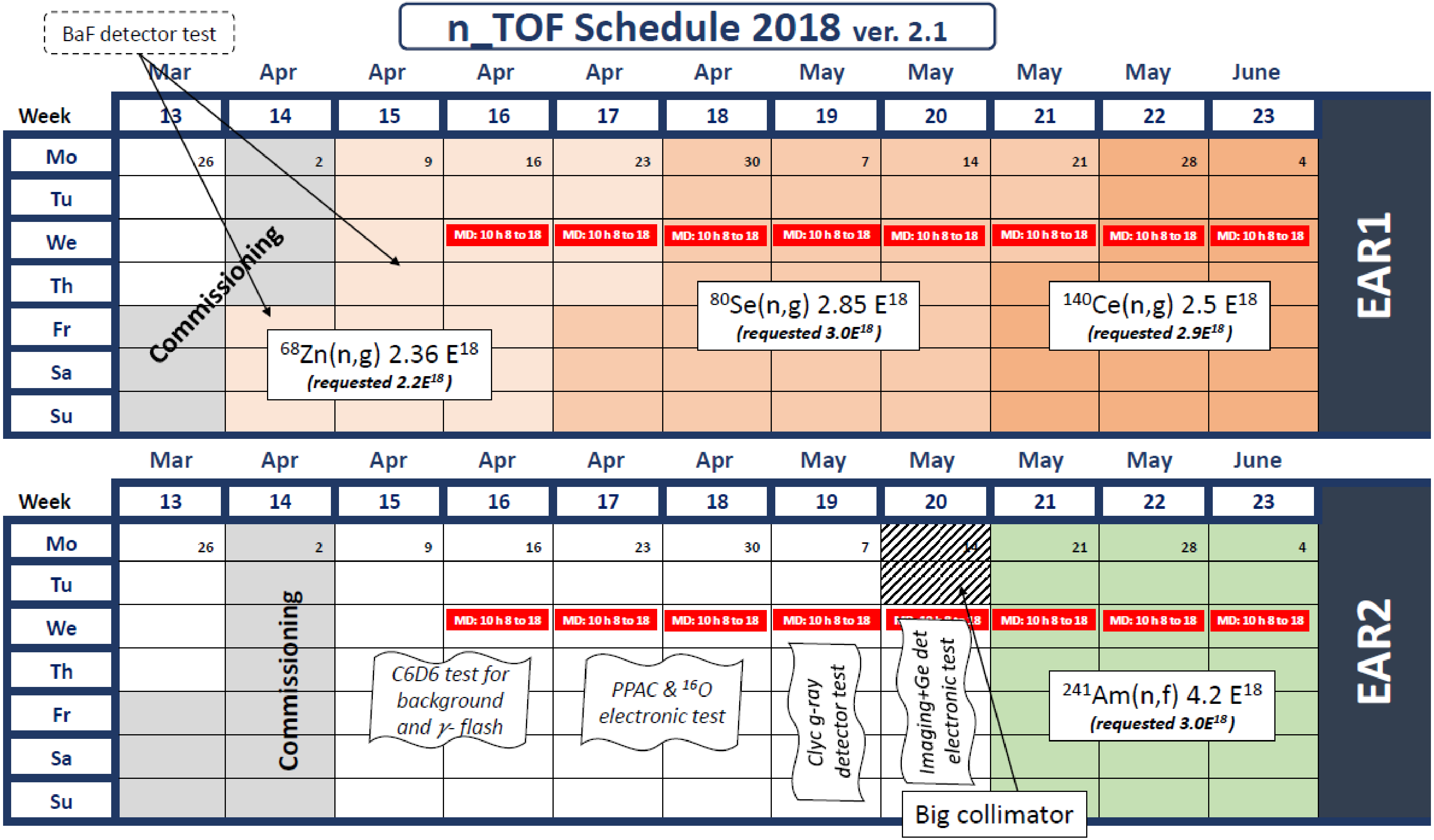
Status of n_TOF

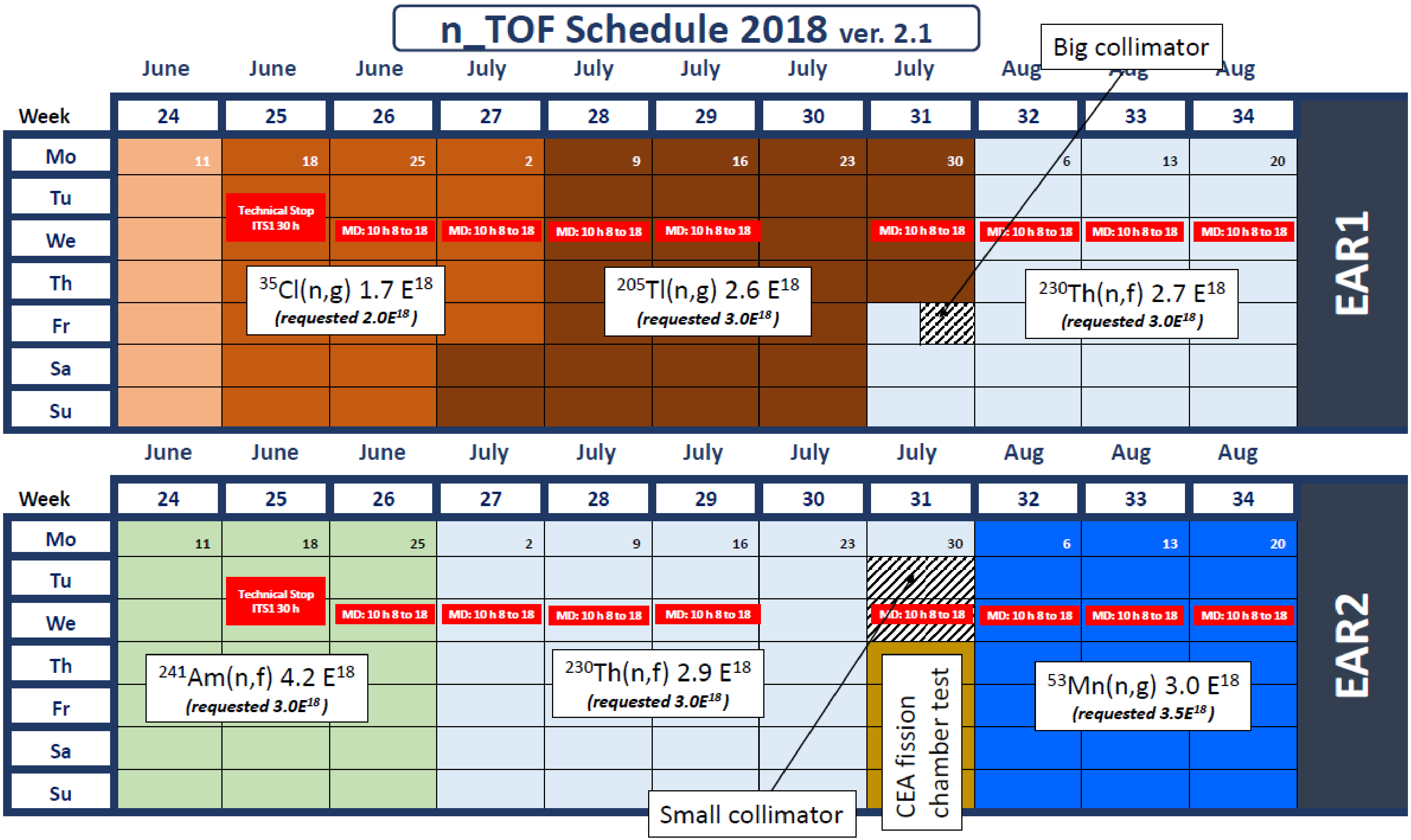
Laurent Tassan-Got
on behalf of the n_TOF collaboration

April-May



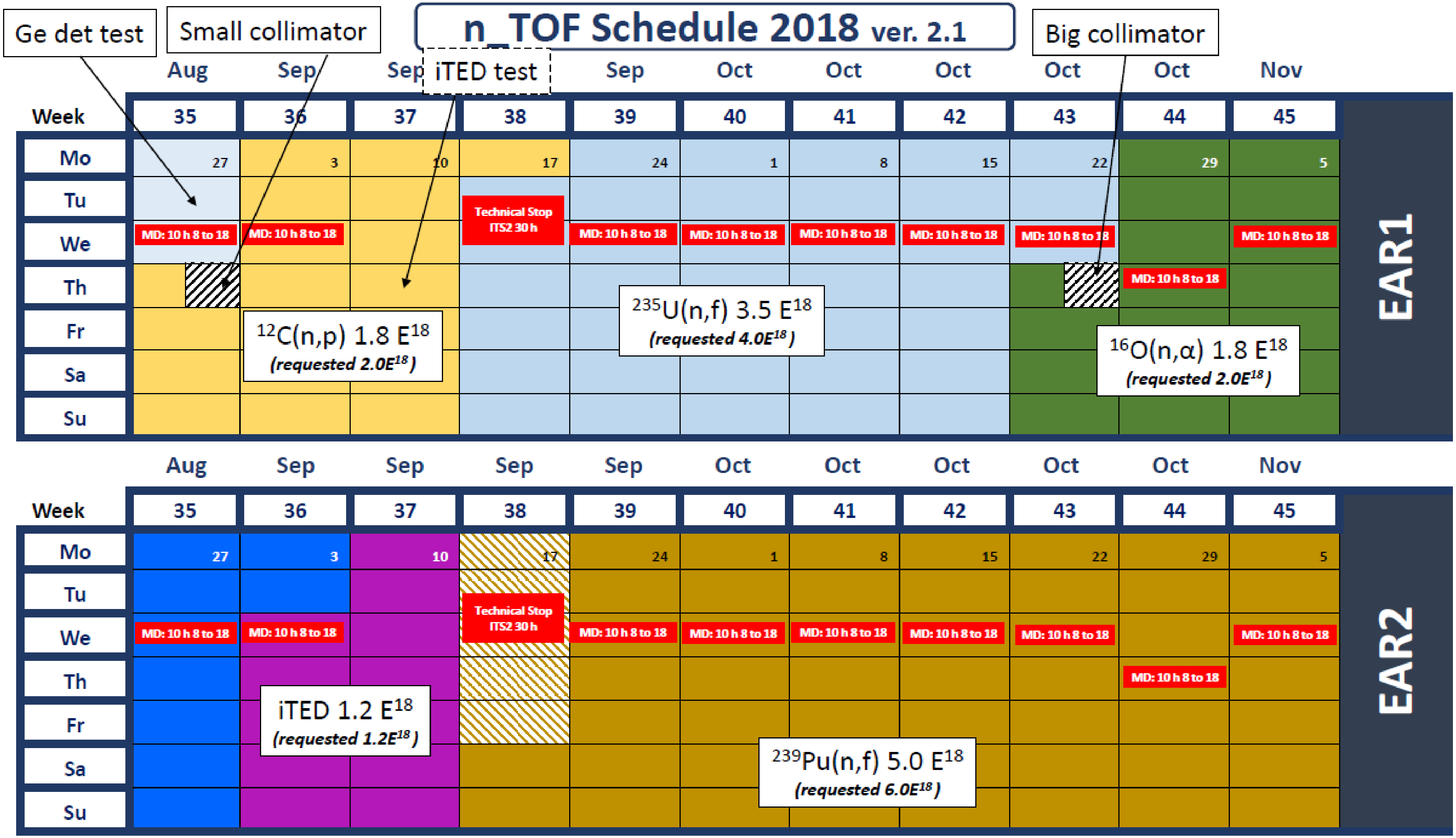
n_TOF Schedule 2018 ver. 2.1
BaF detector test
Mar Apr Apr Apr Apr Apr May May May May June
Week 13 14 15 16 17 18 19 20 21 22 23
Mo Tu We Th Fr Sa Su
26 2 9 16 23 30 7 14 21 28 4
MD: 10 h 8 to 18
Commissioning
^{68}Zn(n,g) 2.36 E^{18}
(requested 2.2E^{18})
^{80}Se(n,g) 2.85 E^{18}
(requested 3.0E^{18})
^{140}Ce(n,g) 2.5 E^{18}
(requested 2.9E^{18})
EAR1
C6D6 test for background and γ-flash
PPAC & ^{16}O electronic test
Clyc g-ray detector test
Imaging+Ge det electronic test
^{241}Am(n,f) 4.2 E^{18}
(requested 3.0E^{18})
Big collimator
EAR2

