^{80}Se(n,γ) experiment

Víctor Babiano Suárez
Luis Caballero, David Calvo, Cesar Domingo, Ion Ladarescu, Pablo Olleros, José Luis Taín
IFIC (Universitat de València – CSIC)

Francisco Calviño, Adria Casanovas, Ariel Tarifeño (UPC)

Victor Alcayne (CIEMAT)

Carlos Guerrero, Mª Ángeles Millán, Mª Teresa Rodríguez (US)

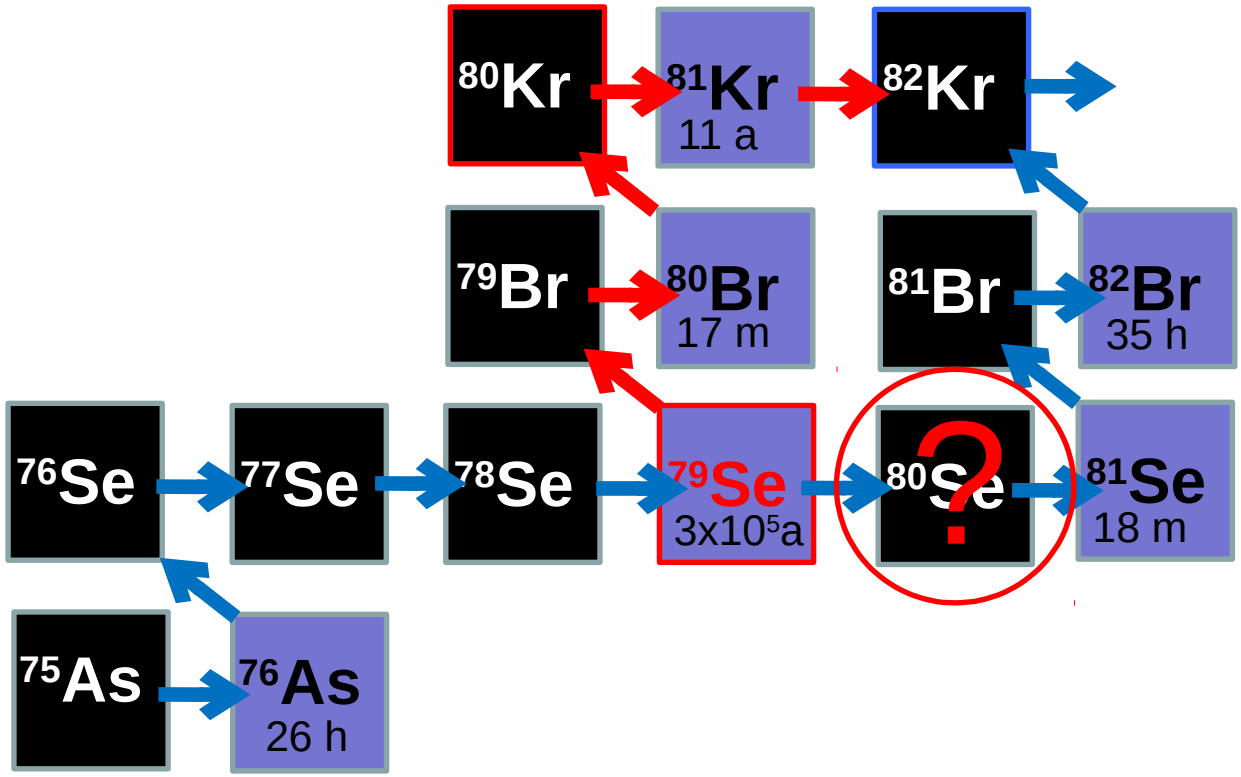
n_TOF local team and the n_TOF Collaboration

This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No.681740)

^{80}Se(n,γ) with C6D6 @ EAR1

Motivations:

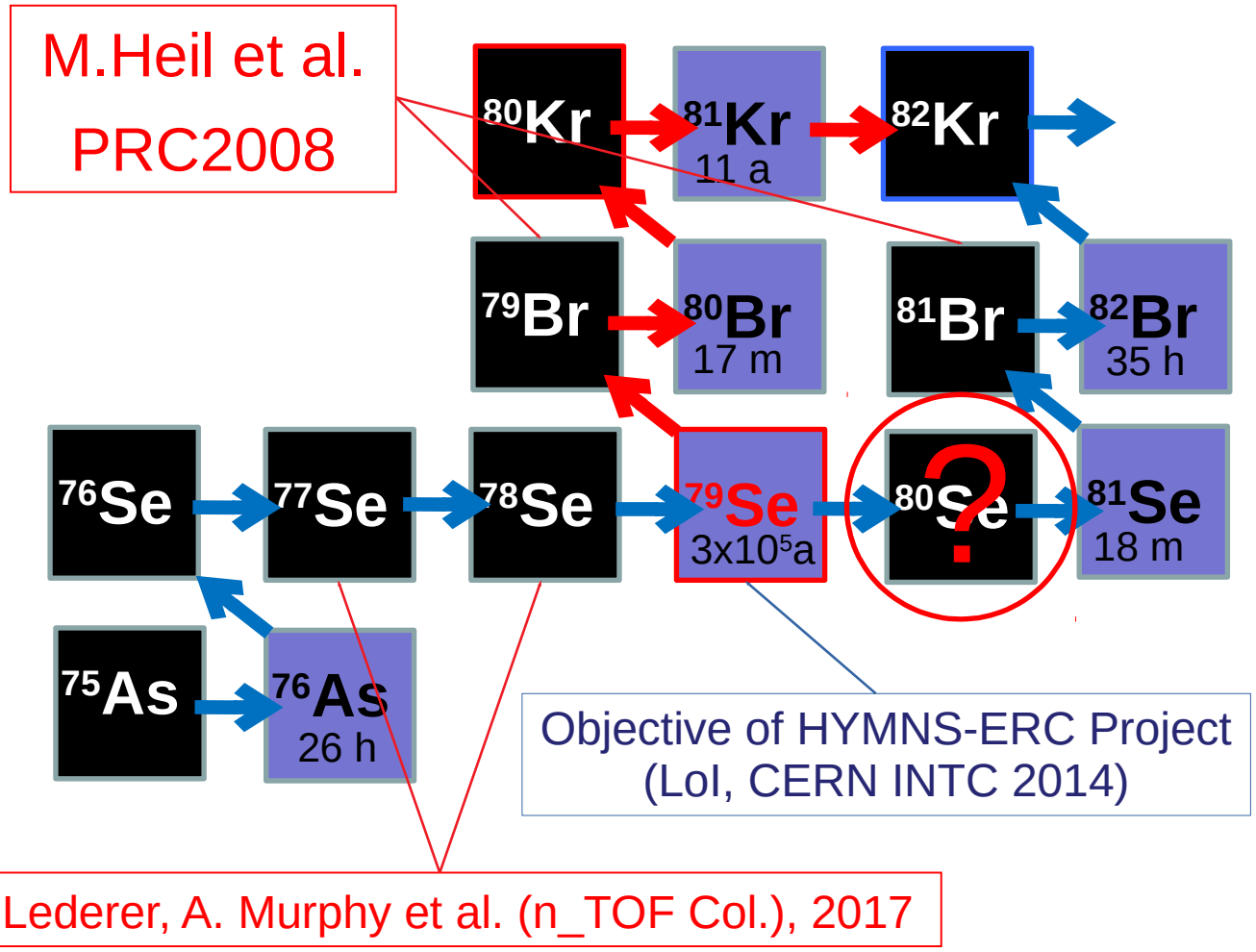
- The ^{80}Se(n,γ) cross section data, are needed for a consistent interpretation of the s-process branching at ^{79}Se.



^{80}Se(n,γ) with C6D6 @ EAR1

Motivations:

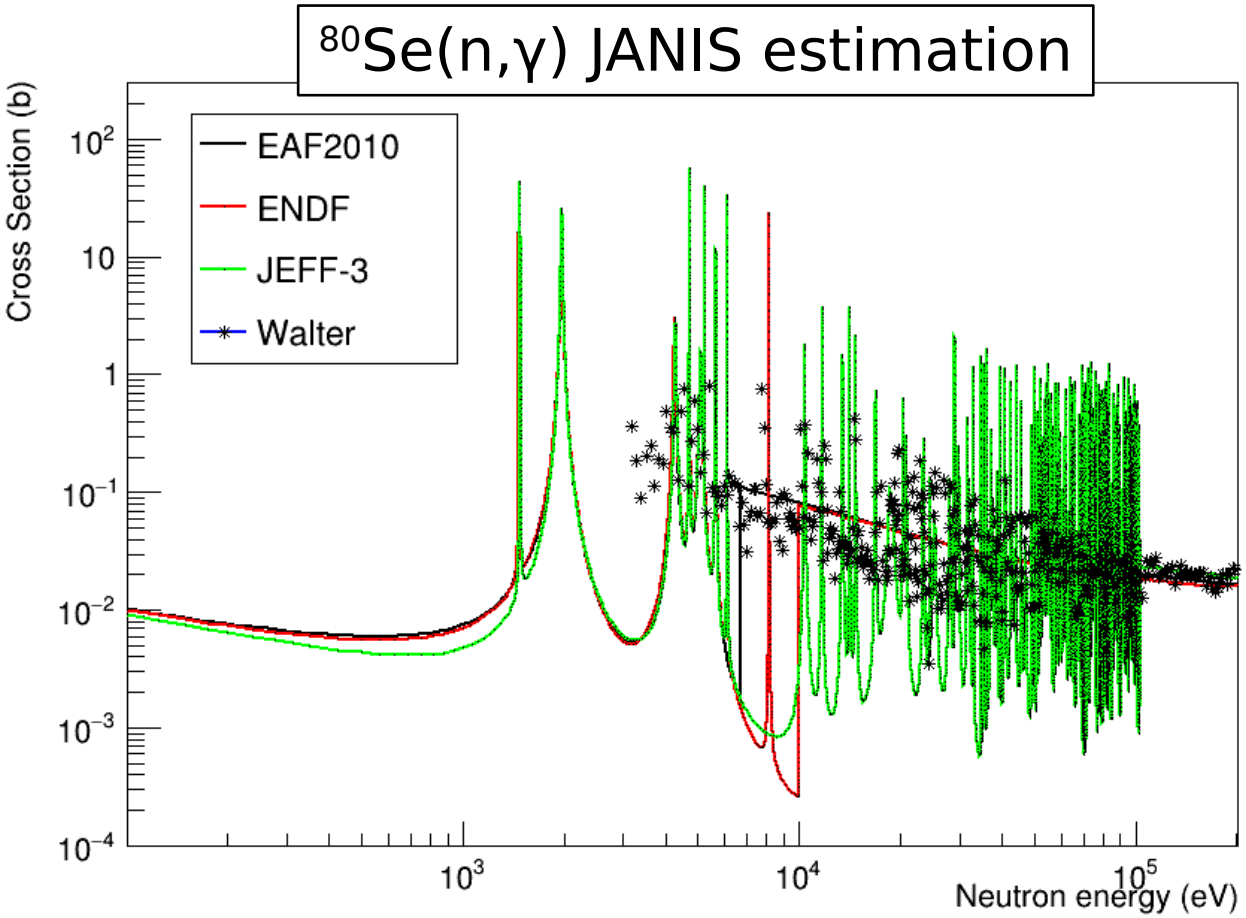
- The ^{80}Se(n,γ) cross section data, are needed for a consistent interpretation of the s-process branching at ^{79}Se.



^{80}Se(n,γ) with C6D6 @ EAR1

Motivations:

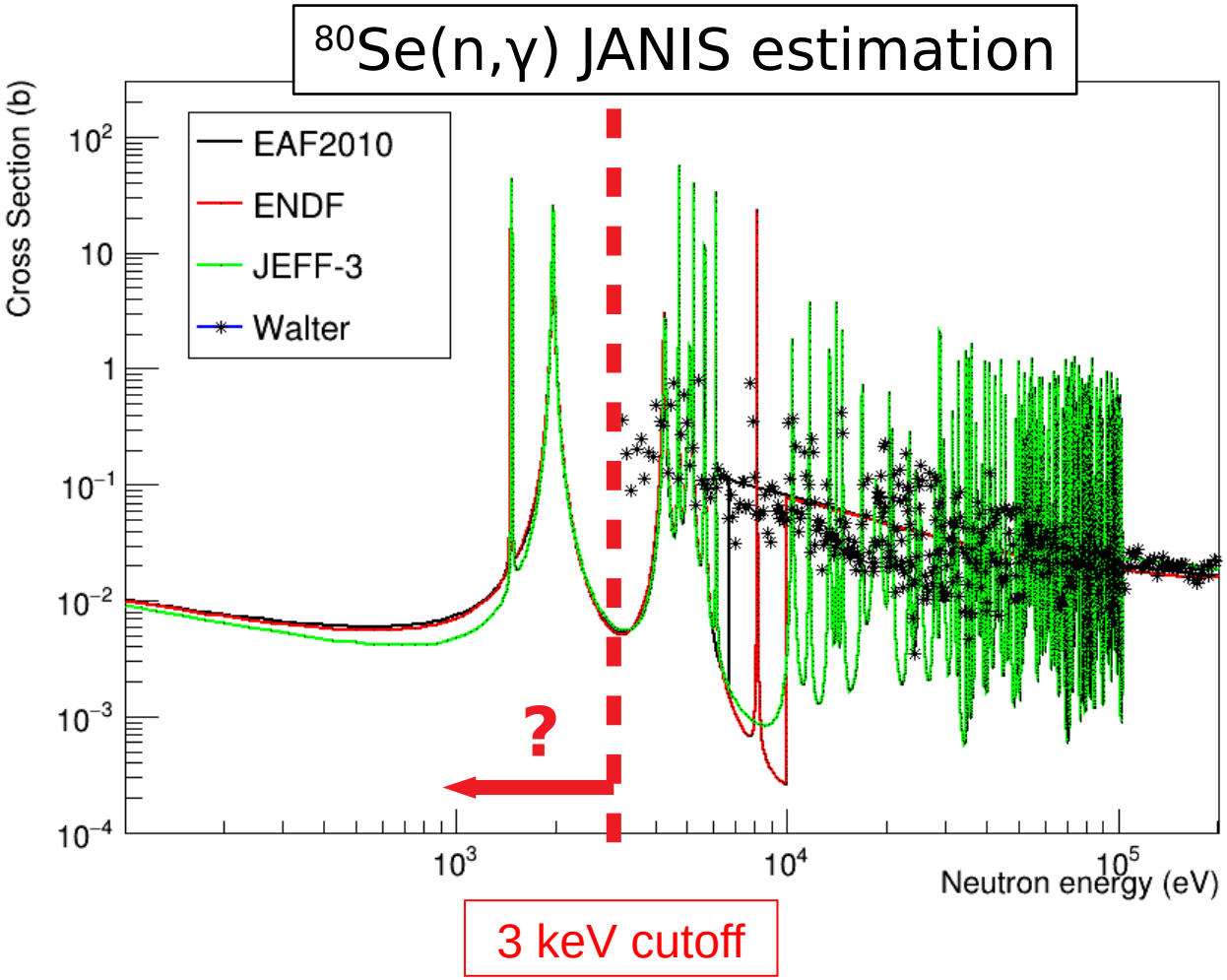
- There exist only one previous TOF measurement on ^{80}Se. However, the latter suffers of insufficient accuracy and completeness.



