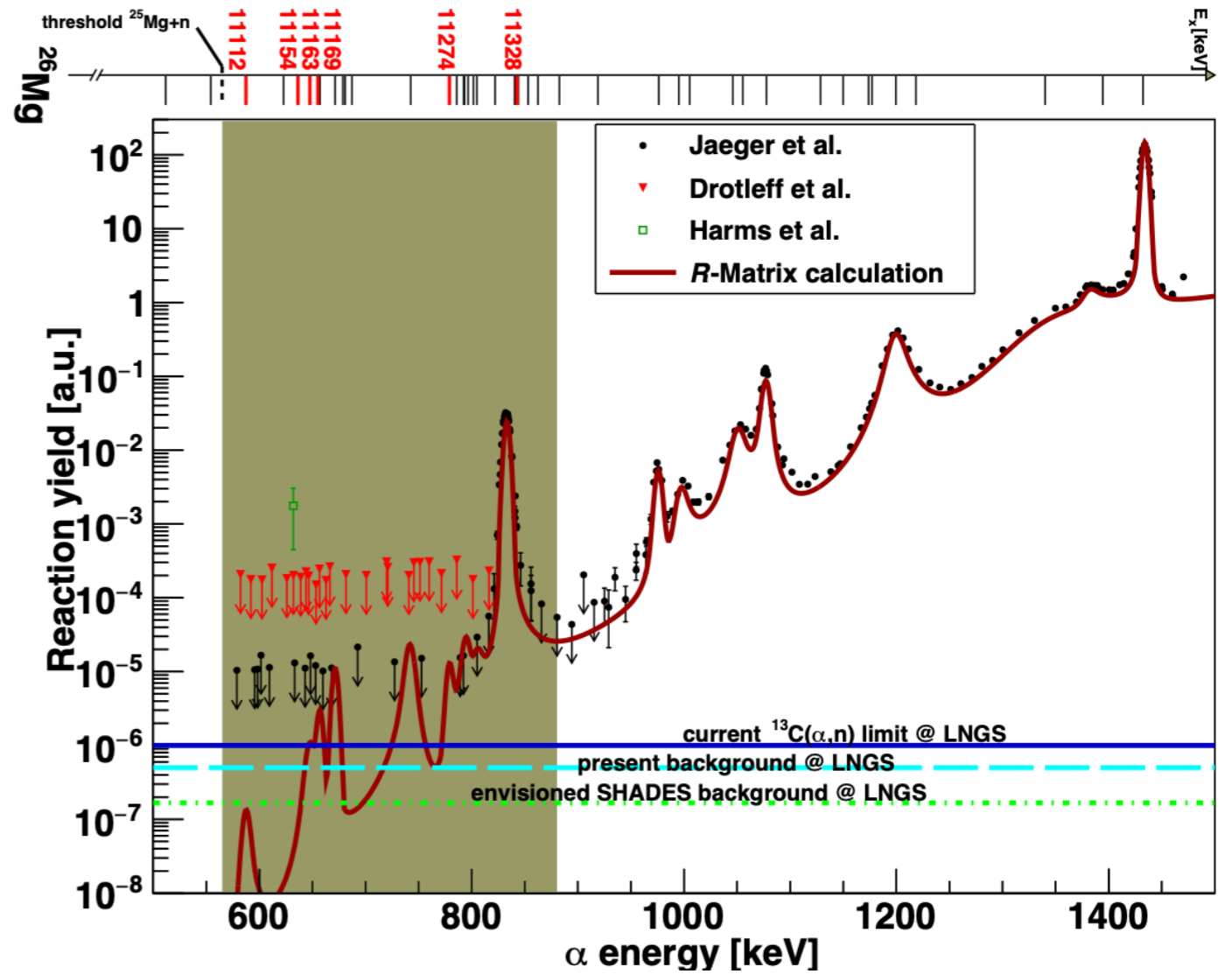
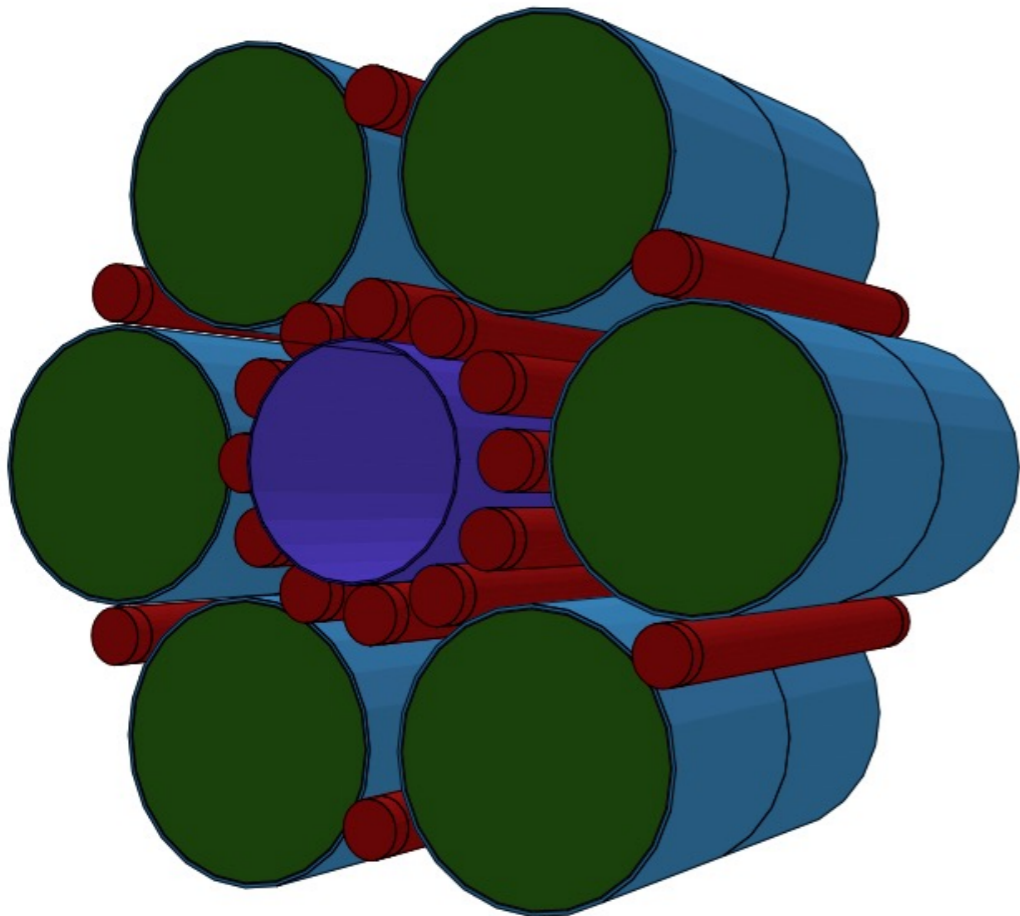


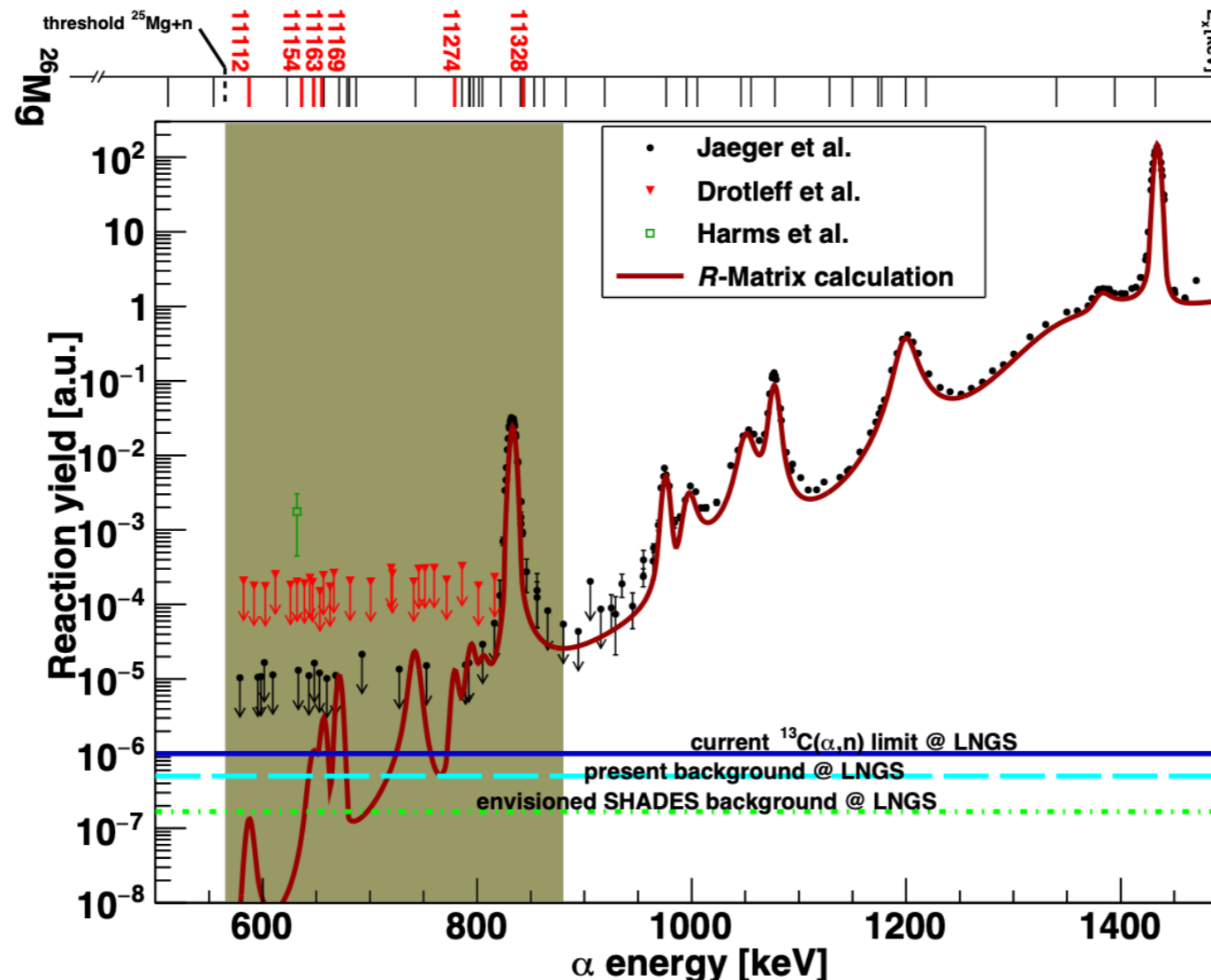
$^{22}\text{Ne}(\alpha, n)^{25}\text{Mg}$ status