June-August

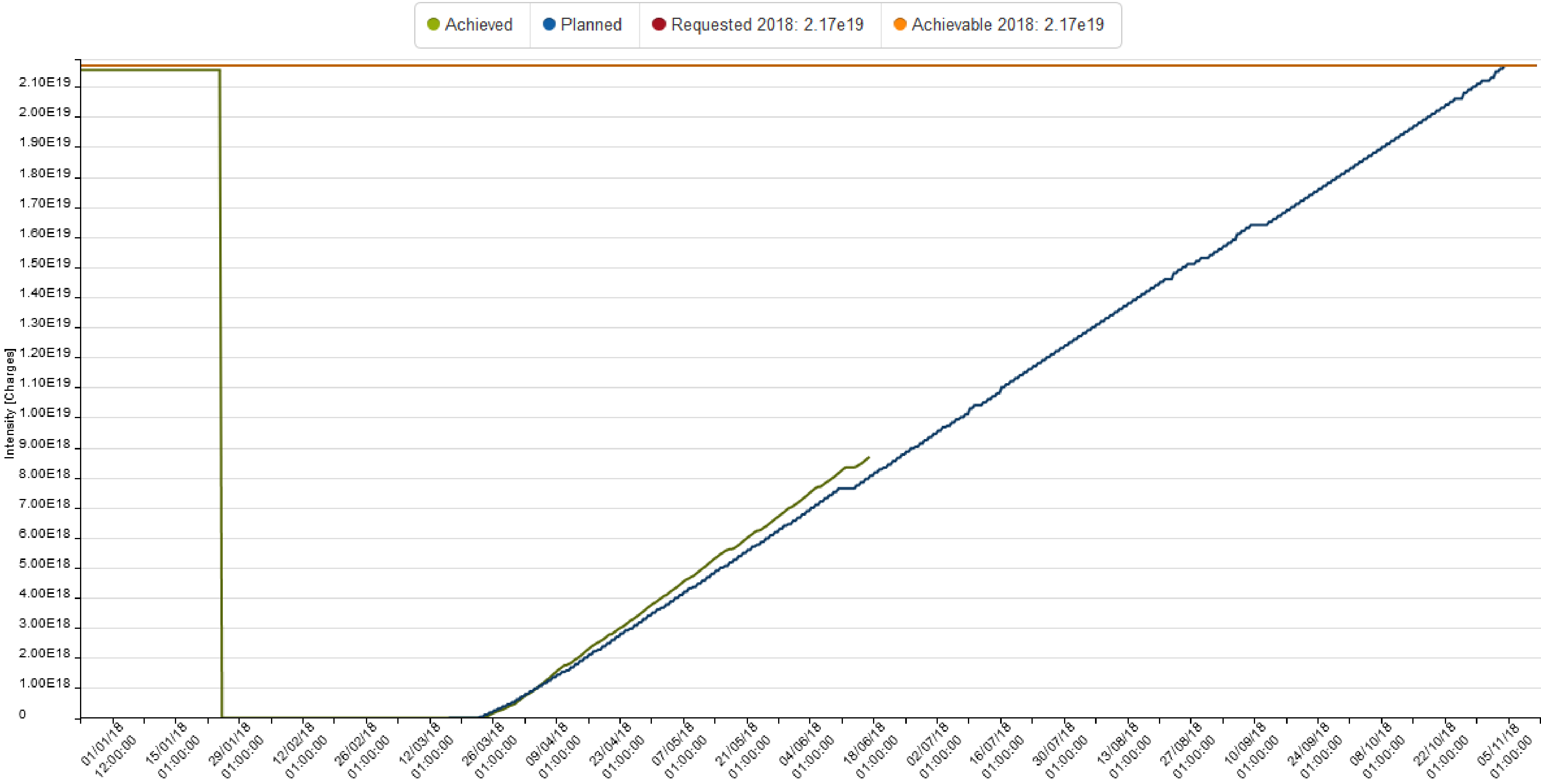


n_TOF Schedule 2018 ver. 2.1
Big collimator
June June June July July July July July Aug Aug Aug
Week 24 25 26 27 28 29 30 31 32 33 34
Mo Tu We Th Fr Sa Su
11 18 25 2 9 16 23 30 6 13 20
Technical Stop ITS1 30 h
MD: 10 h 8 to 18
^{35}Cl(n,g) 1.7 E^{18}
(requested 2.0E^{18})
^{205}Tl(n,g) 2.6 E^{18}
(requested 3.0E^{18})
^{230}Th(n,f) 2.7 E^{18}
(requested 3.0E^{18})
EAR1
June June June July July July July July Aug Aug Aug
Week 24 25 26 27 28 29 30 31 32 33 34
Mo Tu We Th Fr Sa Su
11 18 25 2 9 16 23 30 6 13 20
Technical Stop ITS1 30 h
MD: 10 h 8 to 18
^{241}Am(n,f) 4.2 E^{18}
(requested 3.0E^{18})
^{230}Th(n,f) 2.9 E^{18}
(requested 3.0E^{18})
CEA fission chamber test
^{53}Mn(n,g) 3.0 E^{18}
(requested 3.5E^{18})
EAR2
Small collimator

