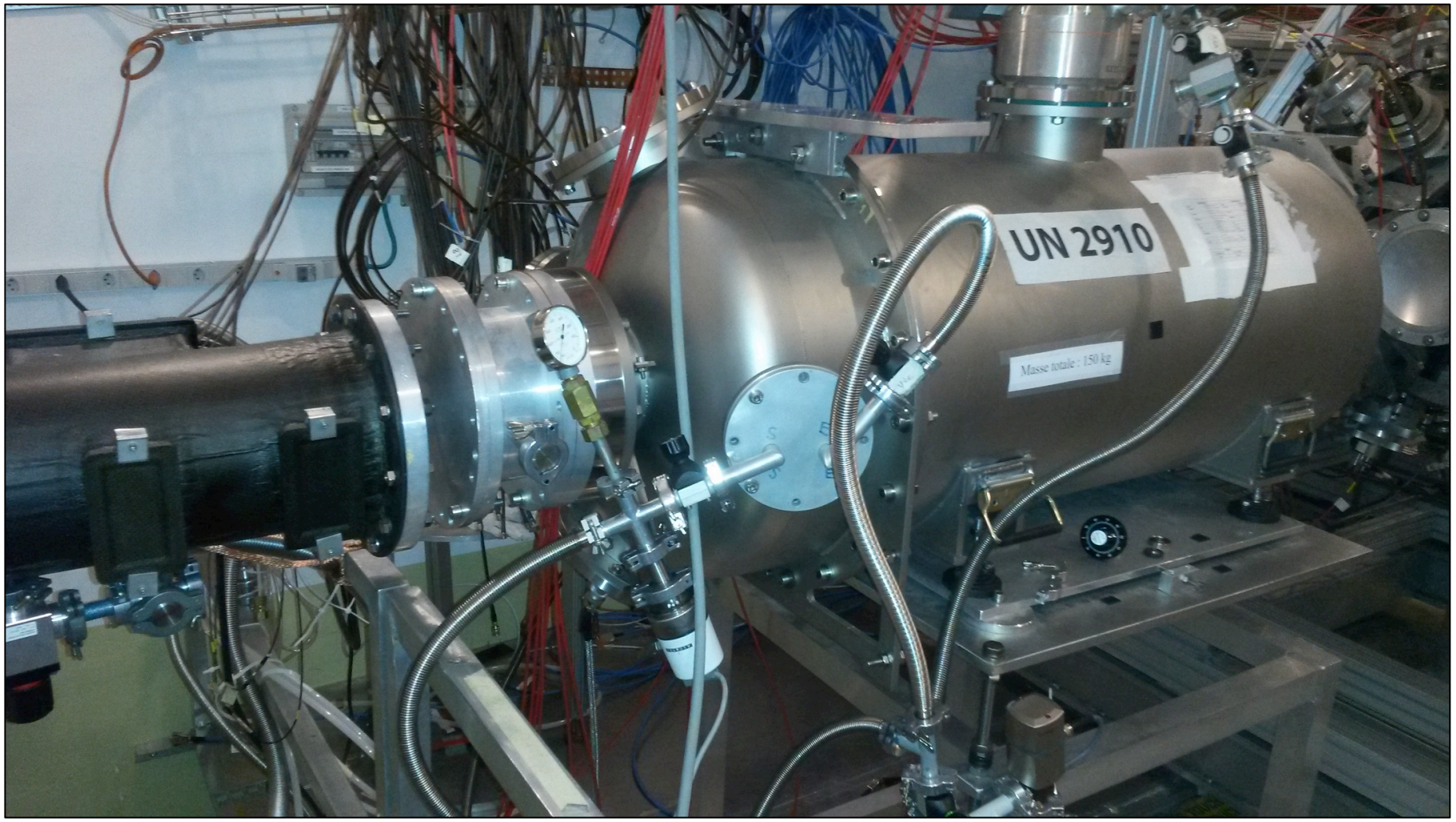






data: M. Sabaté-Gilarte

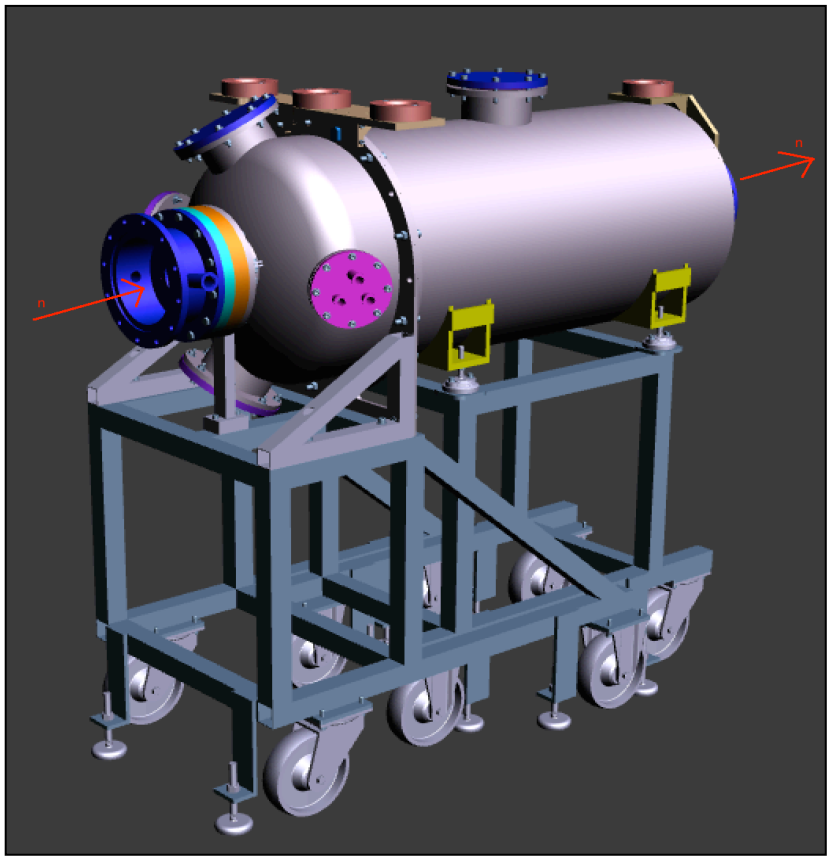