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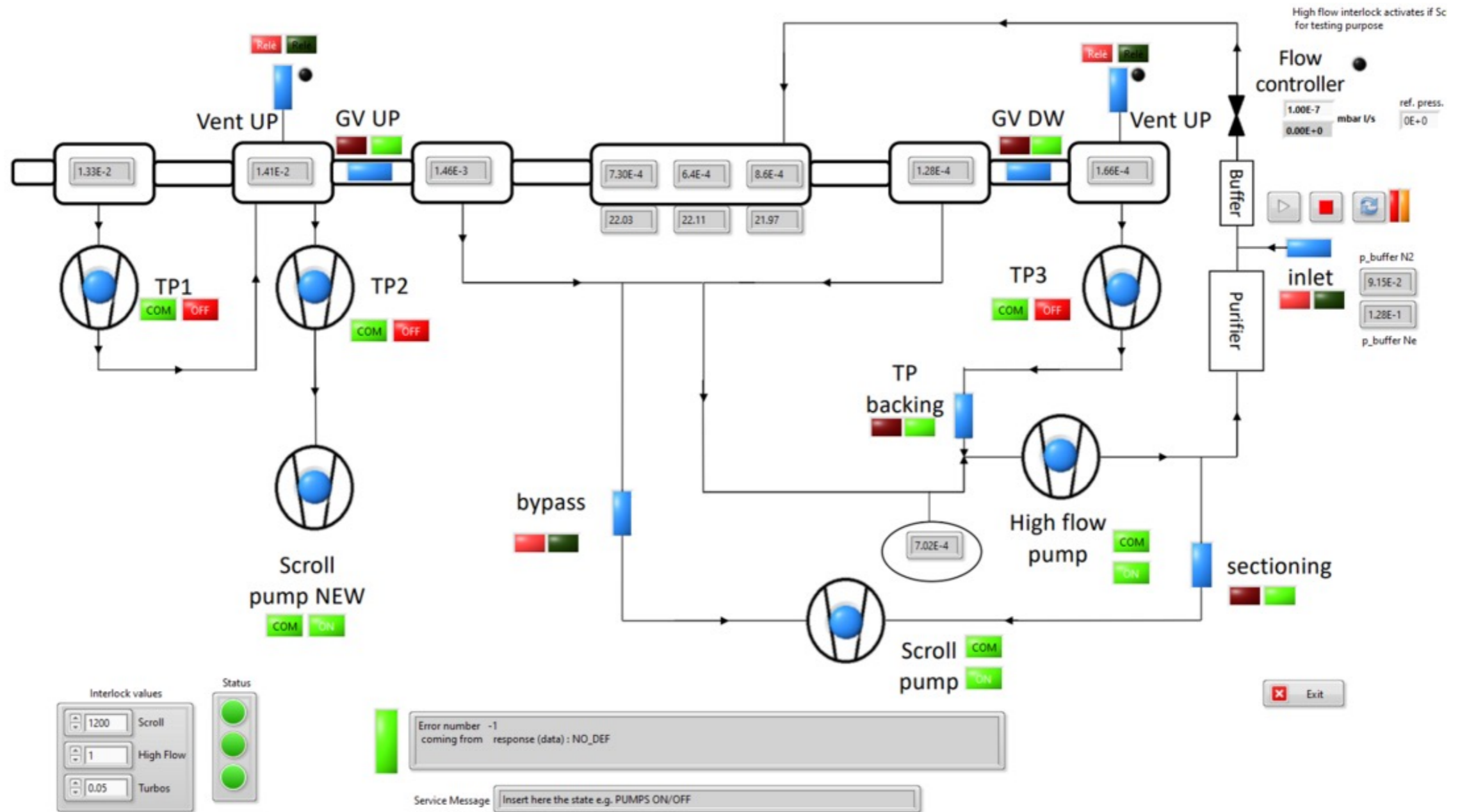


Overview



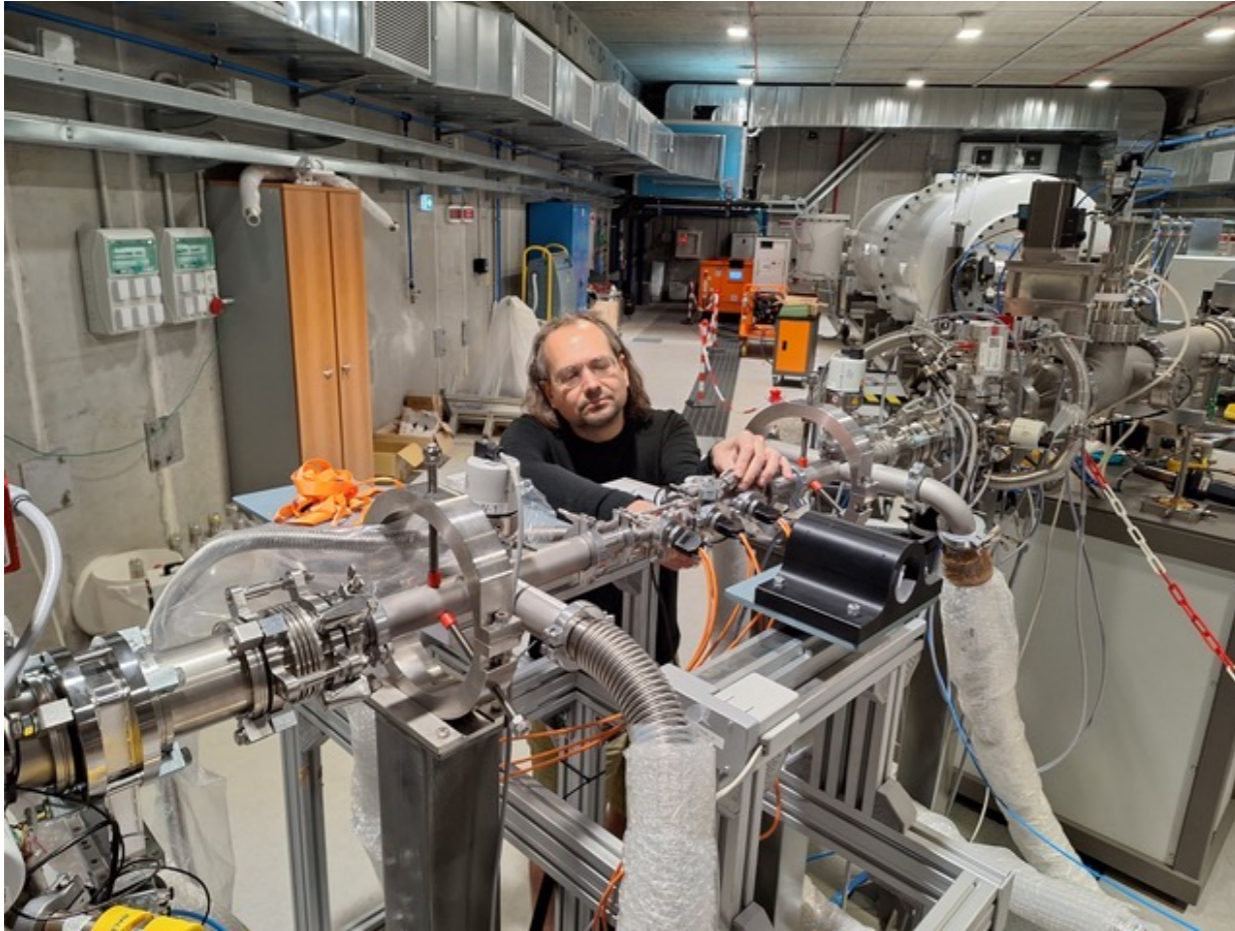
- Need to measure < 1 MeV (threshold at 570 keV)