September-November



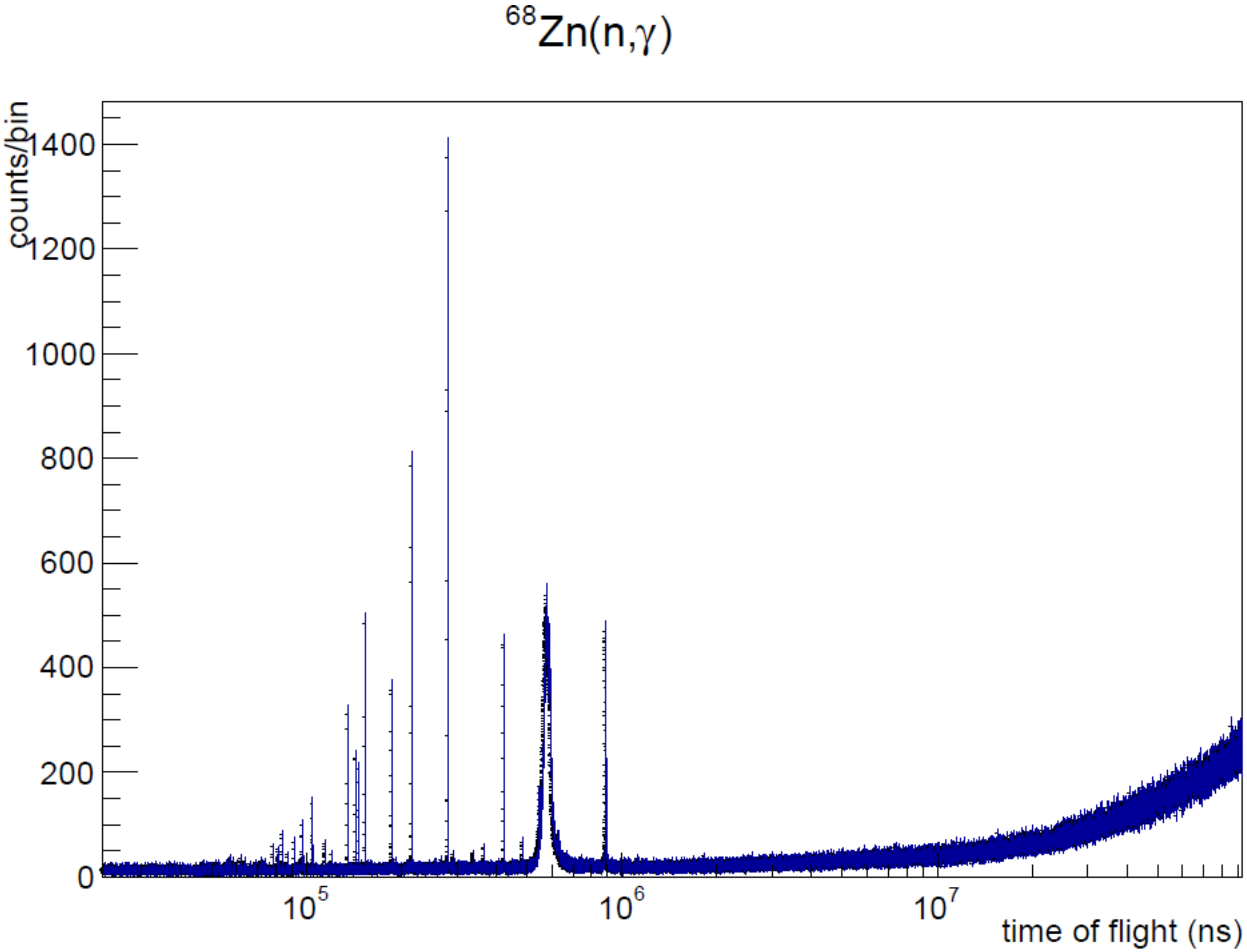
Proton delivery



A few preliminary results

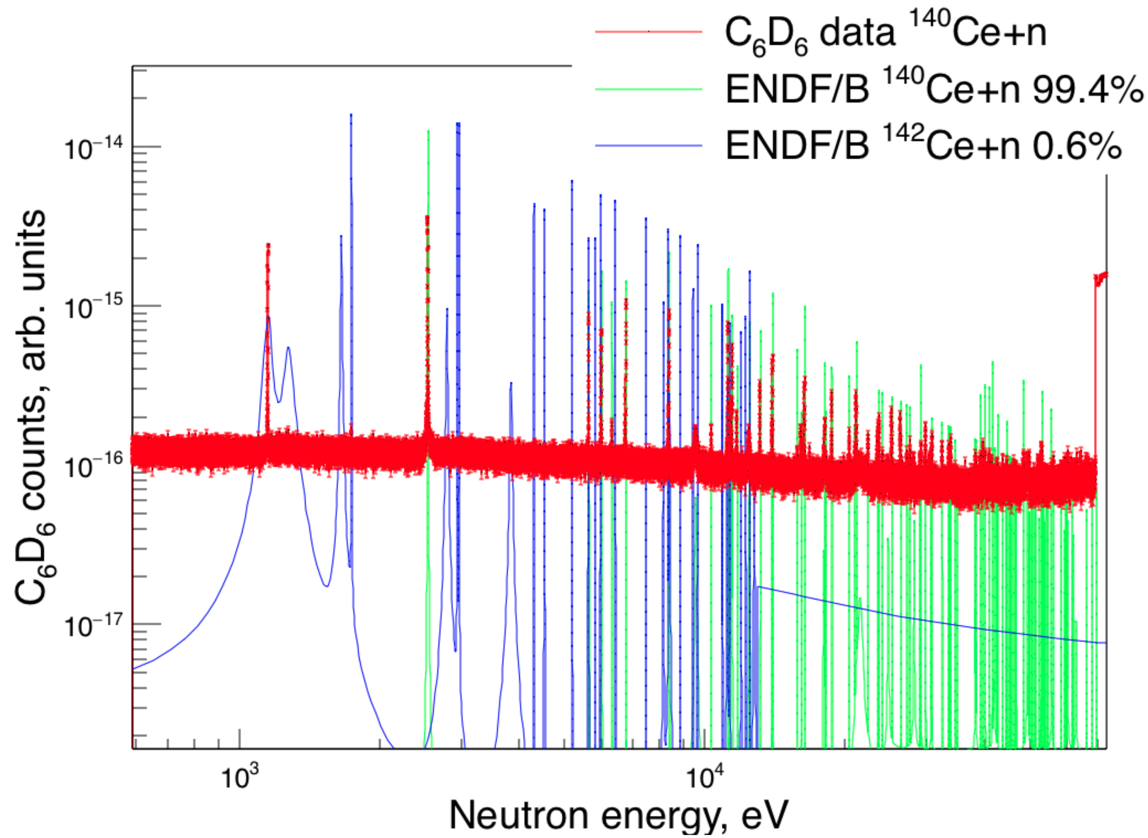
$^{68}Zn(n,\gamma)$

The main nuclear uncertainty for the abundance of ^{68}Zn, produced in AGB stars (s-process)



A few preliminary results

^{140}Ce(n,γ) Neutron closed shell.
Problem in simulation of the natural abundance through the s-process