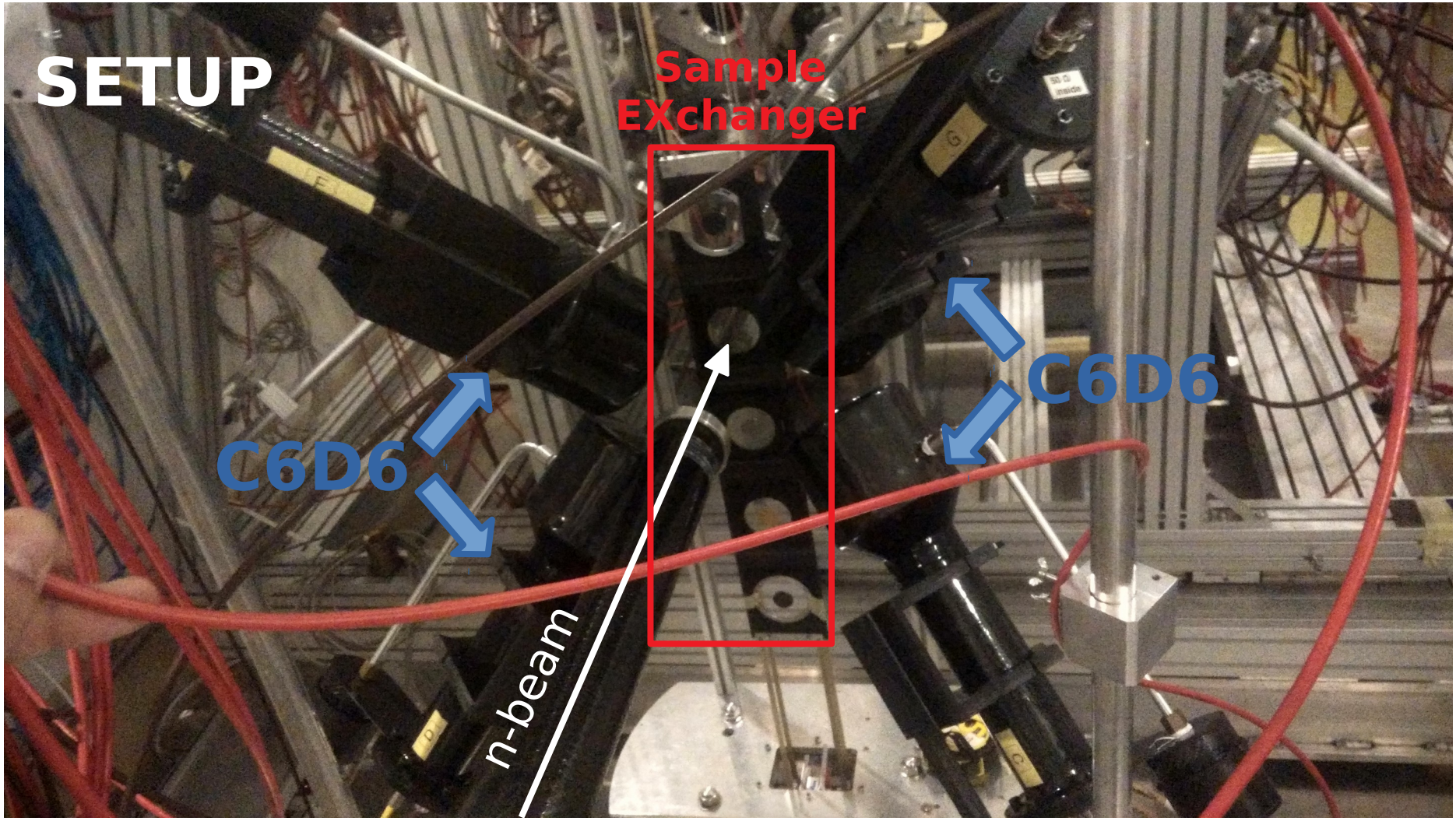
^{80}Se(n,γ) with C6D6 @ EAR1

Motivations:

- There exist only one previous TOF measurement on ^{80}Se. However, the latter suffers of insufficient accuracy and completeness.



^{80}Se(n,γ) with C6D6 @ EAR1



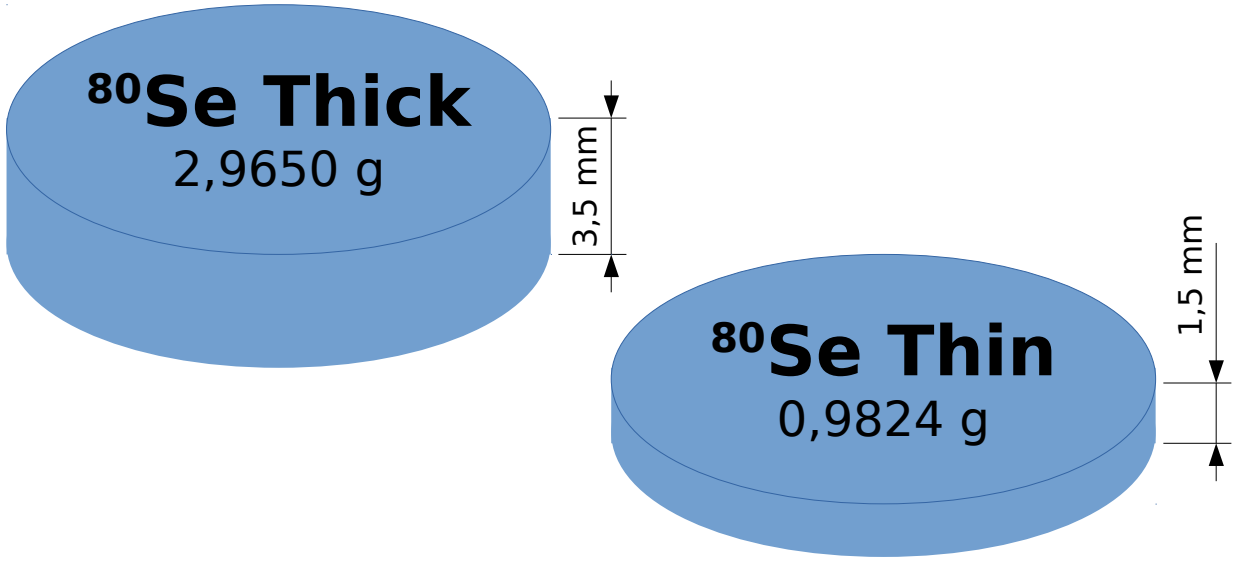
^{80}Se(n,γ) with C6D6 @ EAR1

In this talk, a very preliminary results will be shown. As well as the main difficulties to obtain them (rebounds).