^{237}Np(n,f) PPAC EAR1

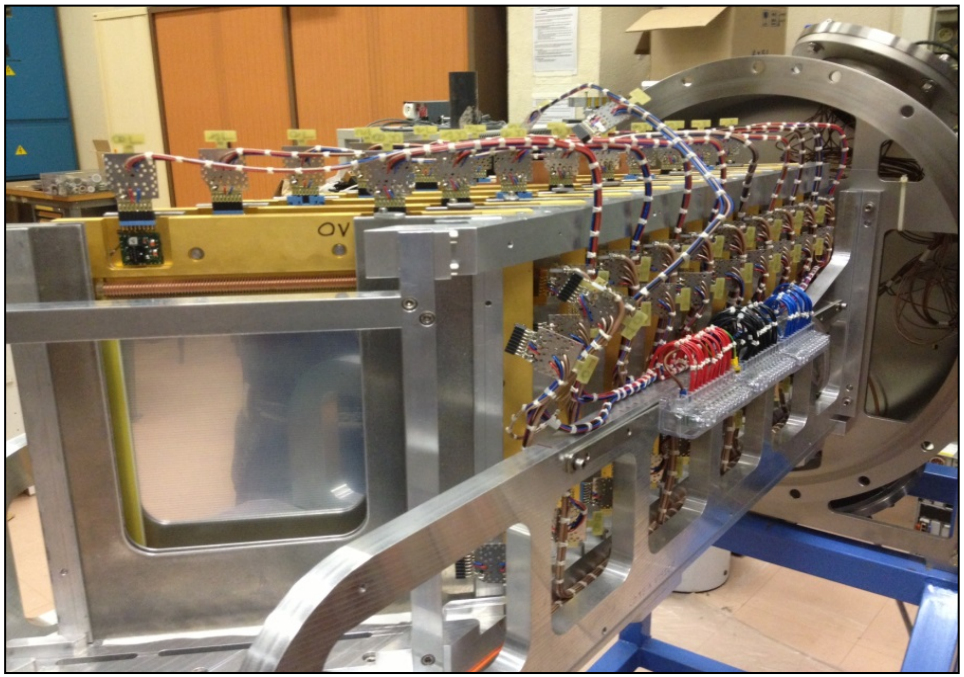


data: Y. Chen

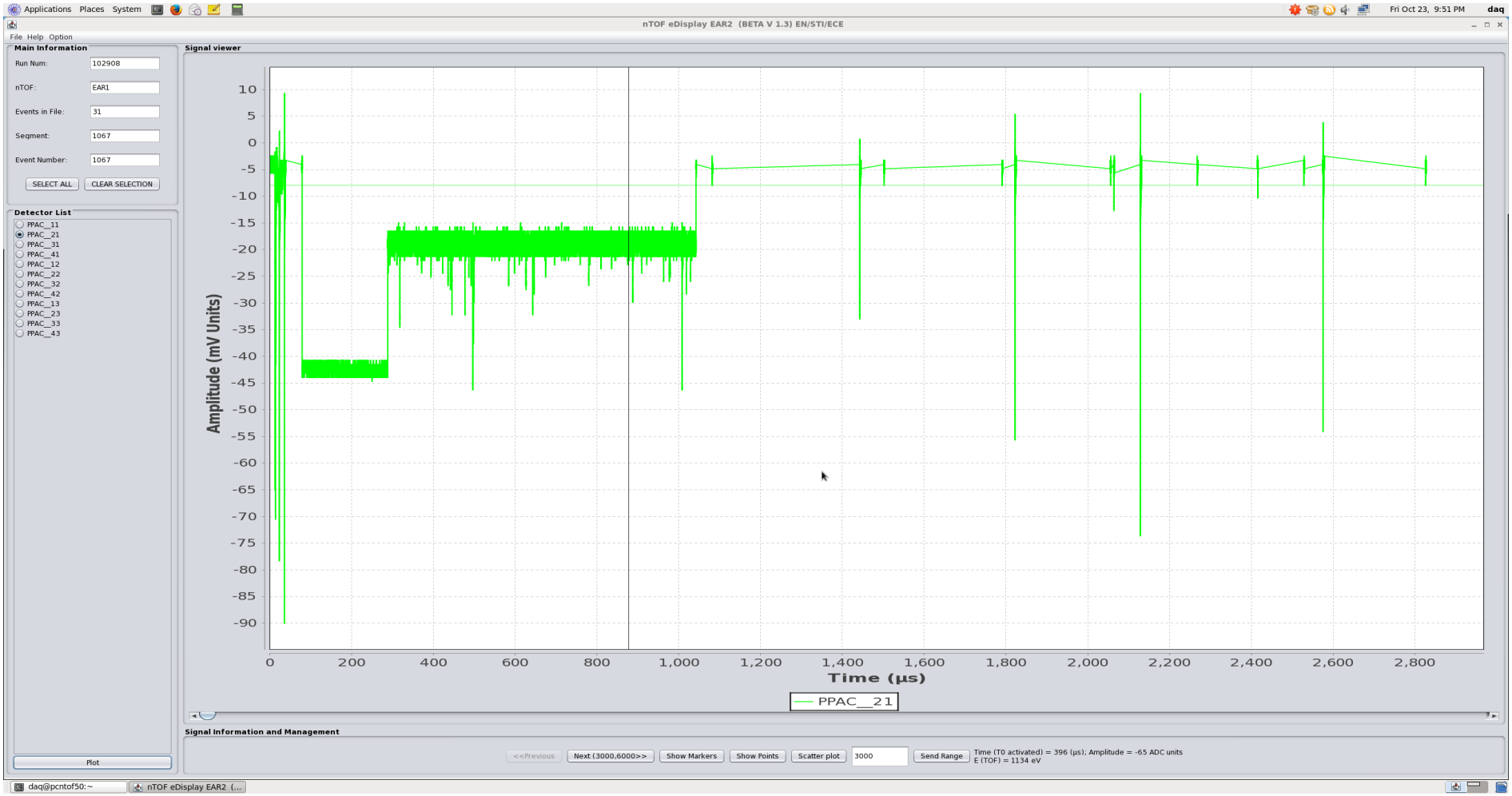
Goal:

- Accurate measurement of the (n,f) cross section
- Angular distribution of fission fragments





Acqiris driver: memory mixing problem



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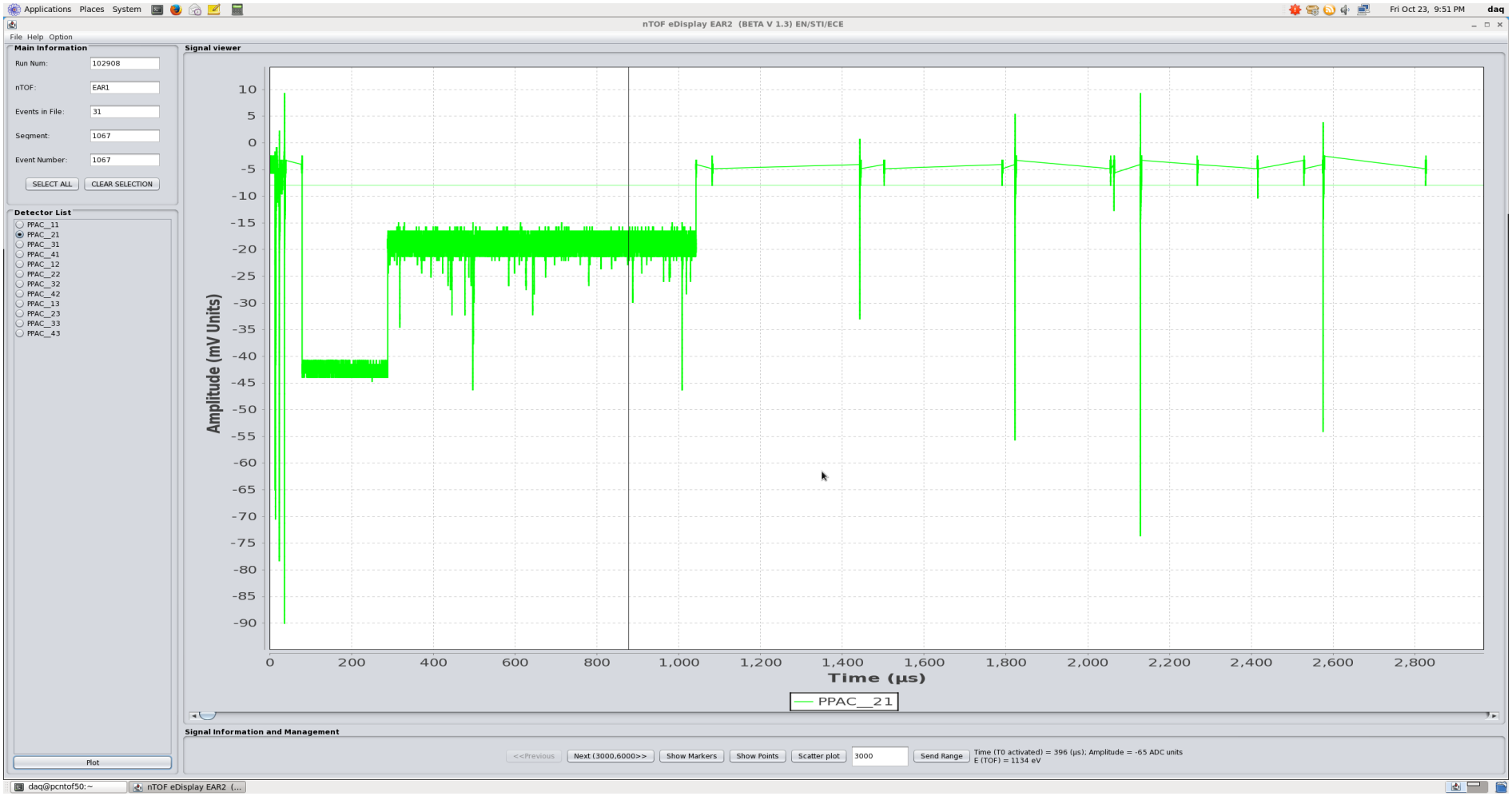
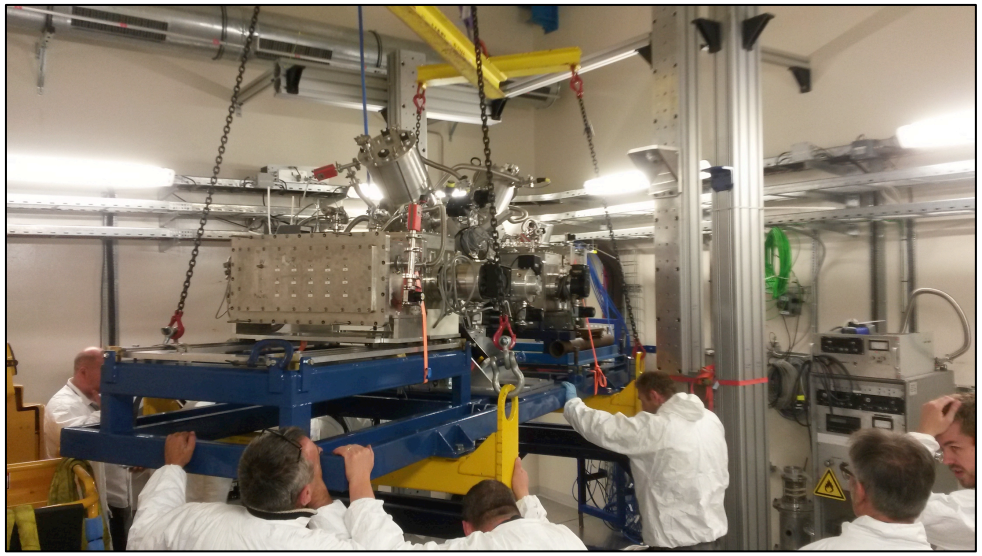
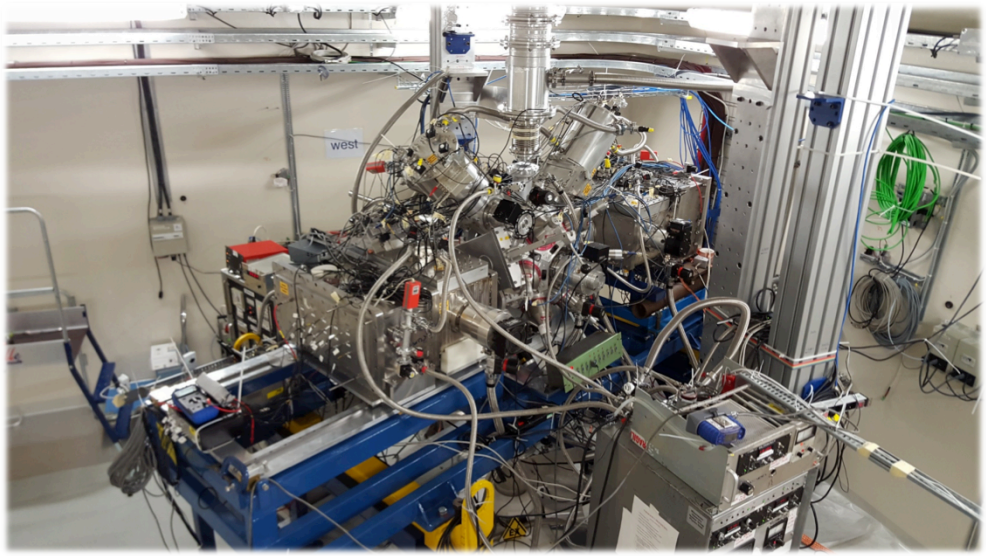
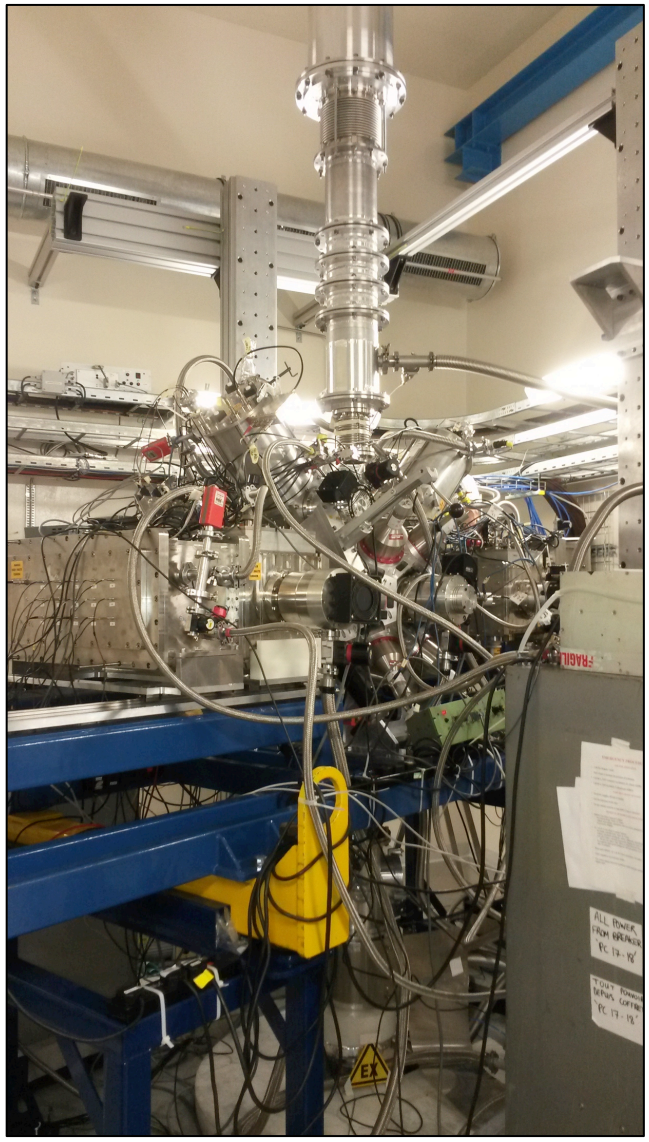