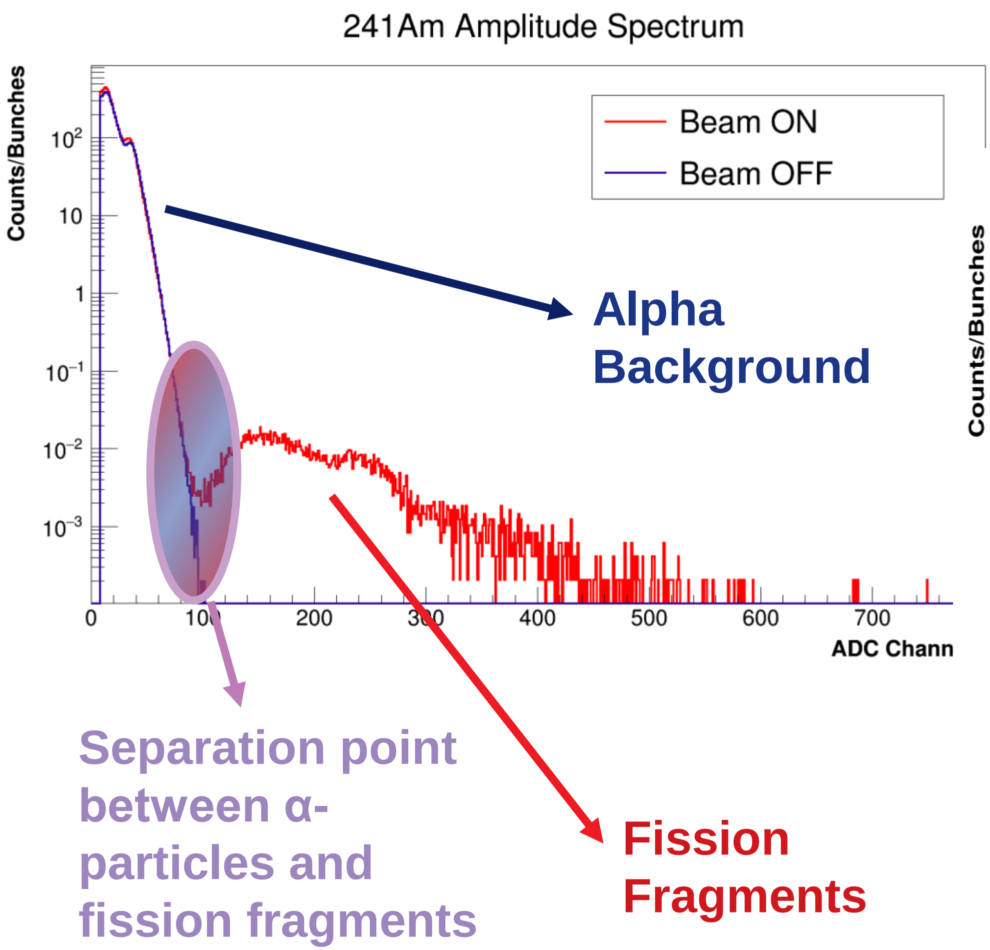


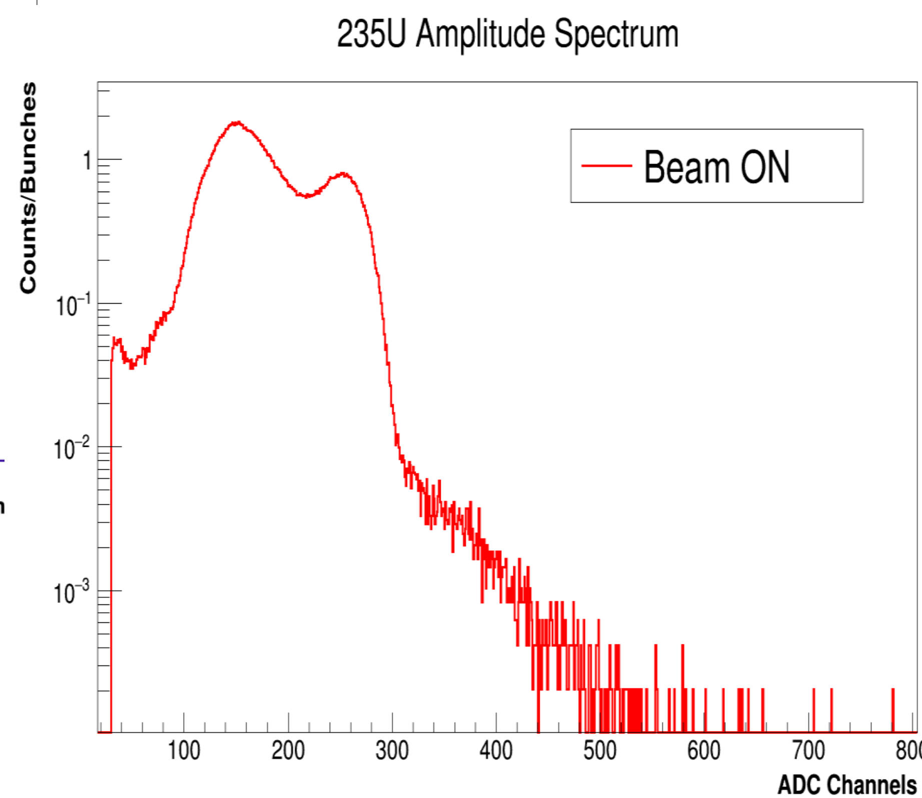
New assignation of the 1st resonance !