@EAR1

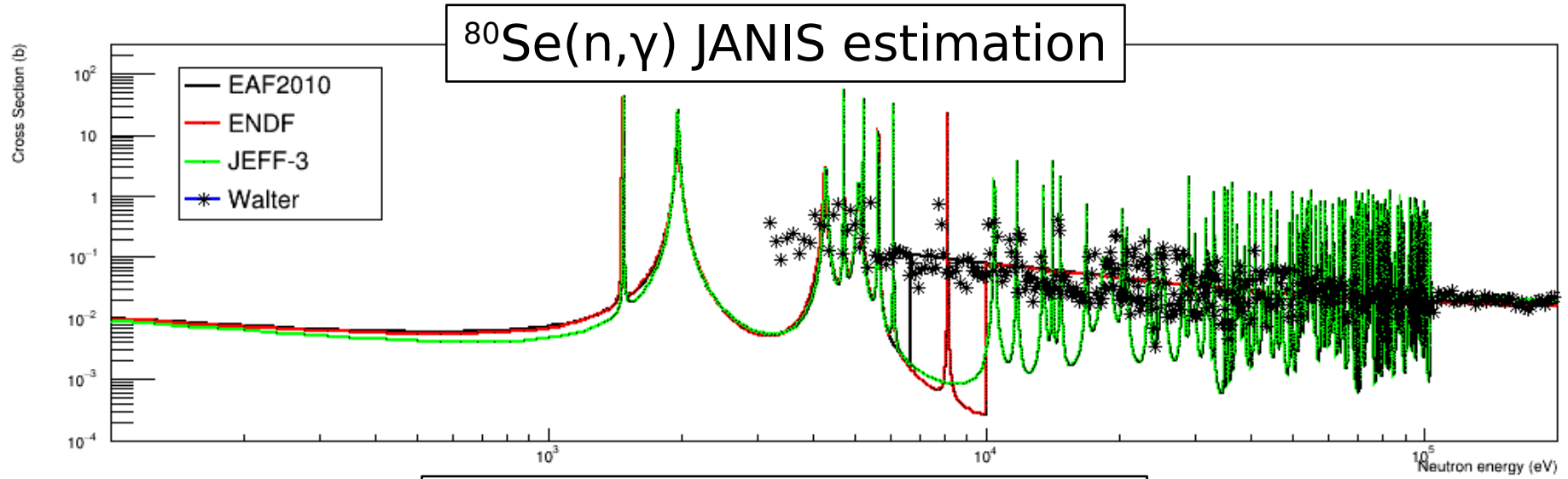
^{80}Se samples

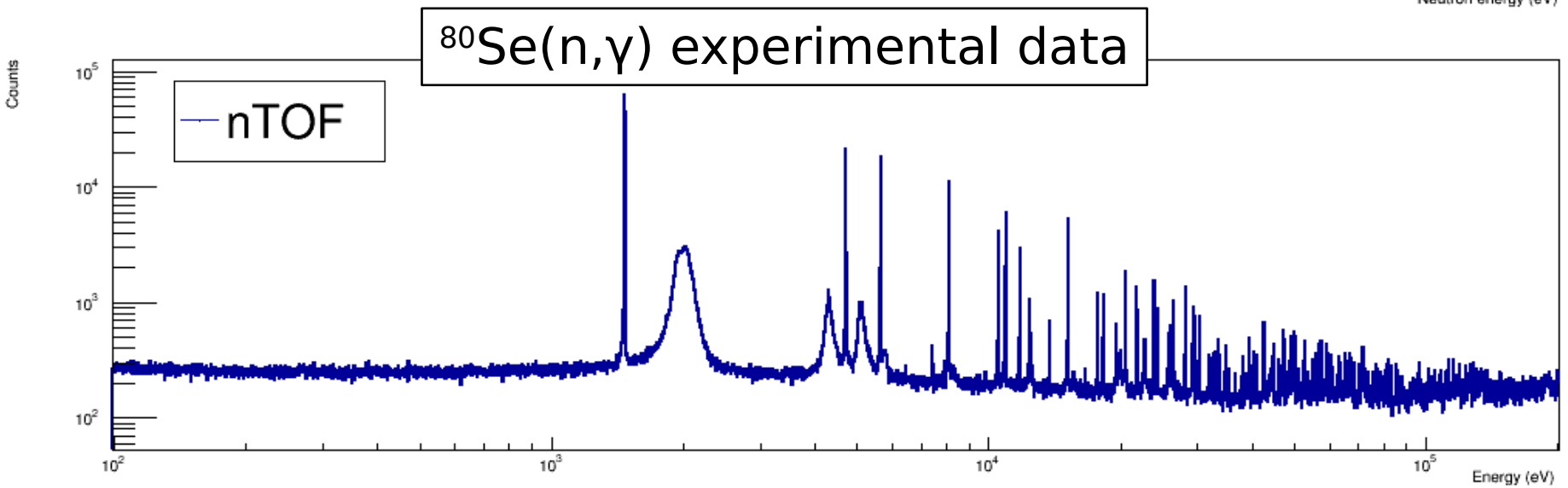
- Disk
- 20 mm (Ø)
- 3,5 mm; 1,5 mm



** Thanks to PSI and specially to Stephan Heinitz for the ^{80}Se samples.*

^{80}Se(n,γ) with C6D6 @ EAR1

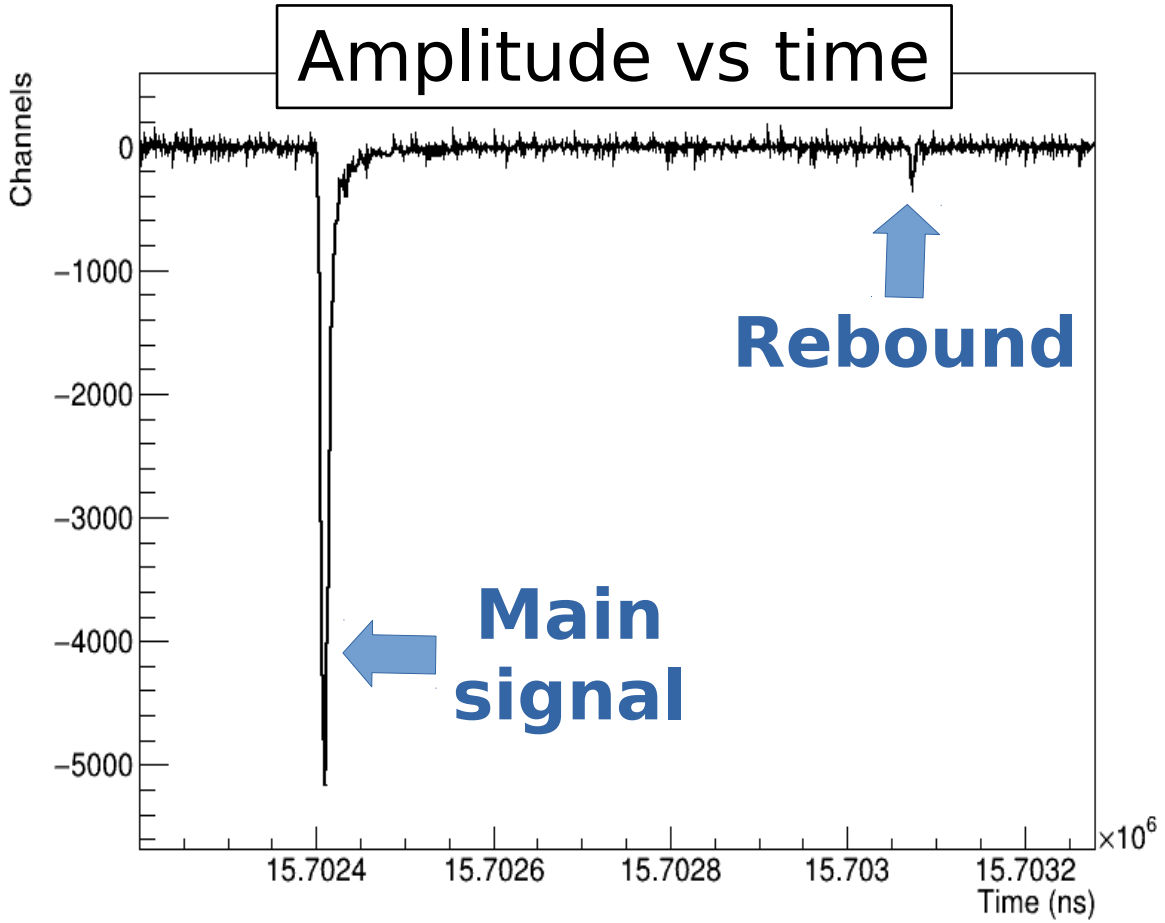




^{80}Se(n,γ) with C6D6 @ EAR1

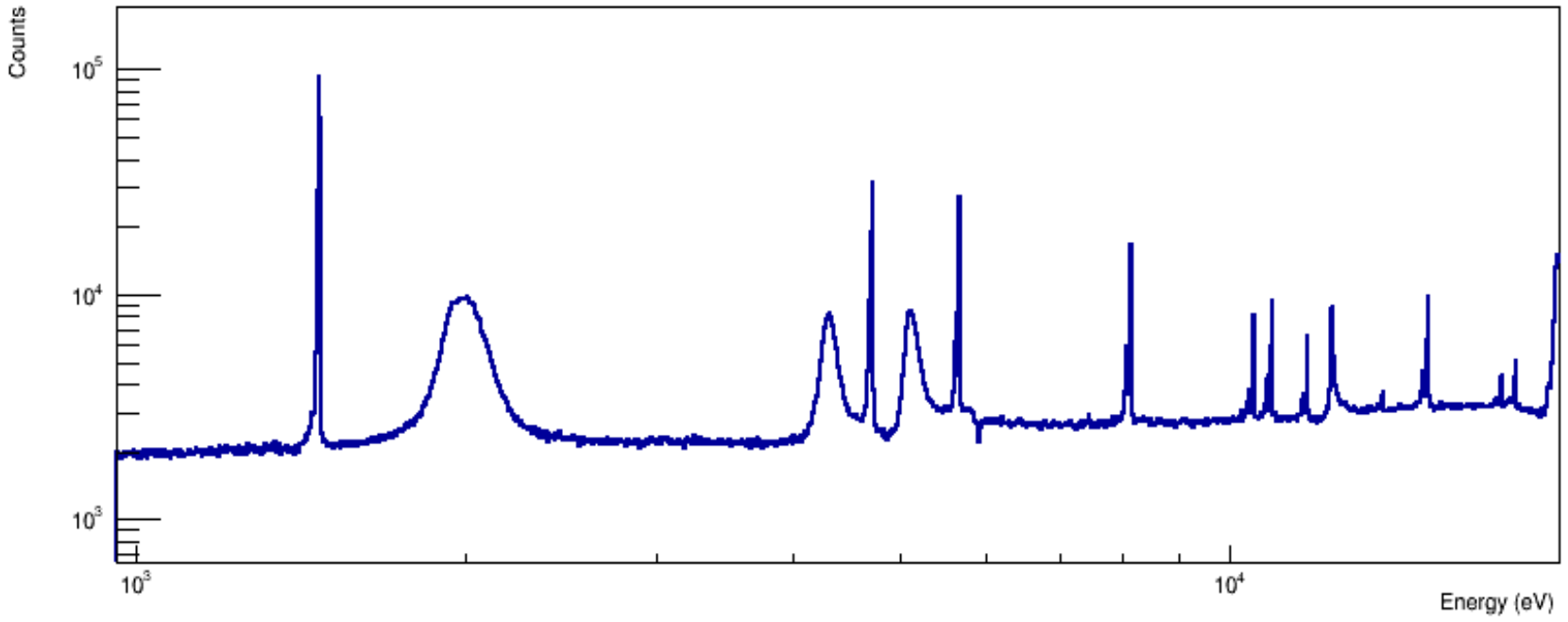
First difficulty:

- The first problem that arose when carrying out the analysis of the data was the existence of rebound signals



^{80}Se(n,γ) with C6D6 @ EAR1

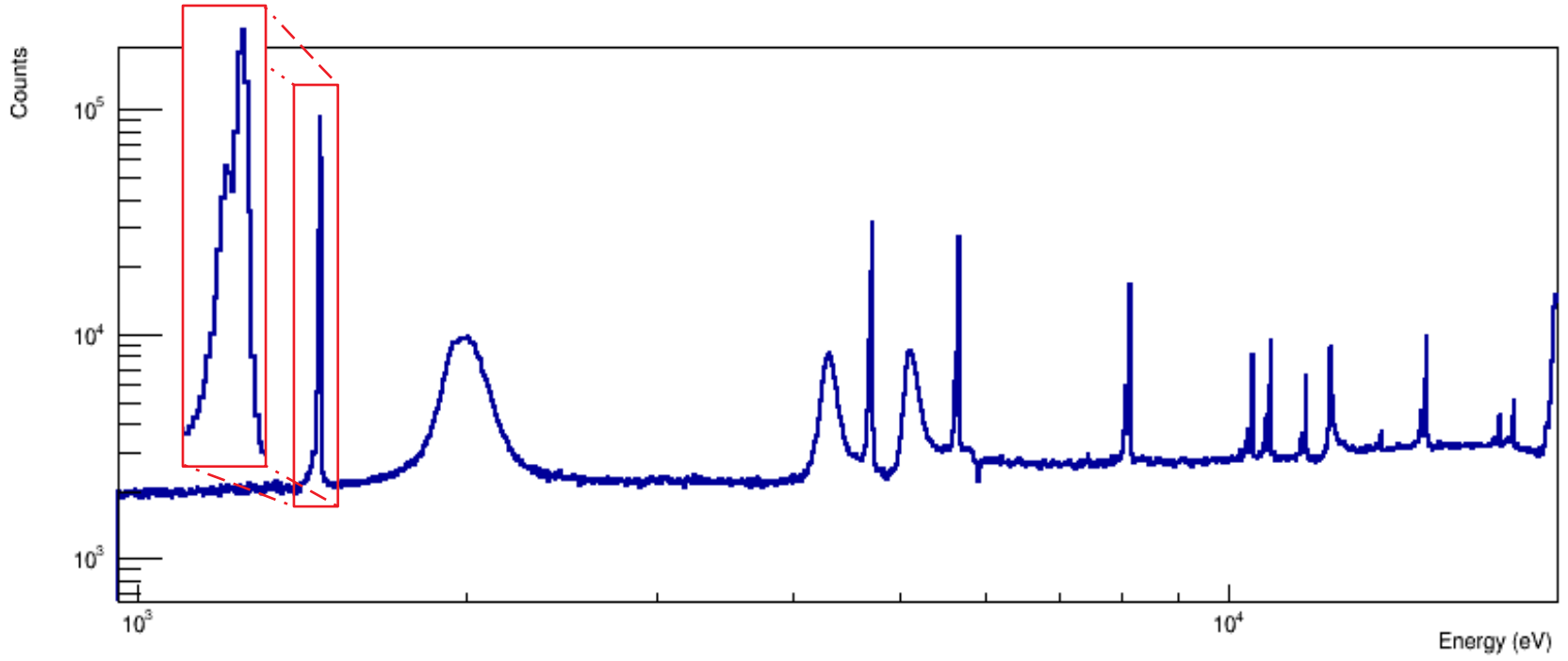
First difficulty:



^{80}Se(n,γ) spectrum fragment

^{80}Se(n,γ) with C6D6 @ EAR1

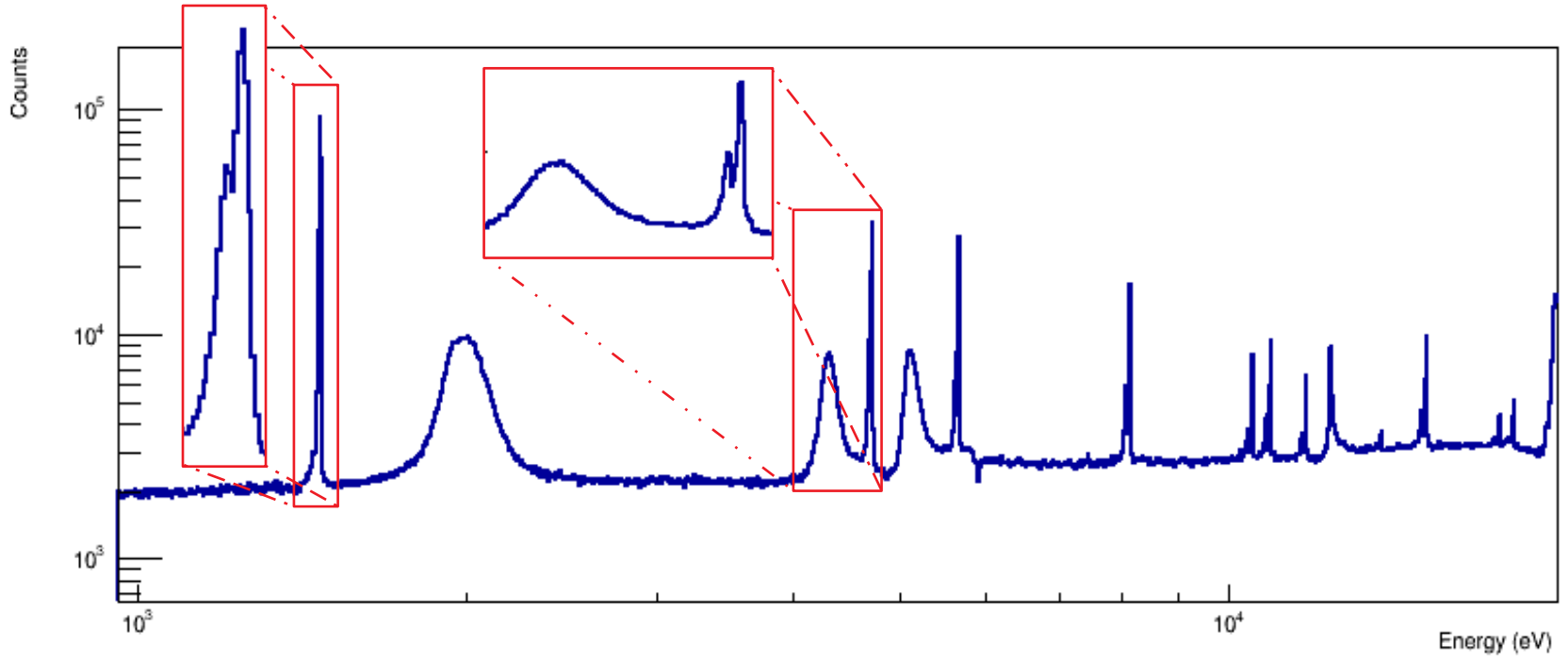
First difficulty:



^{80}Se(n,γ) spectrum fragment

^{80}Se(n,γ) with C6D6 @ EAR1

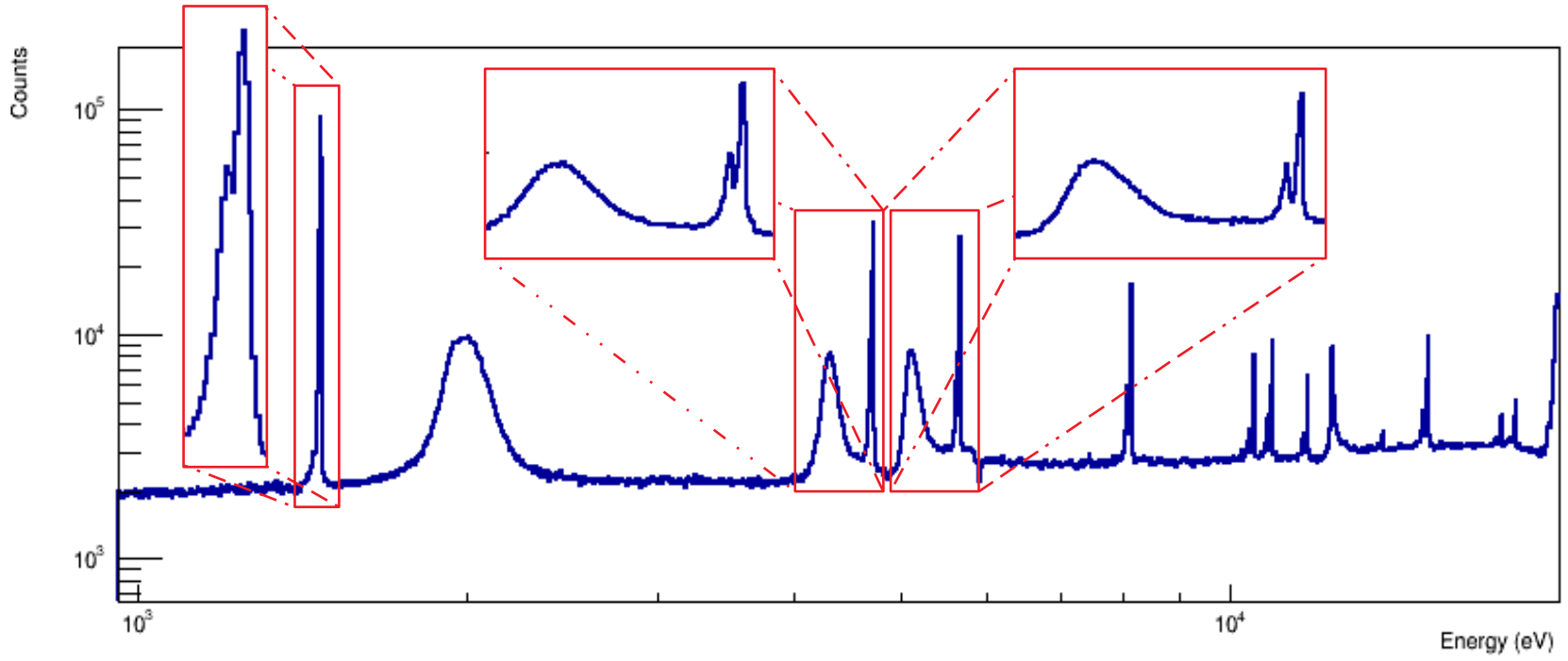
First difficulty:



^{80}Se(n,γ) spectrum fragment

^{80}Se(n,γ) with C6D6 @ EAR1

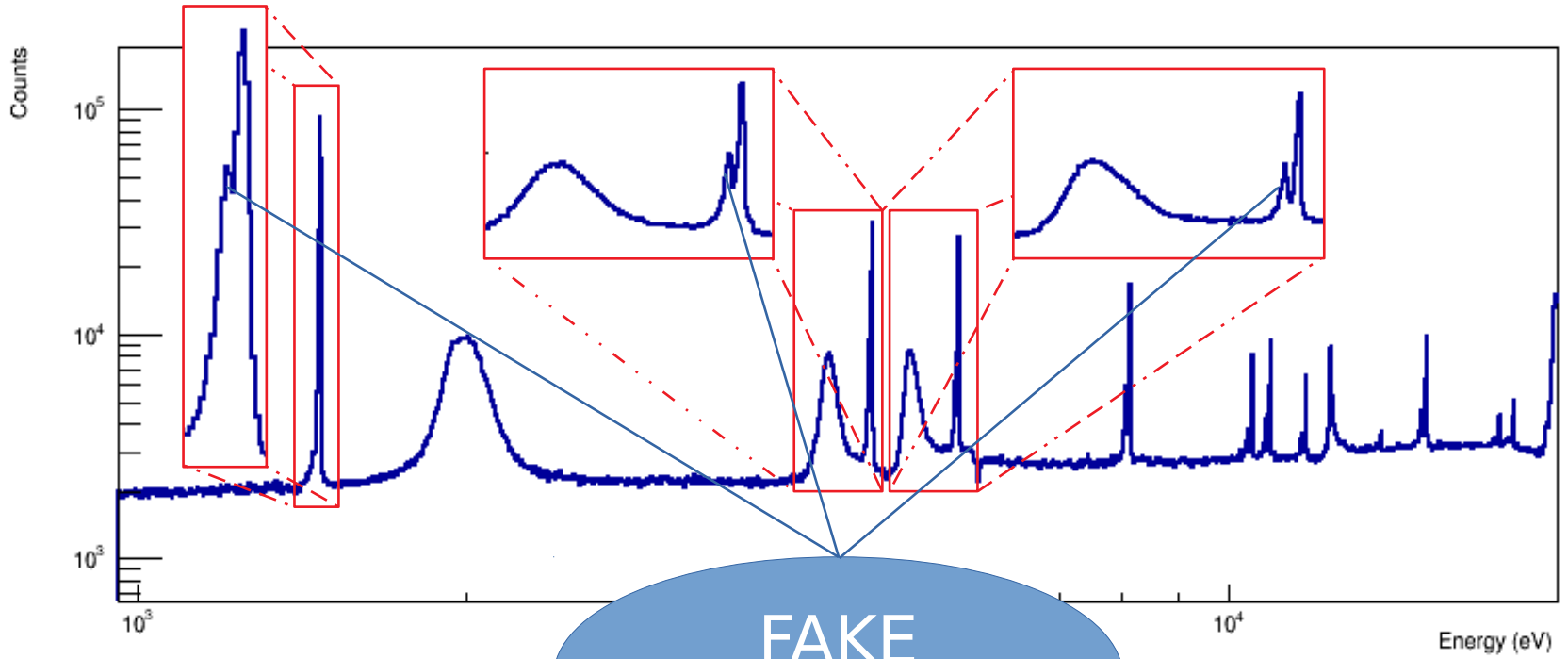
First difficulty:



^{80}Se(n,γ) spectrum fragment

^{80}Se(n,γ) with C6D6 @ EAR1

First difficulty:

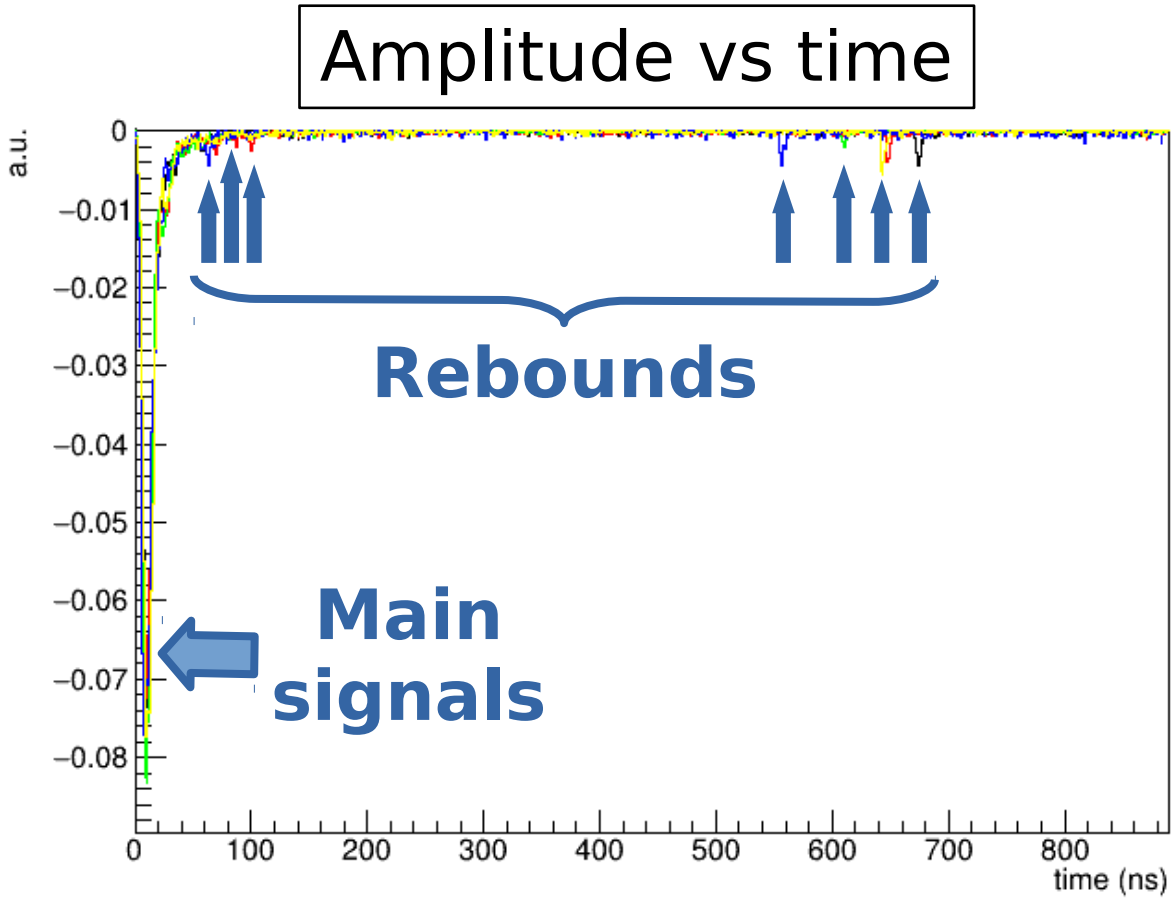


^{80}Se(n gment

^{80}Se(n,γ) with C6D6 @ EAR1

First solutions:

- Since they appear at different times each time, we can not model them on a average pulse.

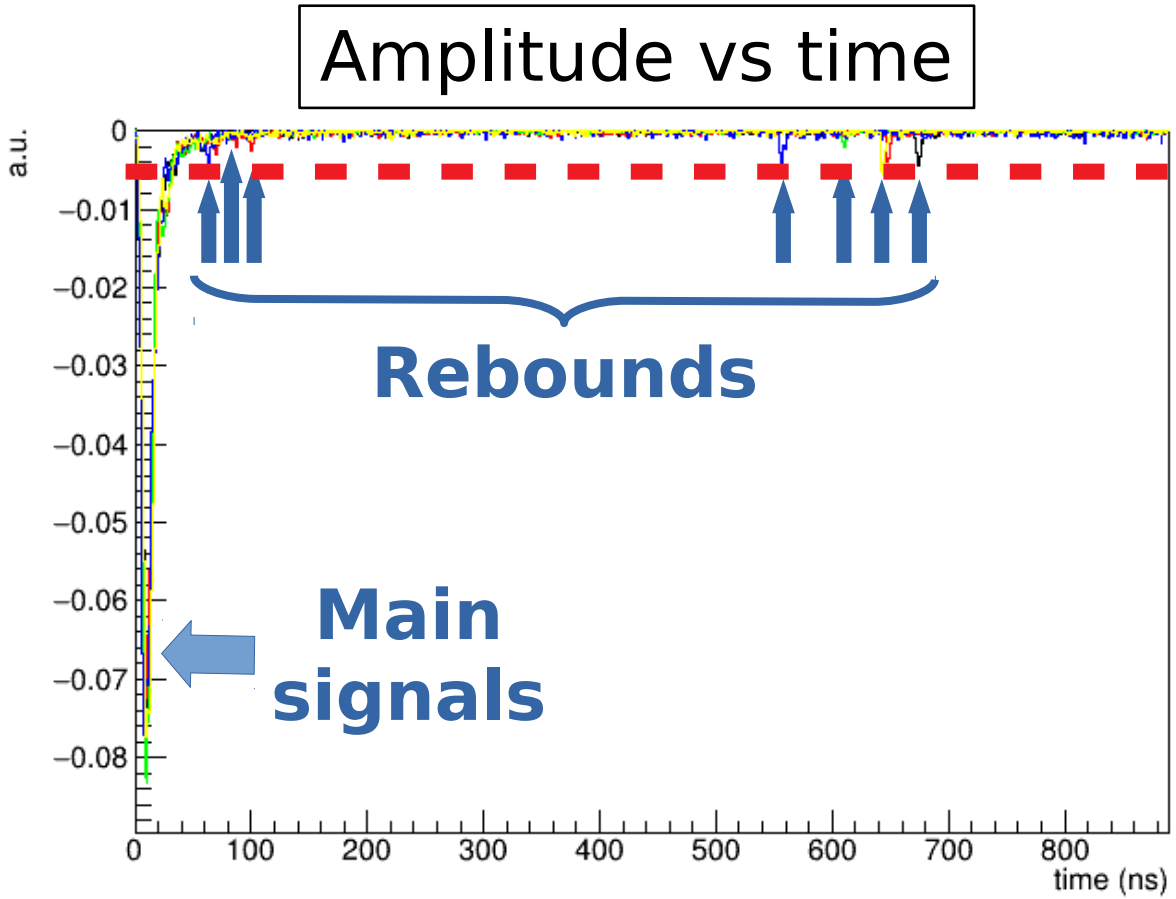


^{80}Se(n,γ) with C6D6 @ EAR1

First solutions:

- Since th appear at diffe times each tim we can not mo m on a averag ulse.

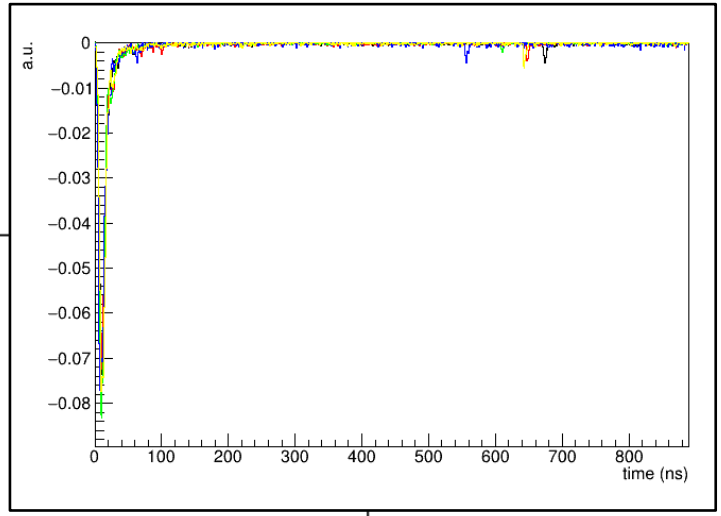
Threshold!

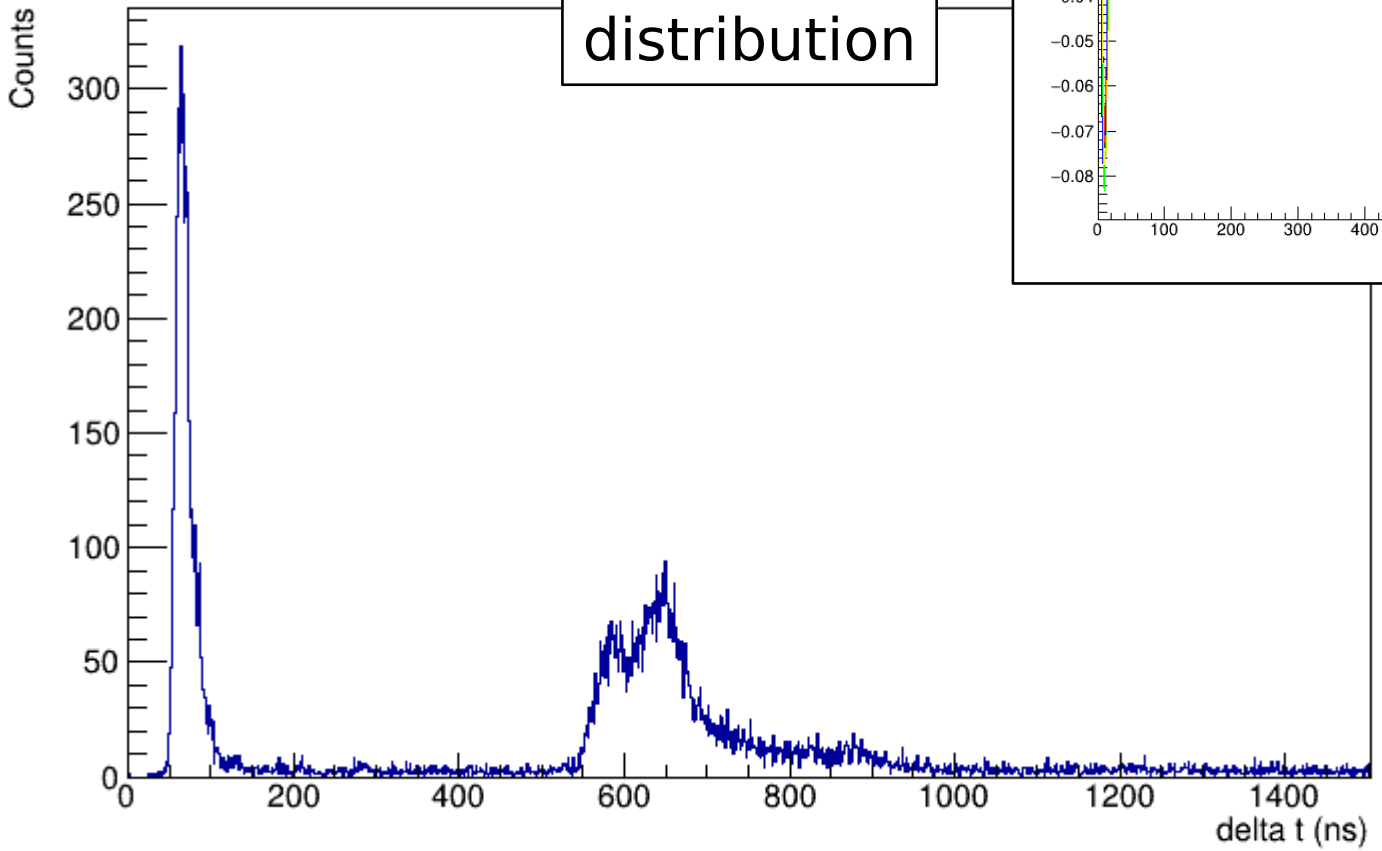


^{80}Se(n,γ) with C6D6 @ EAR1

First solutions:

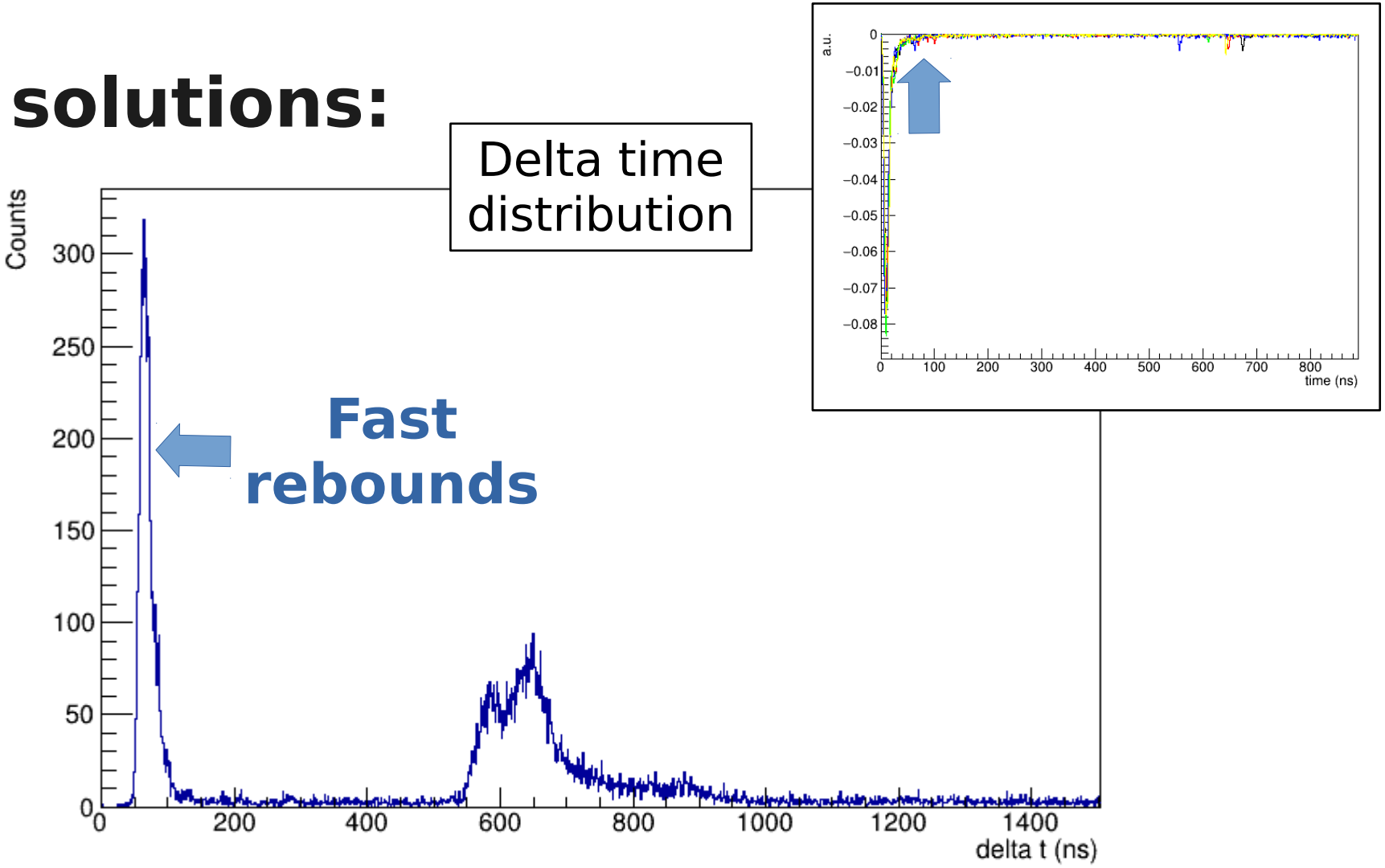
Delta time distribution





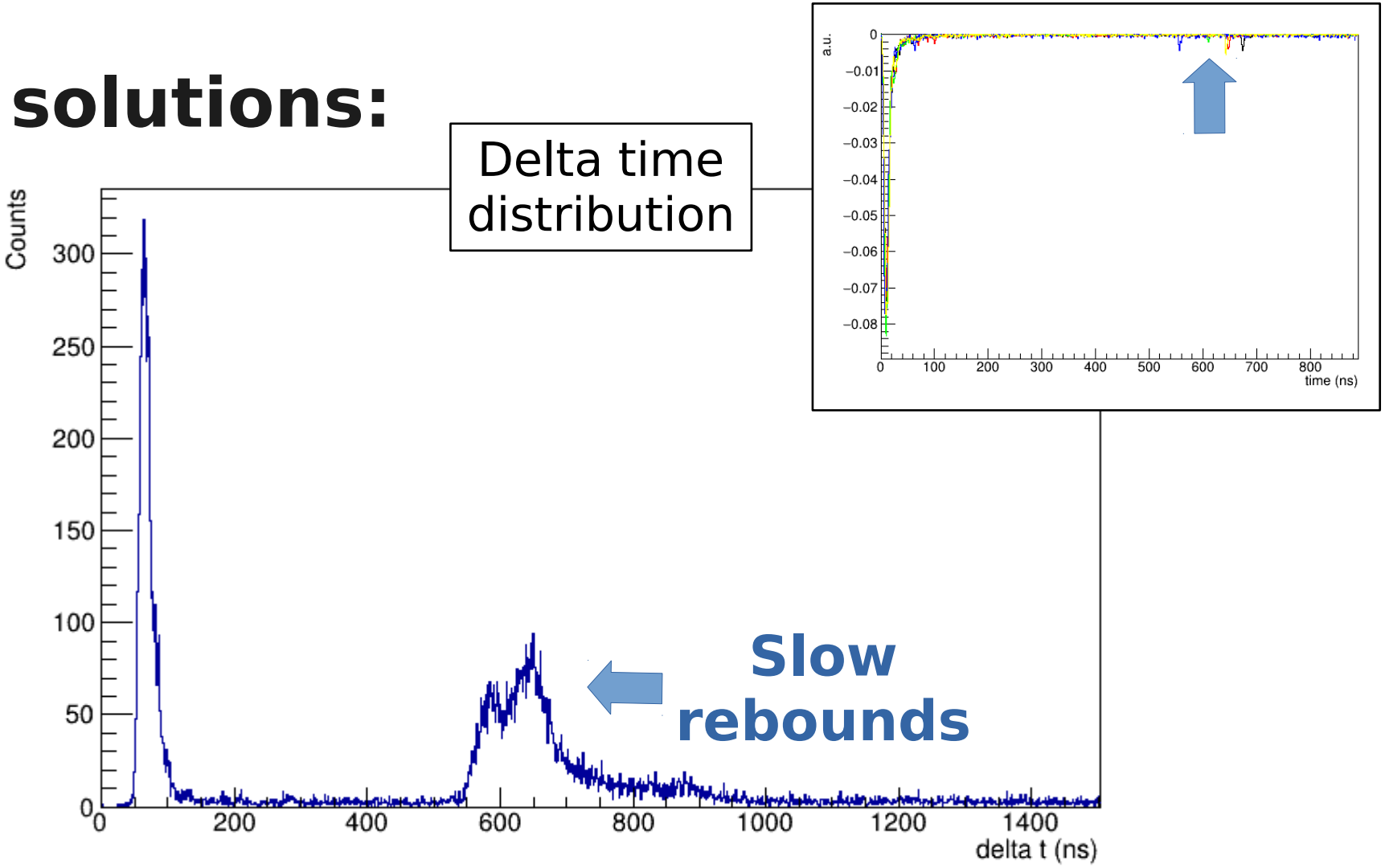
^{80}Se(n,γ) with C6D6 @ EAR1

First solutions:

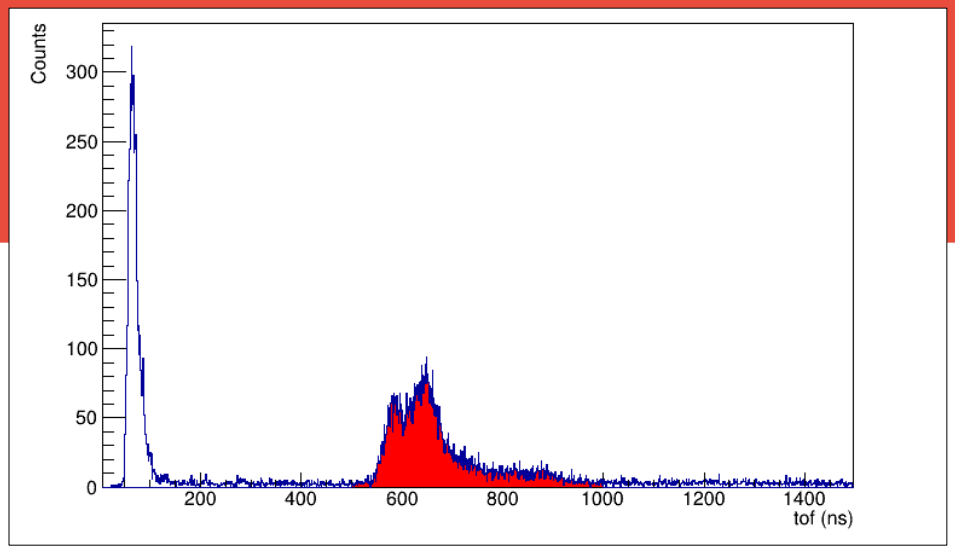


^{80}Se(n,γ) with C6D6 @ EAR1

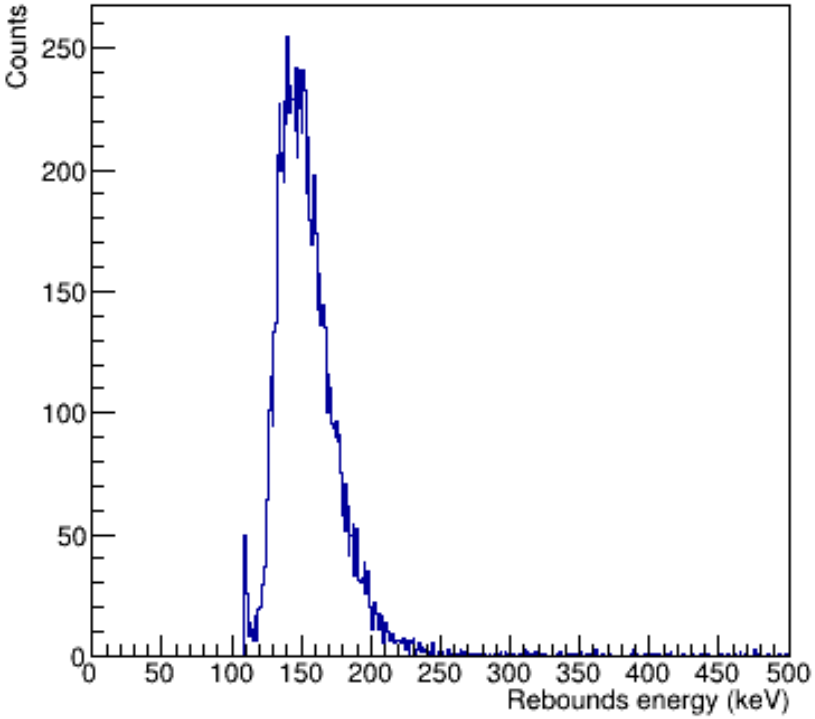
First solutions:



^{80}Se @ EAR1



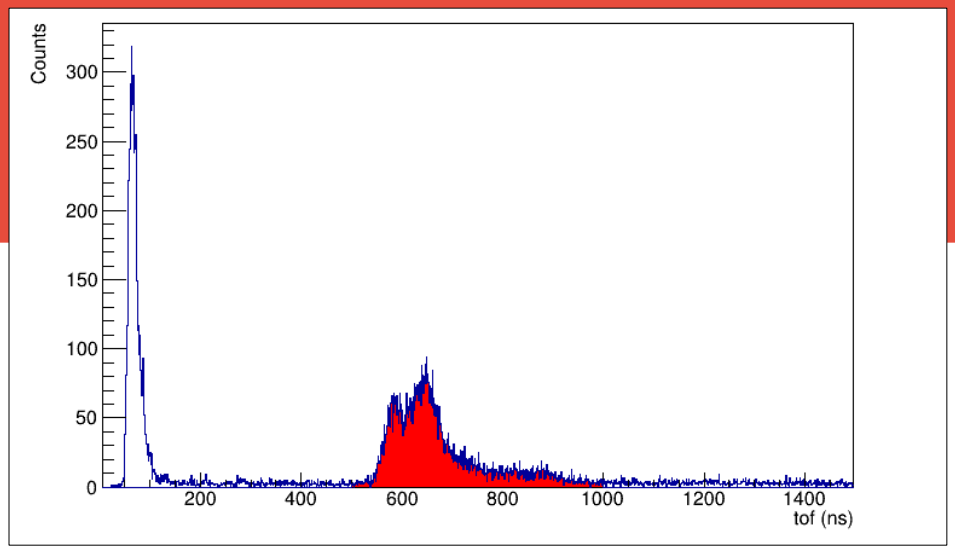
First solutions:



$$1\ \text{MeV} < A_{M\text{-}S} < 2\ \text{MeV}$$

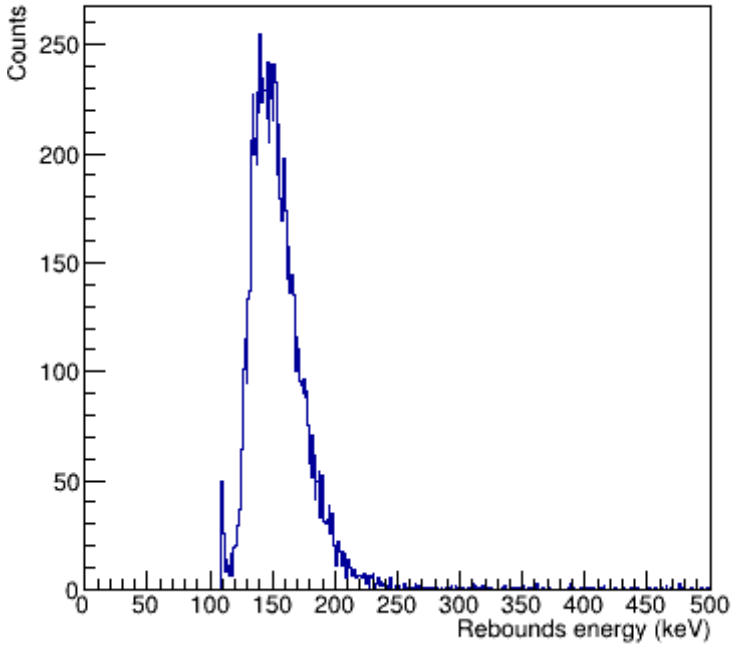
$A_{M\text{-}S}$: Amplitude of the main signal

^{80}Se @ EAR1

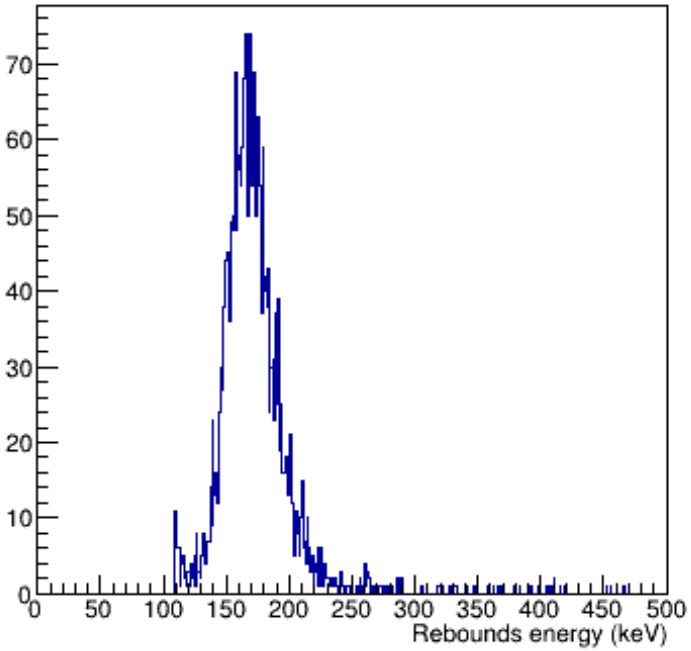


First solutions:

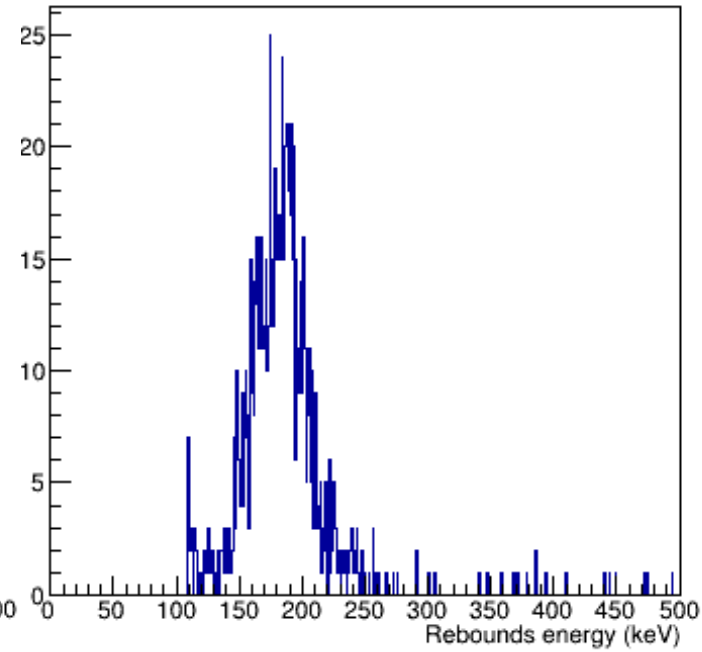
1 MeV < A_{M-S} < 2 MeV



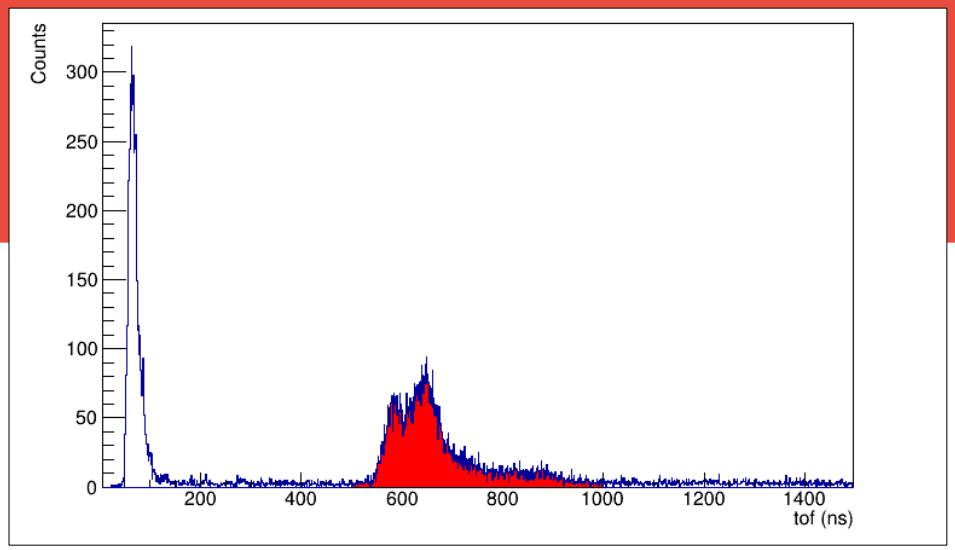
2 MeV < A_{M-S} < 3 MeV



3 MeV < A_{M-S} < 4 MeV



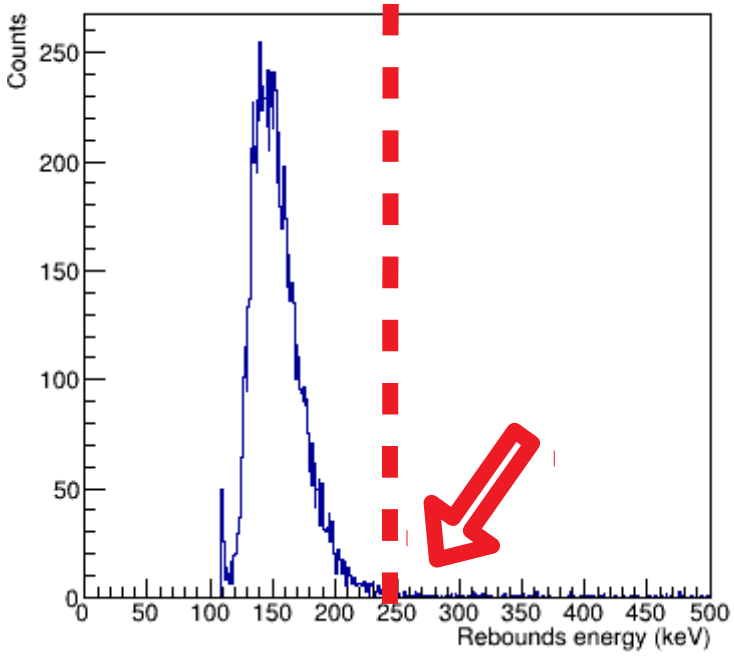
^{80}Se @ EAR1



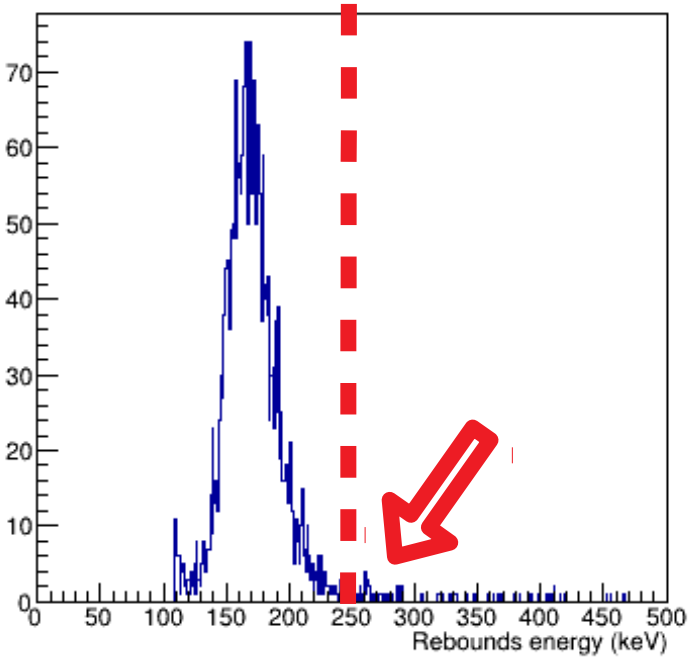
First solutions:

Threshold ~250 keV

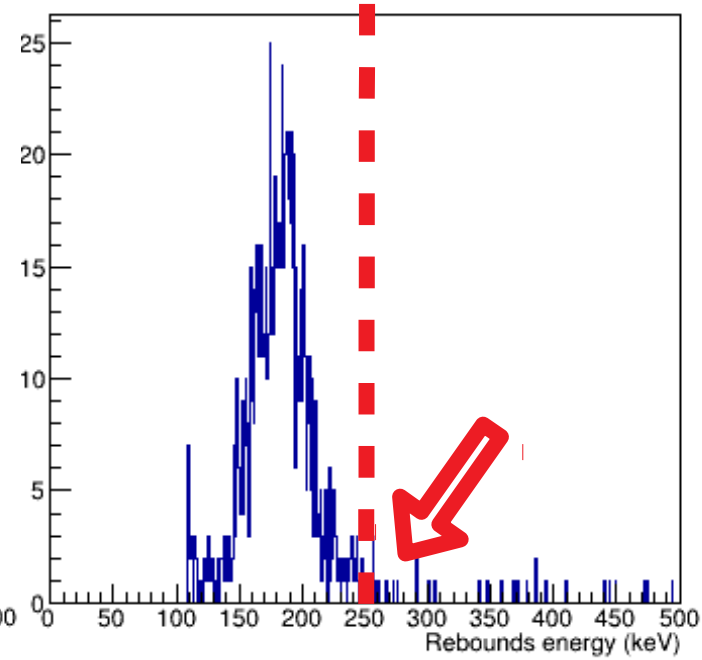
1 MeV < A_{M-S} < 2 MeV



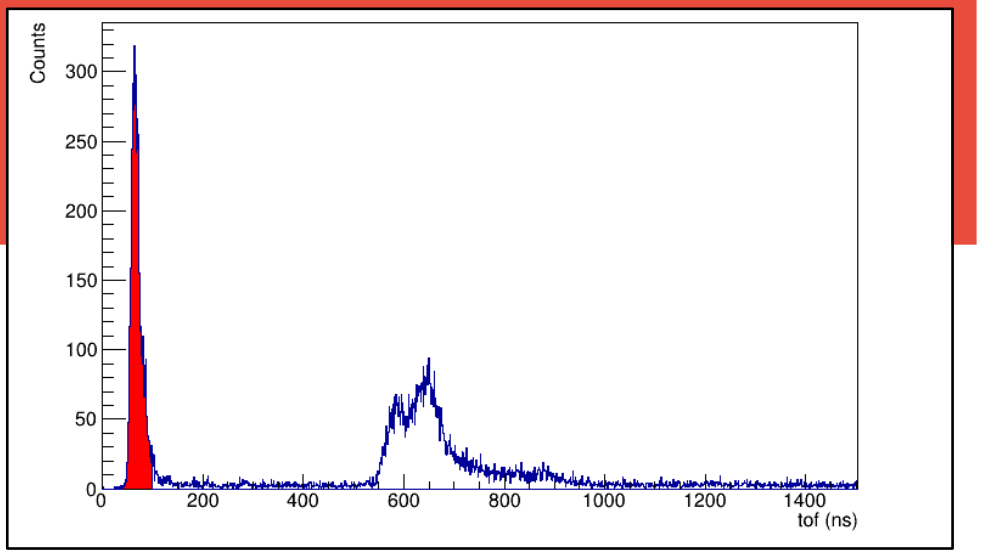
2 MeV < A_{M-S} < 3 MeV



3 MeV < A_{M-S} < 4 MeV

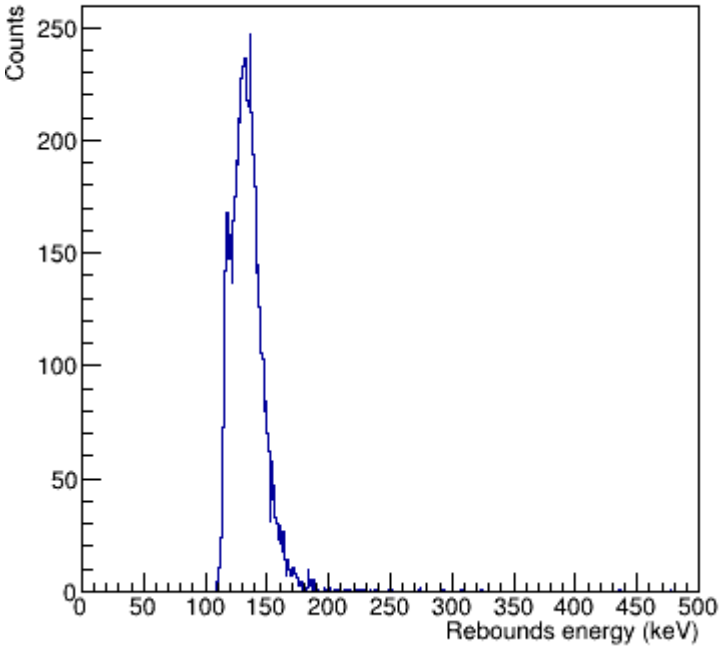


^{80}Se @ EAR1

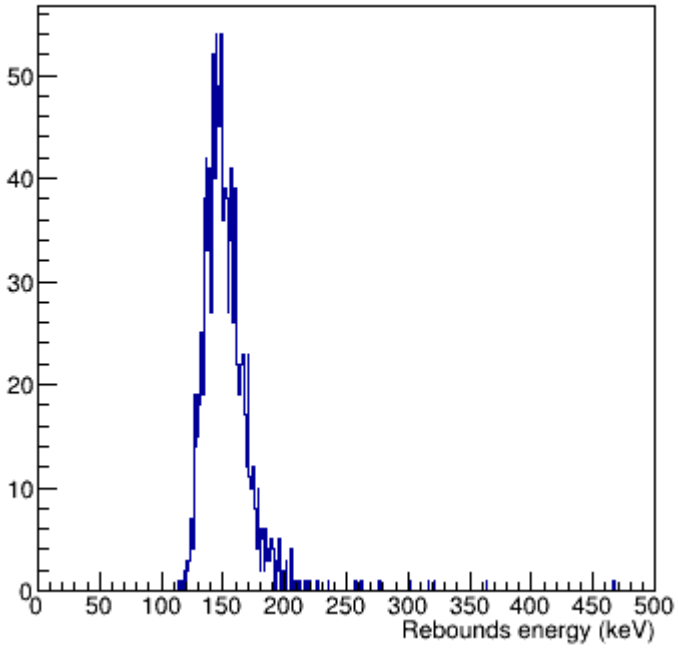


First solutions:

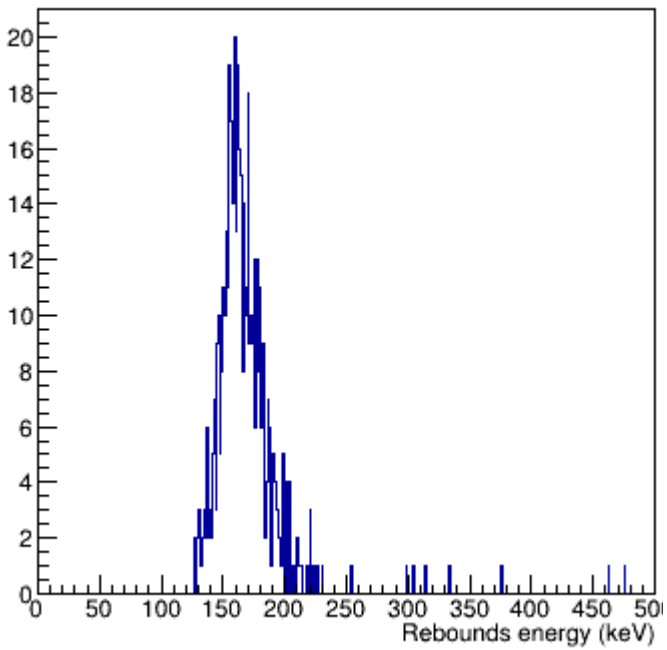
1 MeV < A_{M-S} < 2 MeV



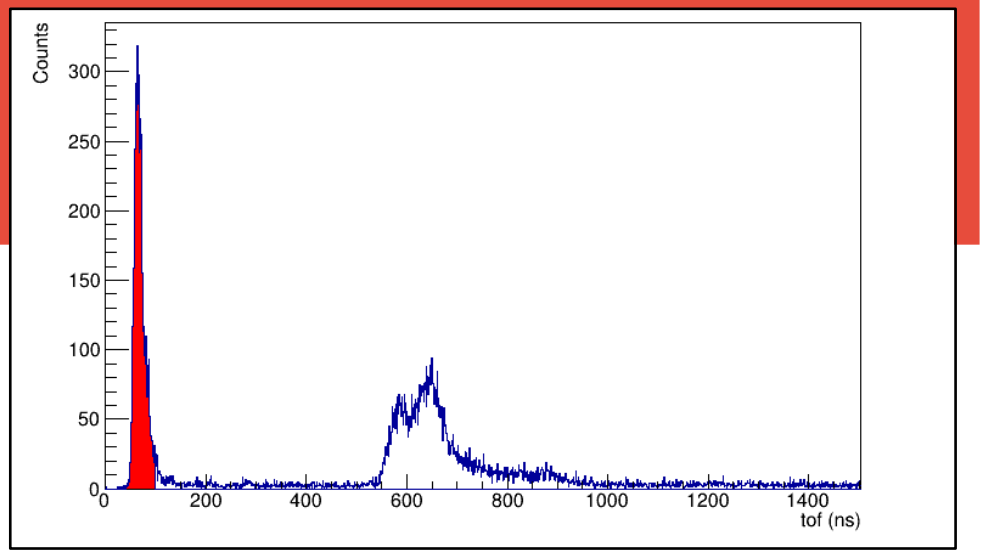
2 MeV < A_{M-S} < 3 MeV



3 MeV < A_{M-S} < 4 MeV



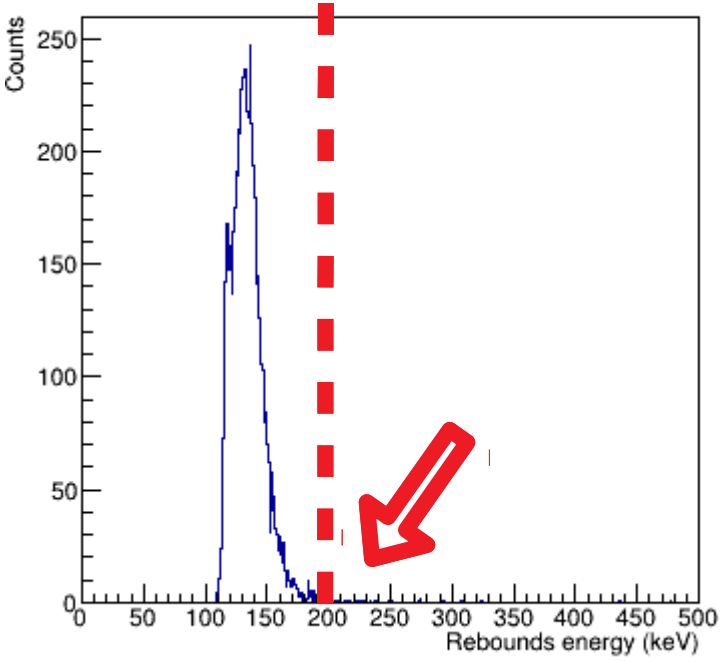
^{80}Se @ EAR1



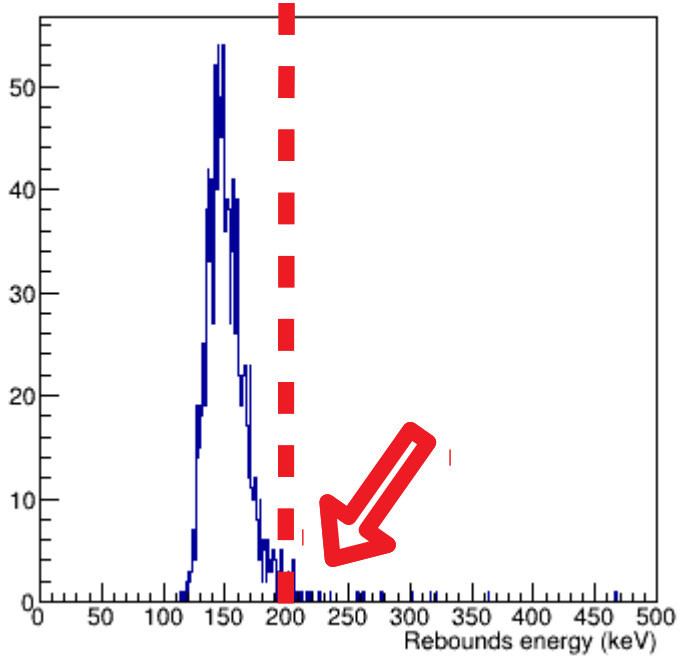
First solutions:

Threshold <250 keV

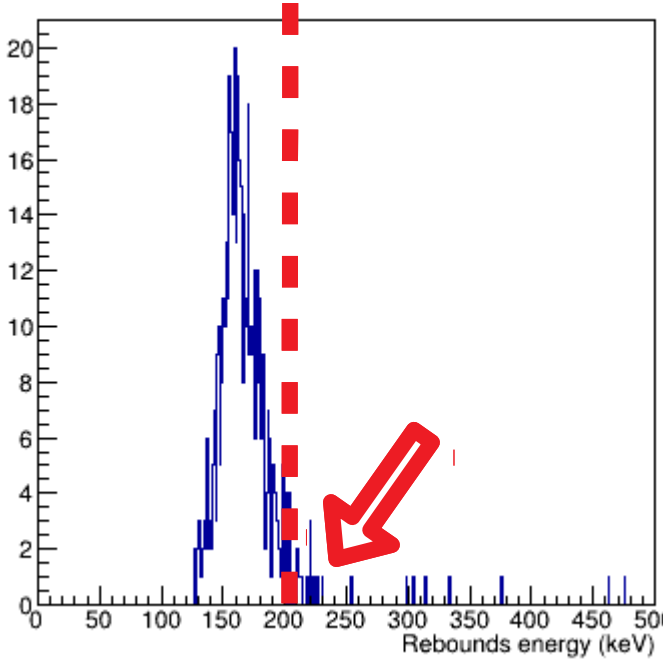
1 MeV < A_{M-S} < 2 MeV



2 MeV < A_{M-S} < 3 MeV

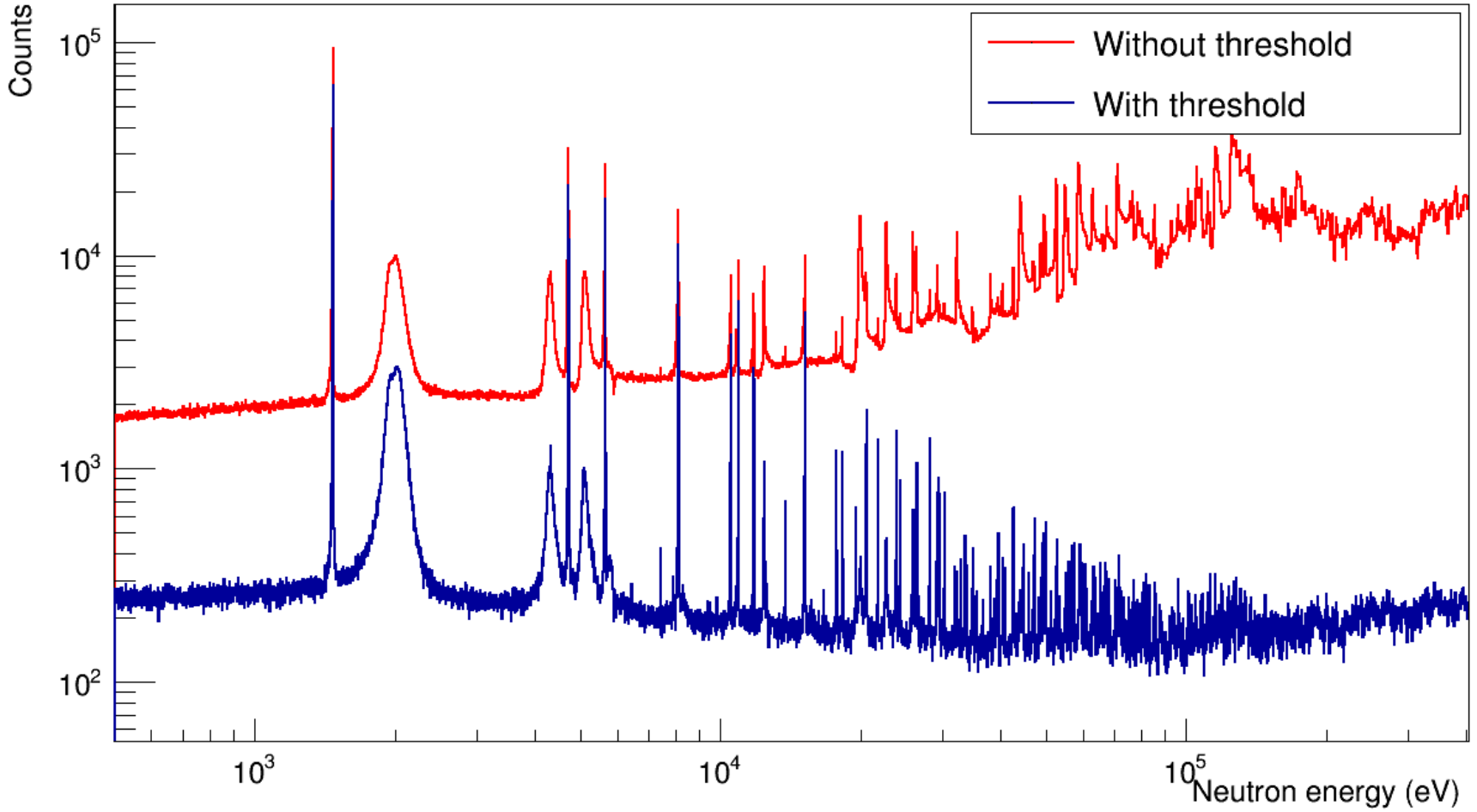


3 MeV < A_{M-S} < 4 MeV



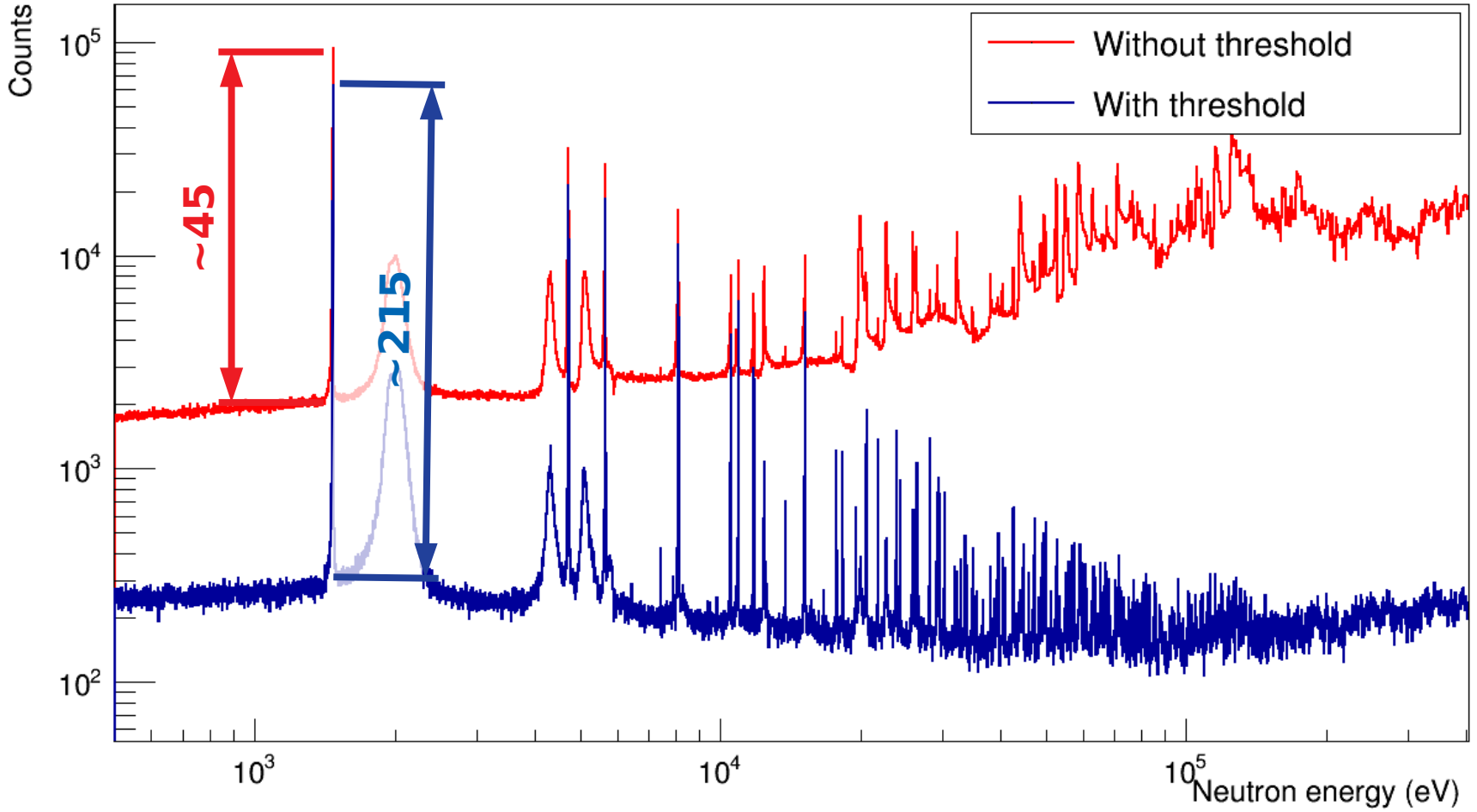
^{80}Se(n,γ) with C6D6 @ EAR1

PRELIMINARY RESULTS



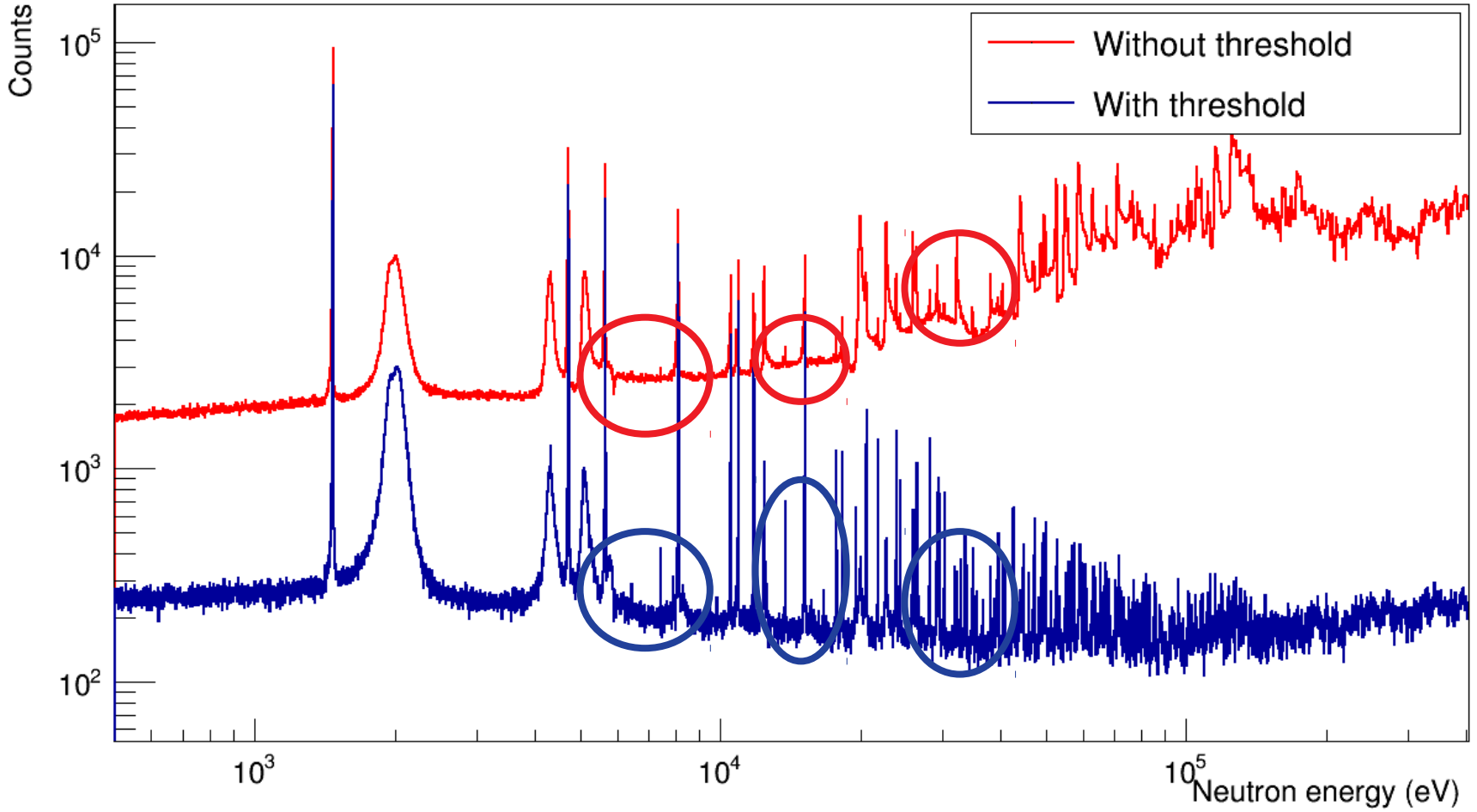
^{80}Se(n,γ) with C6D6 @ EAR1

PRELIMINARY RESULTS



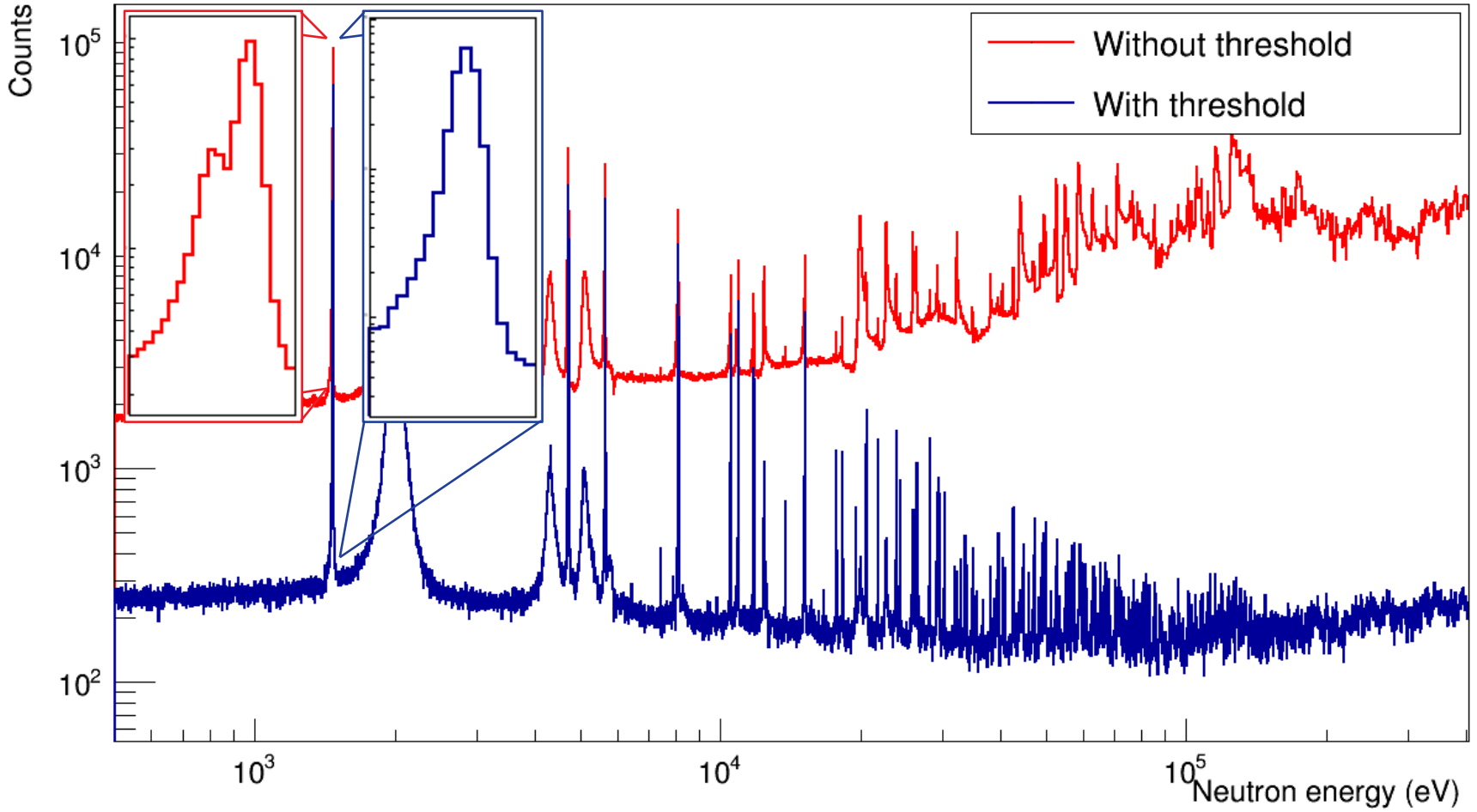
^{80}Se(n,γ) with C6D6 @ EAR1

PRELIMINARY RESULTS



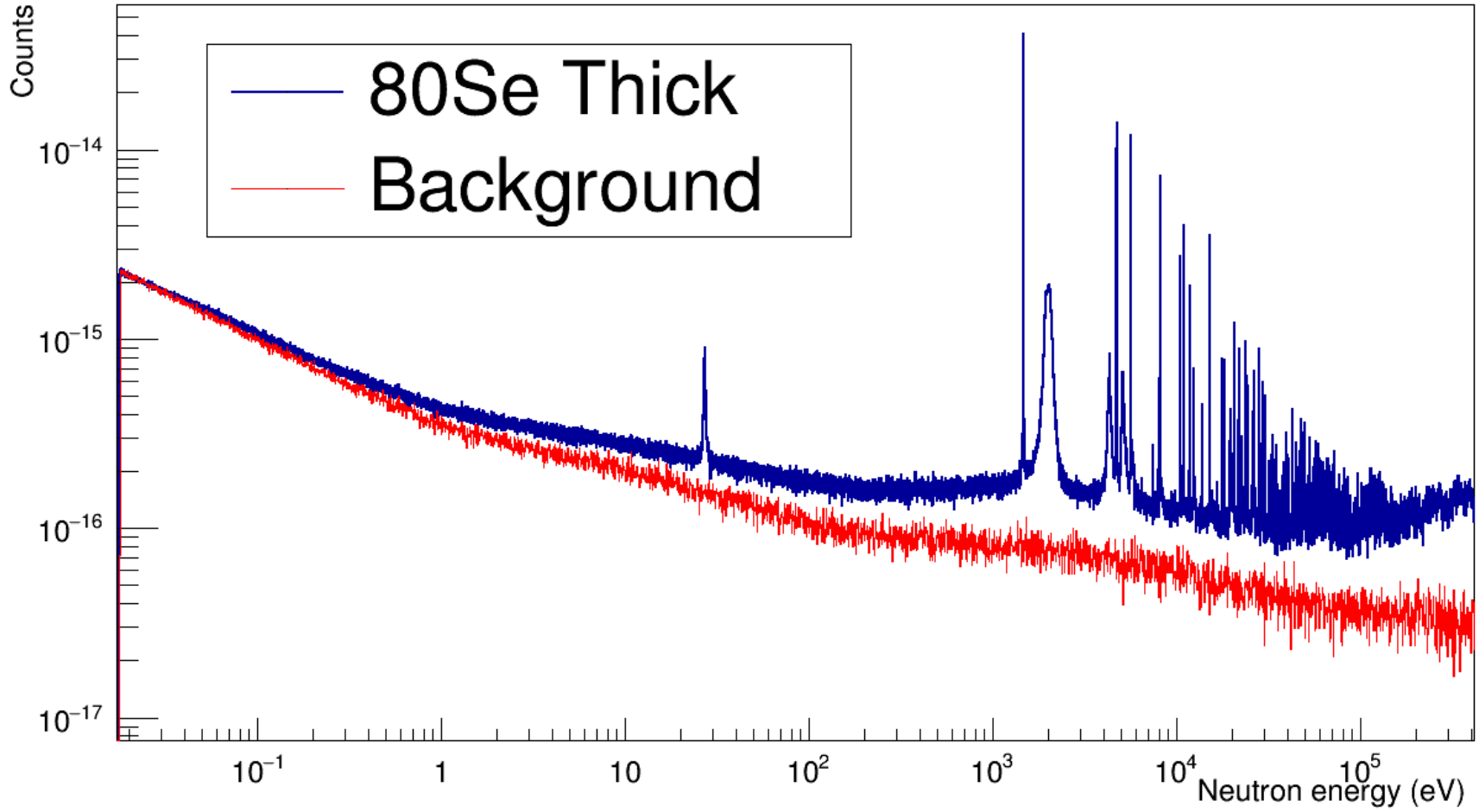
^{80}Se(n,γ) with C6D6 @ EAR1

PRELIMINARY RESULTS



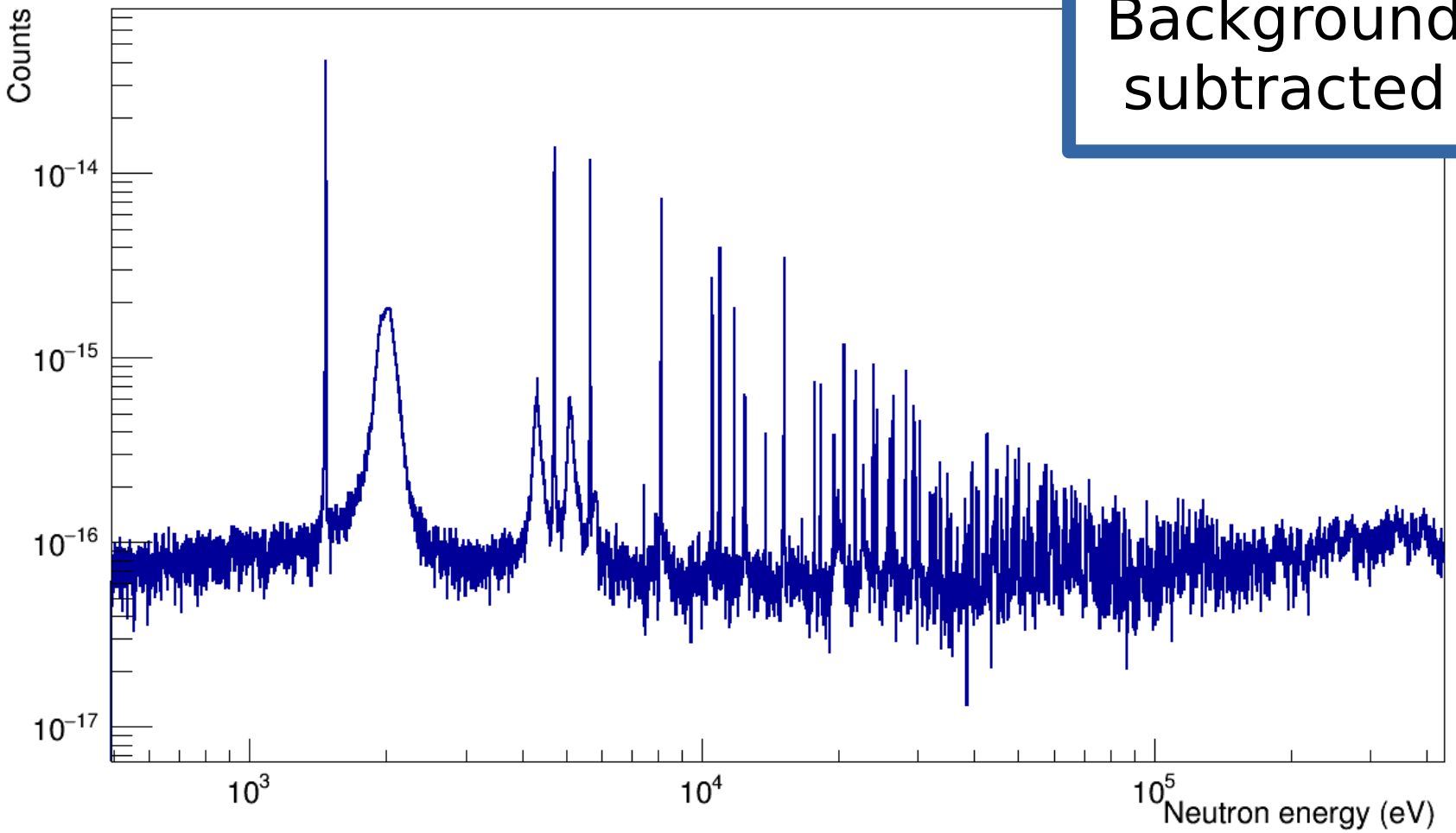
^{80}Se(n,γ) with C6D6 @ EAR1

PRELIMINARY RESULTS



^{80}Se(n,γ) with C6D6 @ EAR1

PRELIMINARY RESULTS



^{80}Se(n,γ) with C6D6 @ EAR1

Summary and outlook

- With the measurement at n_TOF we have improved significantly the knowledge on this CS with respect to the previous data available (Walter'87).
- We have measured for first time the neutron energy range below 3keV, with a broad s-wave resonance relevant for nucleosynthesis.
- We have measured with high resolution many high energy resonances up to >100 keV.
- In the preliminary analysis performed thus far, the main difficulty is due to the electrical rebounds in the C6D6 signals. For the moment we have solved this issue by means of the analysis thresholds.
- Ongoing work:
  - Performance MC simulations to obtain the WF and apply the PHWT.
  - Determine the experimental neutron capture yield.
  - Make the R-Matrix analysis with SAMMY.
  - Astrophysical interpretation of the results.