- 2016: New SP-devices cards

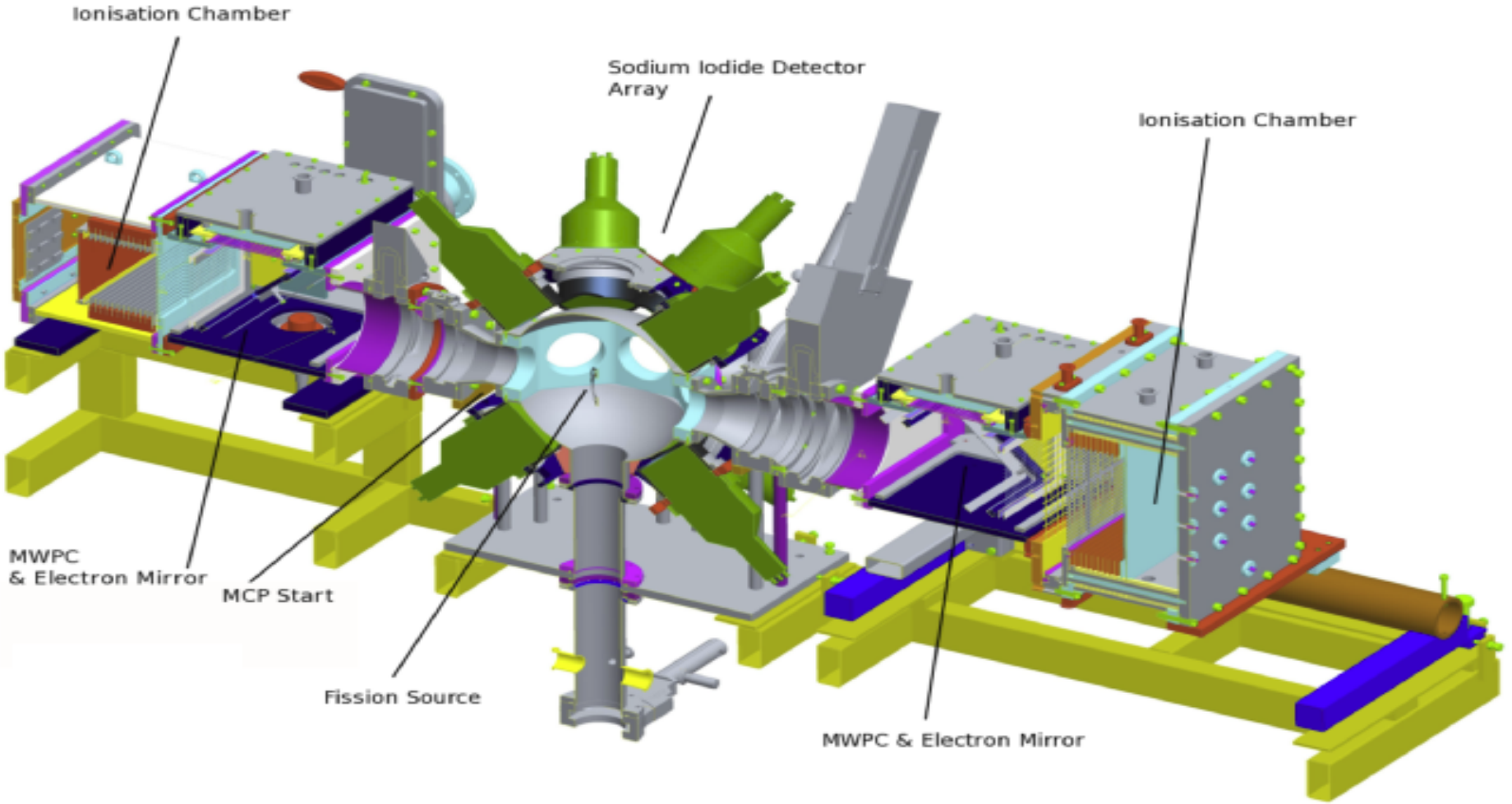
STEFF in EAR2



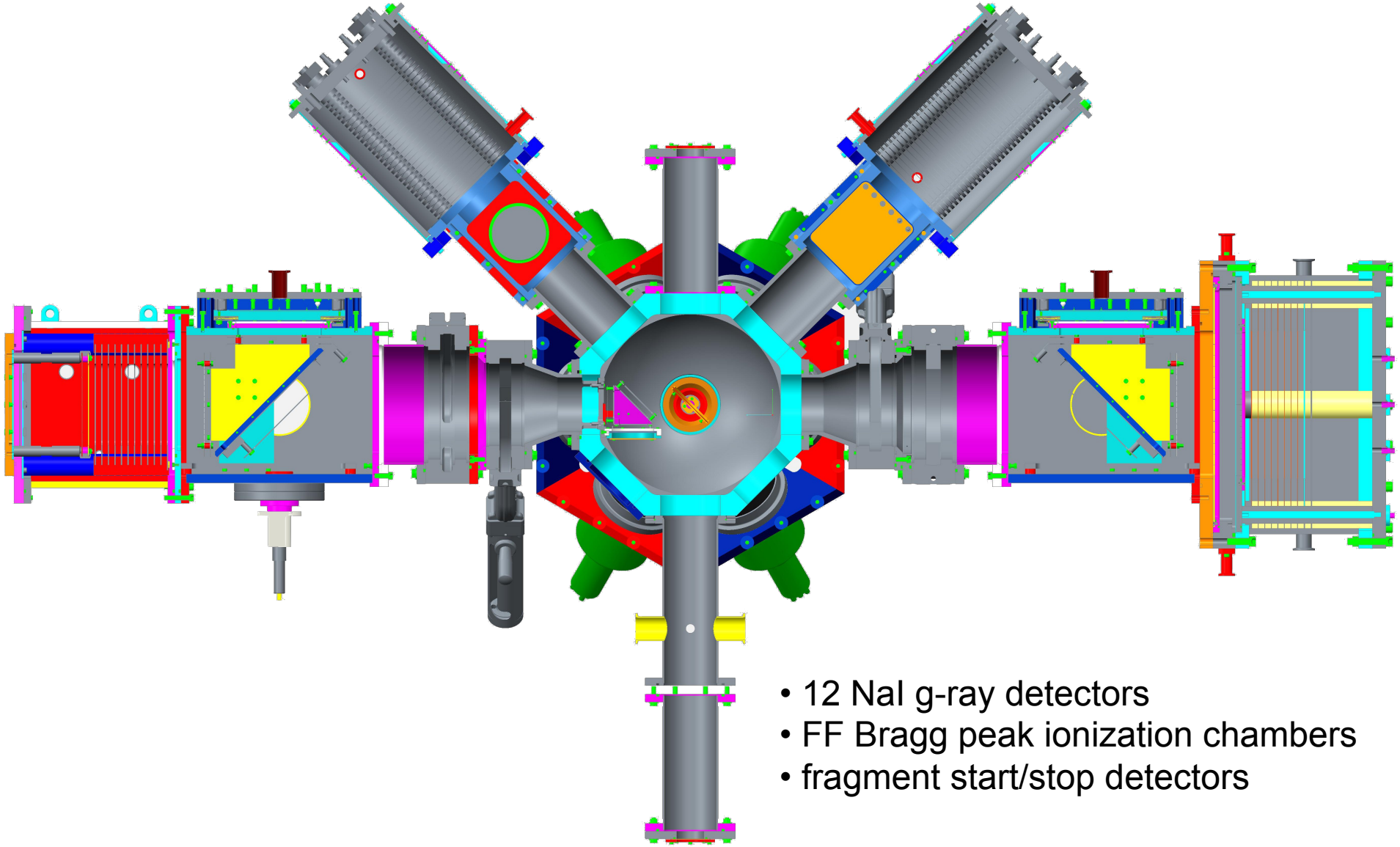