A few preliminary results

^{241}Am(n,f)

Important for incineration in fast reactors
High α activity (100 MBq)





^{231}Pa(n,f) replaced by important detector tests

- ^{231}Pa samples could not be done (fundamental electrochemistry problem)
- Experiment replaced by important tests:
  - neutron dosimeter
  - neutron imaging (energy selectivity)
  - voltage divider for small BaF2 crystals to measure at short time close to the γ-flash
  - fast localisation on PPACs for high energy fission
  - switch technology against γ-flash

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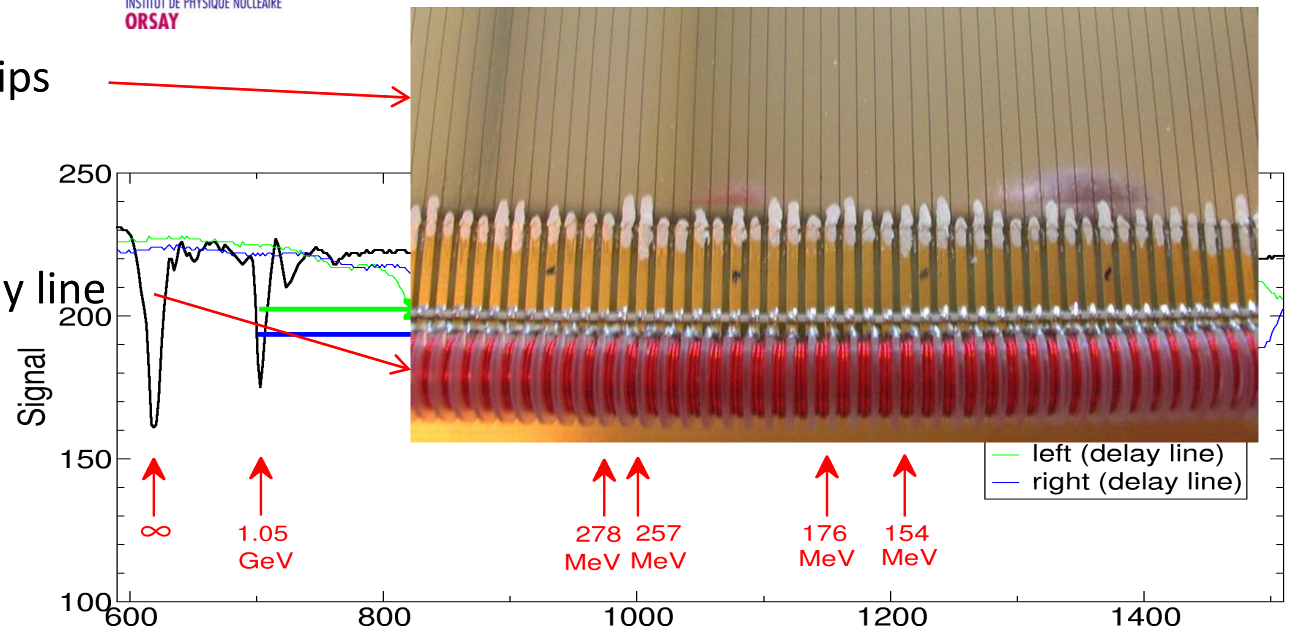
PPAC localisation

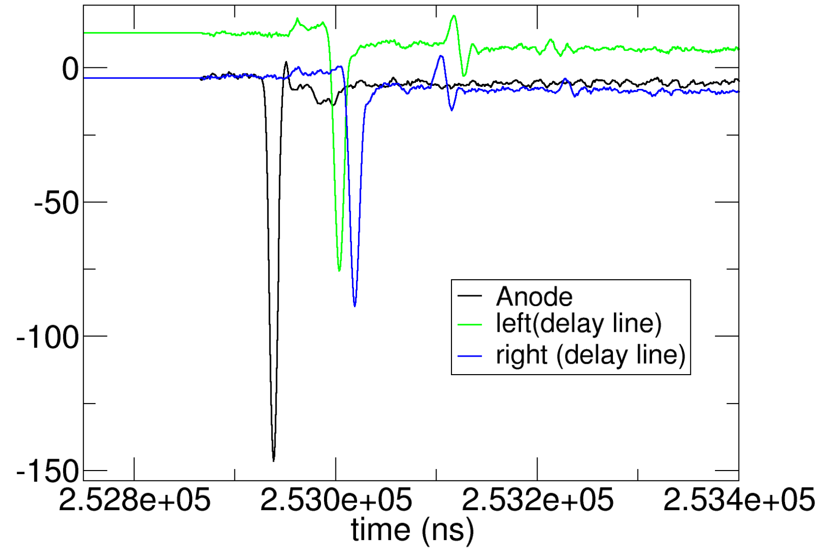
Localisation strips

Delay line



Before

Pile up beyond 200 MeV (EAR1) (wide localisation signals)



After

After re-design of delay lines and preamps: localisation signals as narrow as anodes