STEFF in EAR2

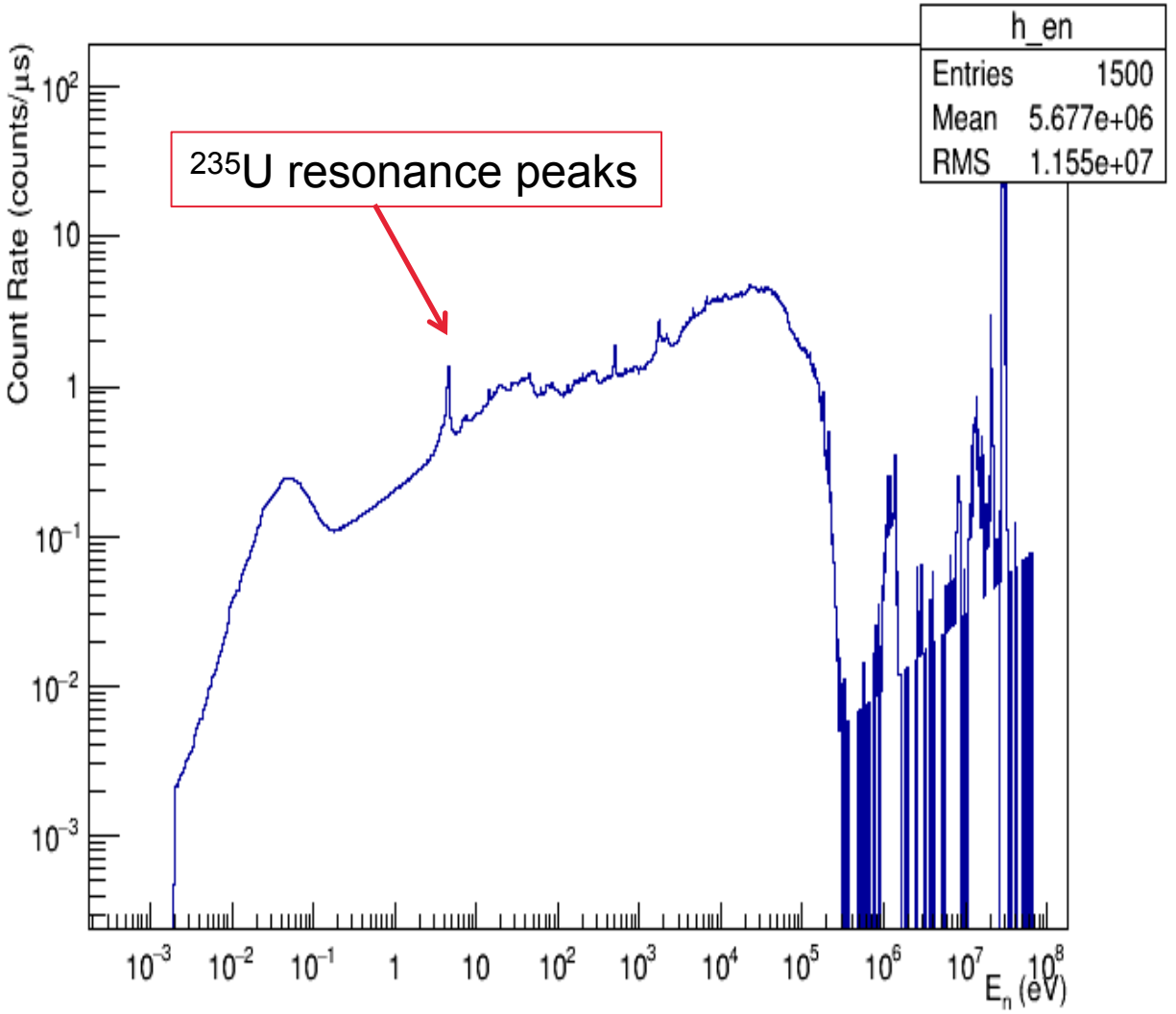


STEFF in EAR2



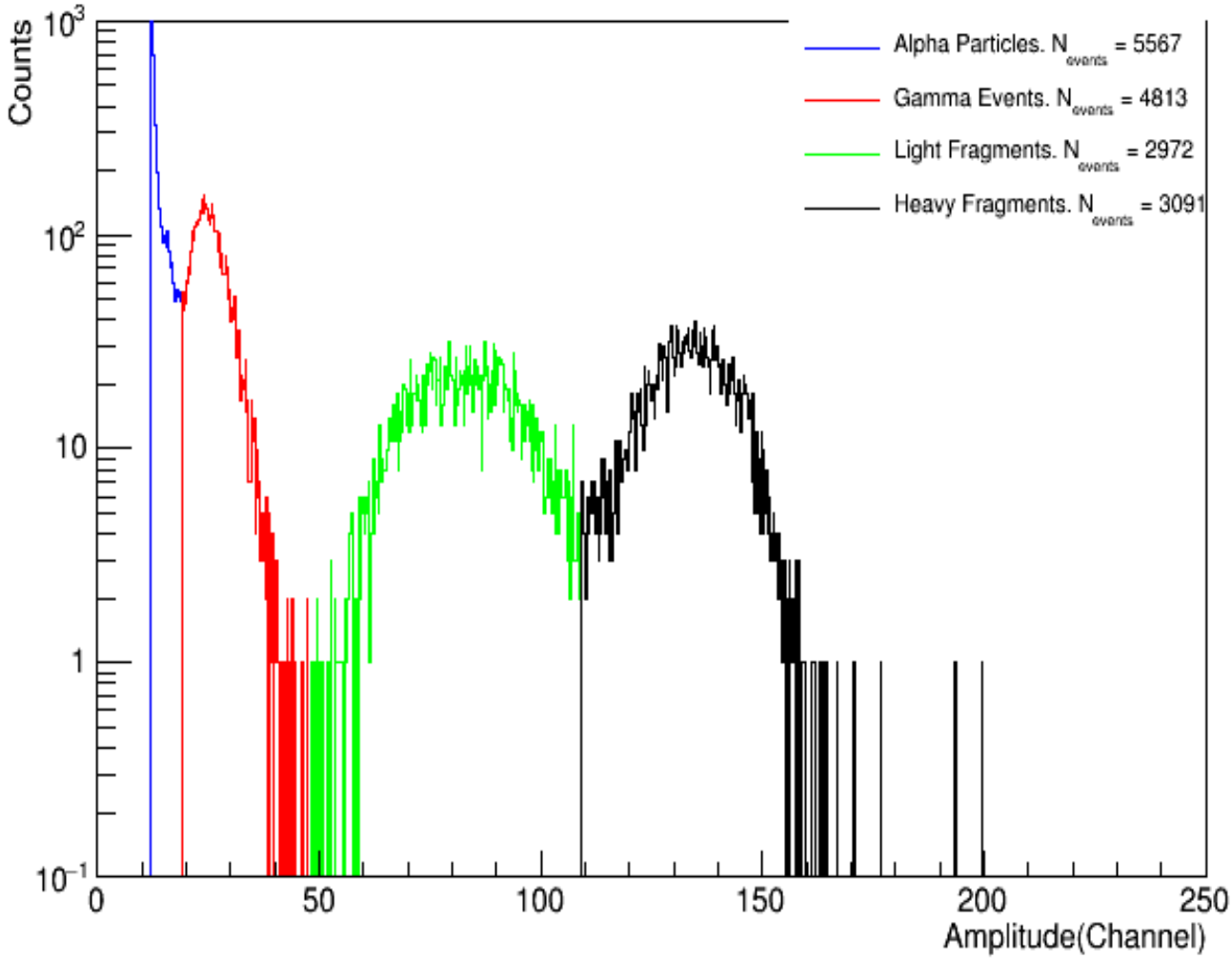
- 12 NaI g-ray detectors
- FF Bragg peak ionization chambers
- fragment start/stop detectors

γ-ray detection rate



data: S. Warren

Bragg detector amplitude spectrum



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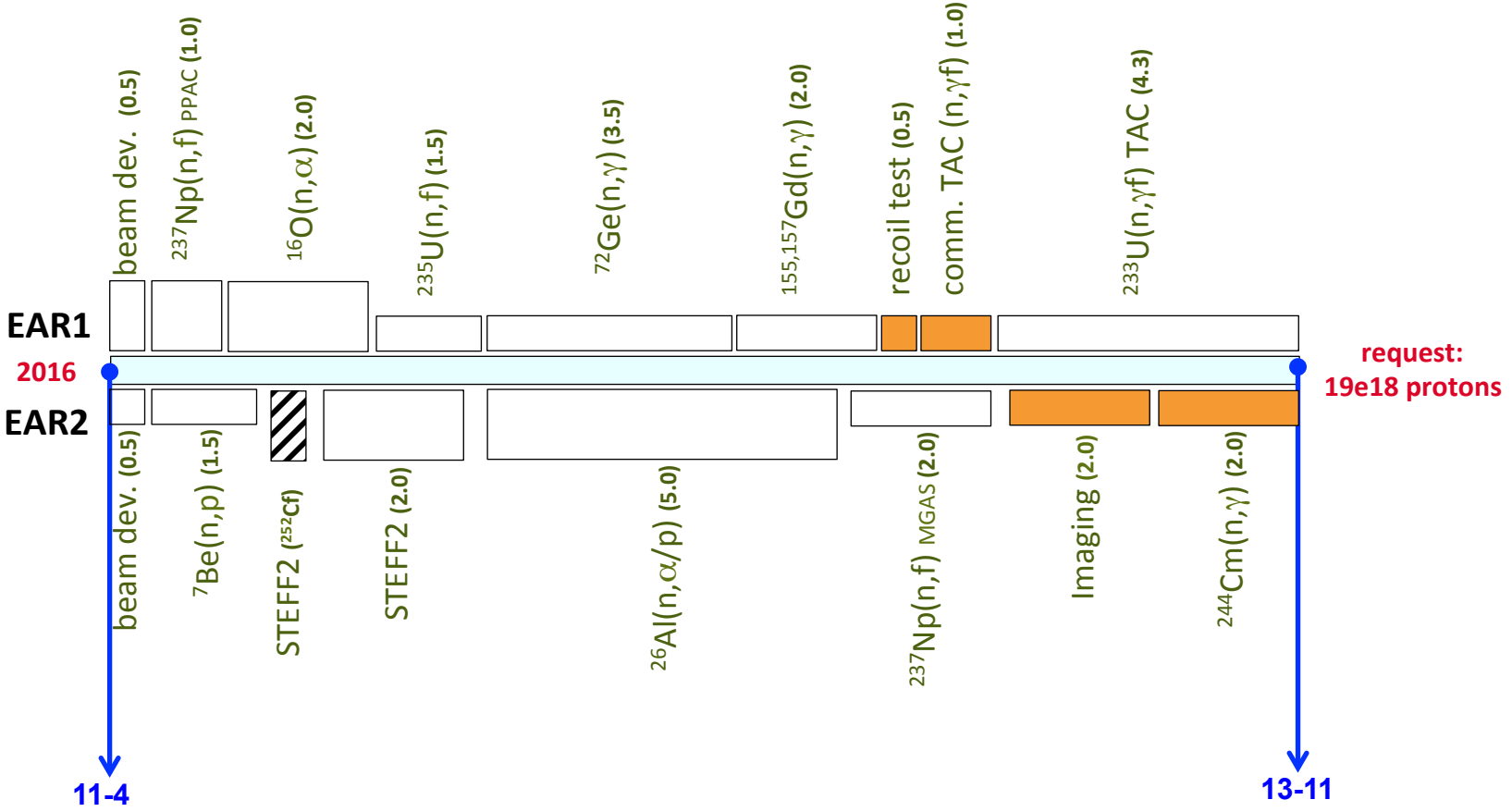
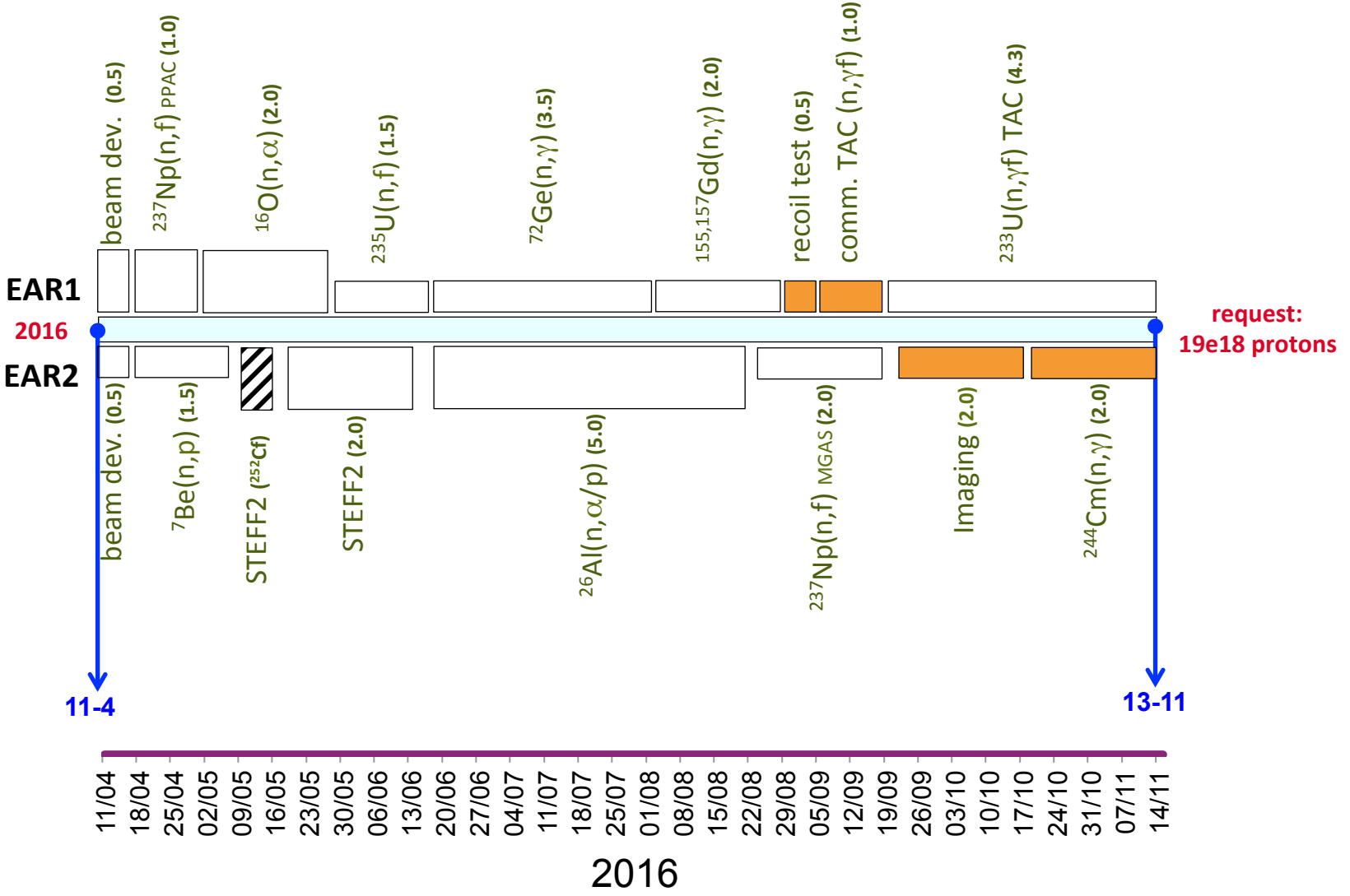
Measurement planning 2016



2016

Measurement planning 2016



n_TOF publications 2015

• C. Guerrero et al.
Correction of dead-time and pile-up in a detector array for constant and rapidly varying counting rates
Nucl. Instr. Meth. A 777 (2015) 63

• C. Paradela et al.
High accuracy determination of the $^{238}U/^{235}U$ fission cross section ratio up to 1 GeV at n_TOF (CERN)
Phys. Rev. C. 91 (2015) 024602

• C. Weiss et al.
The new vertical neutron beam line at the CERN n_TOF facility
Nucl. Instr. Meth. A 799 (2015) 90

+ Several submitted papers

• A. Tsinganis et al.
The fission programme at the CERN n_TOF facility
Physics Procedia 64 (2015) 130

• S. Barros et al.
Optimization of n_TOF-EAR2 with FLUKA
J. of Instrumentation 10 (2015) P09003

• N. Colonna et al.
The Second Beam-Line and Experimental Area at n_TOF: A New Opportunity for Challenging Neutron Measurements at CERN
Nuclear Physics News 25 (2015) 19

• P. Zugec et al.
Pulse processing routines for neutron time-of-flight data
Nucl. Instr. Meth. A 812 (2016) 134

• E. Aza et al.
Neutron beam monitoring for time-of-flight facilities with gaseous detectors
Nucl. Instr. Meth. A 806 (2016) 14

Collaboration ISOLDE – n_TOF

- ISOLDE Class-A Lab: essential for n_TOF sample mounting
- sample production at ISOLDE for n_TOF (^{7}Be)

Thank you for your attention


nTOF