Switch technology

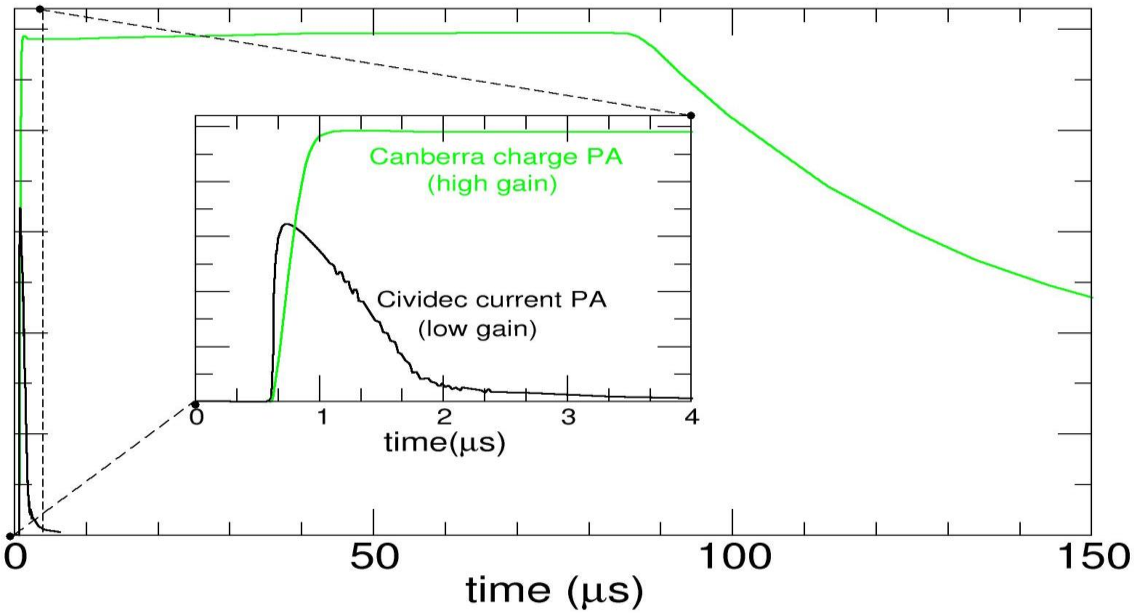
- For reactions above MeV involving low energy particles (LCP, γ) the γ-flash is a concern because its intensity is typically 1000 higher than the energy of particle to be detected.
- As a result the preamplifier gets saturated and takes a long time to be de-saturated (100μs).
- Ionisation chambers, μMegas, silicon, HPGe detectors suffer from this problem.

The solution… (with HZDR)

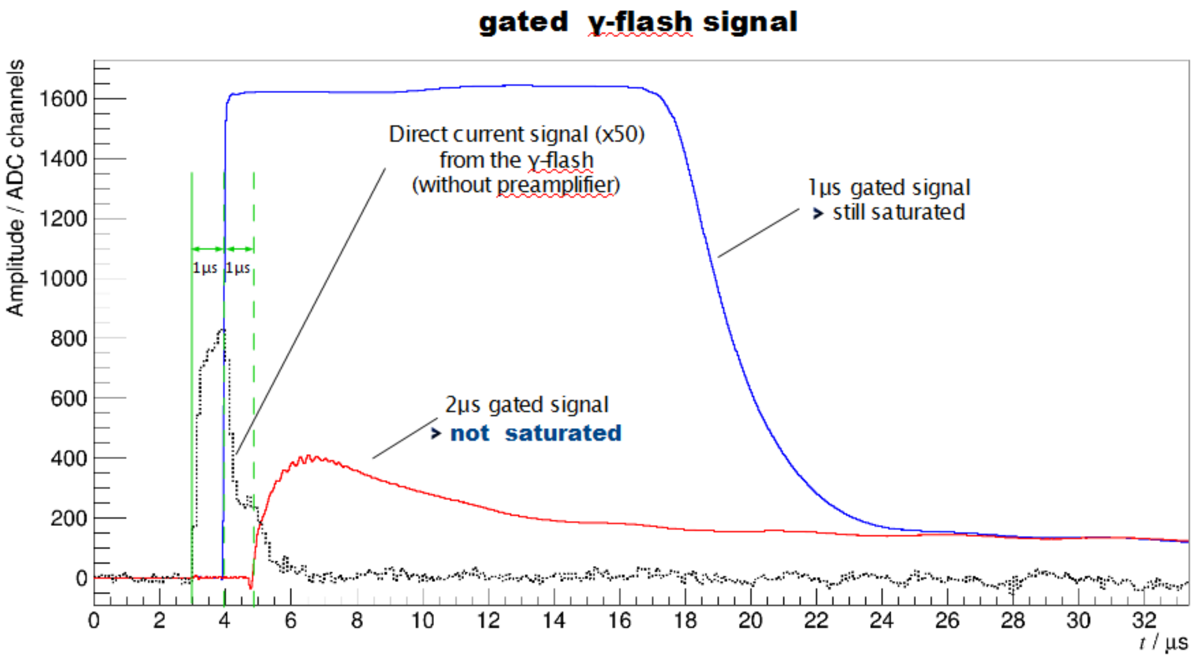
DRESDEN concept

- Insert an electronic switch between the detector and the preamplifier. The device has to be low noised and has to have a large bandwidth (GHz).
- He has to be gated by the proton pulse or ancillary detector

Switch technology



γ-flash gated by the switch



Conclusion

- All the experiment accepted by INTC have been scheduled before LS2
- 10% cut of the experiments at EAR1 to fit into the available beam time, partly compensated by the higher number of delivered protons
- ^{231}Pa(n,f) cancelled due to the unexpected difficulty to make the targets (electroplating)
- All other experiments perform as expected
- Replacement by several detectors tests:
  - Neutron dosimetry
  - Imaging (neutron energy selectivity)
  - Small BaF2 scintillators with new PMT's and VD
  - PPAC: narrower localisation signals: avoid pile up at high energy
  - Switch technology (with HZDR) for gaseous and semiconductor detectors: measurement close to the gamma-flash opening the study of threshold reactions.