- Few cts/hour (comparable challenge to $^{13}\text{C}(\alpha, n)$)
- Beam-induced background needs to be monitored
- Extended gas target, detector array with scintillator and ^3He counters
- Scintillator moderates and can give signal on neutron energy
- Digital DAQ, 14 bit 250 MSample/s cards
- Recirculation of ^{22}Ne gas

Gastarget



- 3 pumping stages, pressure < 10 mbar in center
- 3 temperature sensors in central chamber
- Labview control

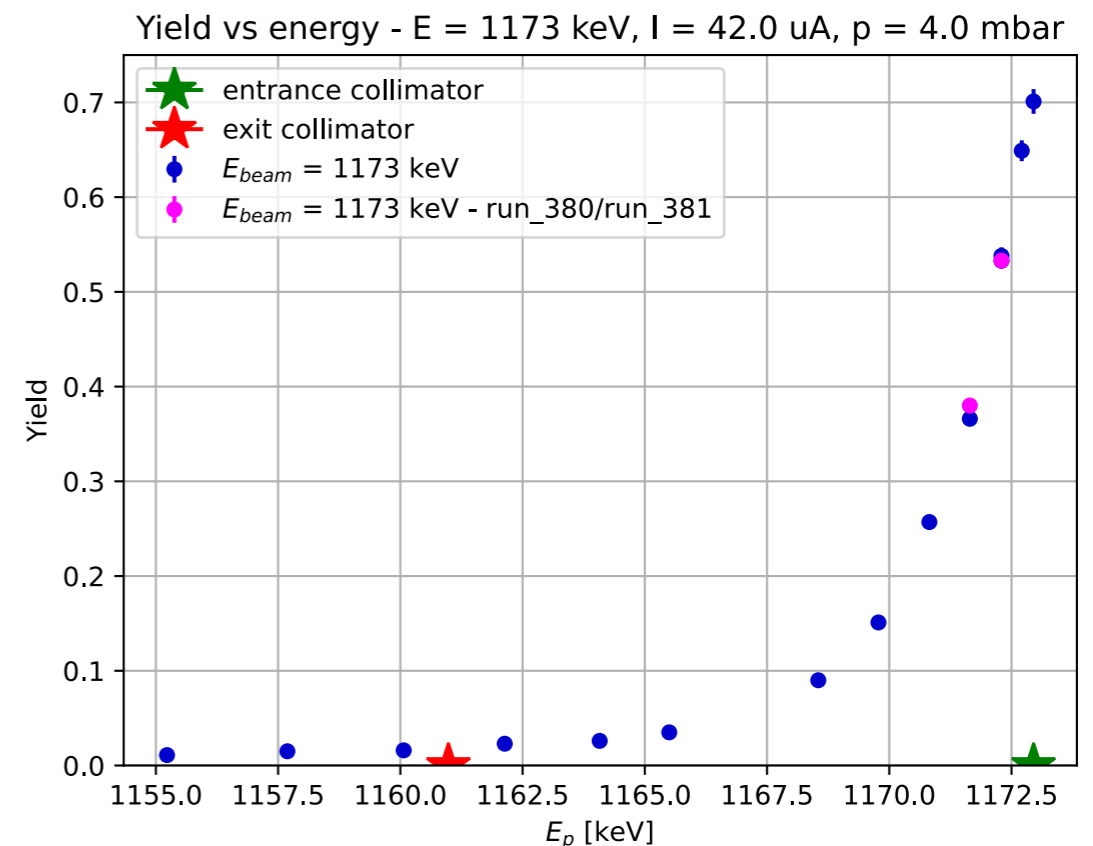
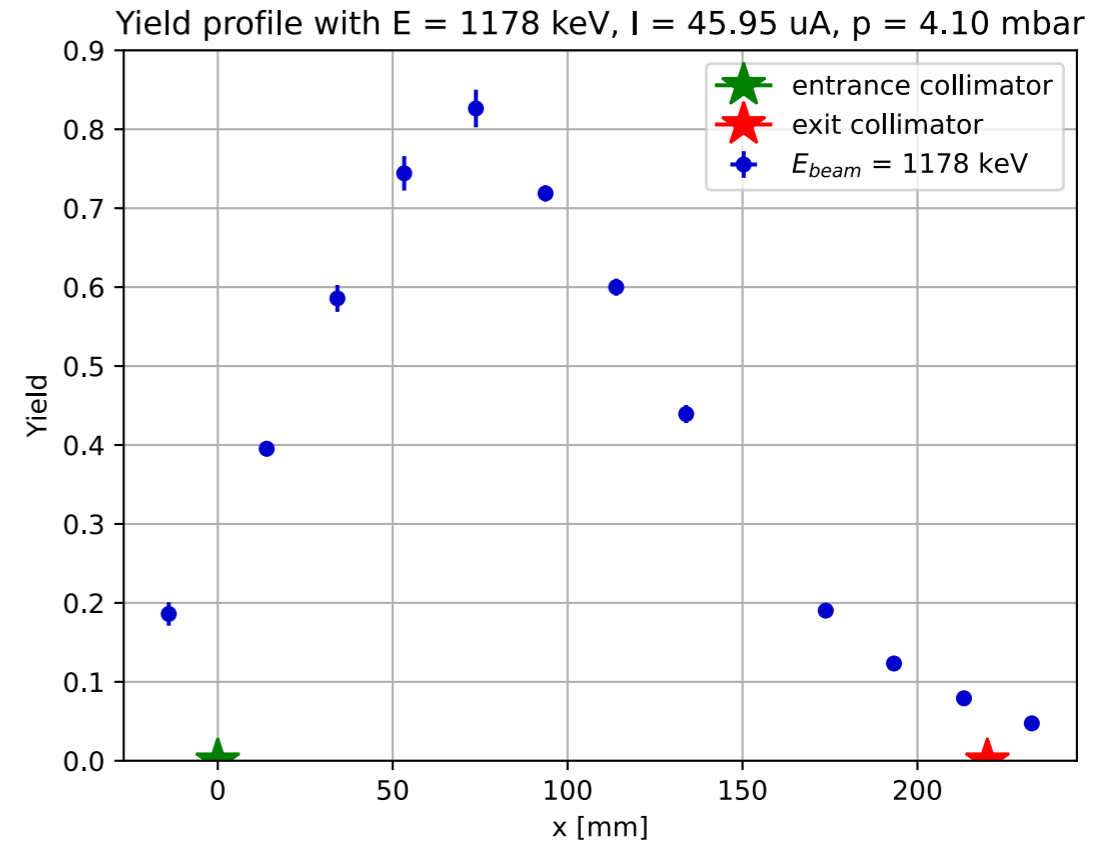
Status



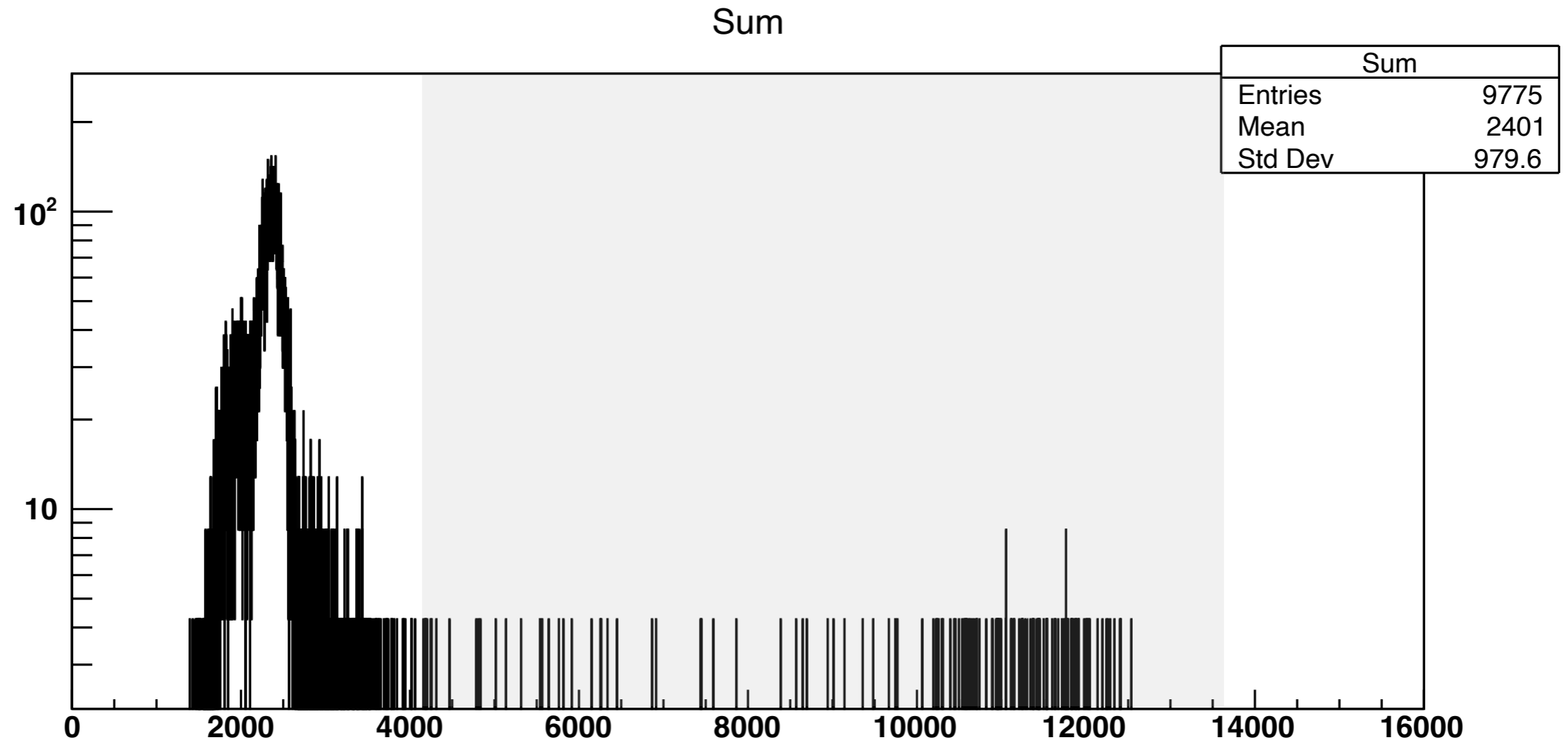
- Beam times Nov/Dec 23 and March 24
- AmBe source in partial array (cables missing)
- Natural neon
- Density profile
- Runs around 830 keV region and 1100 keV
- AmBe source with full array

Example density data

- LaBr detector on moveable table
- Set energy, move detector from up- to downstream
- Repeat...
- Under analysis
- $^{22}\text{Ne}+p$ and $^{14}\text{N}+p$ resonances
- Thesis of M. Vagnoni - Sapienza w. Alba, David also involved



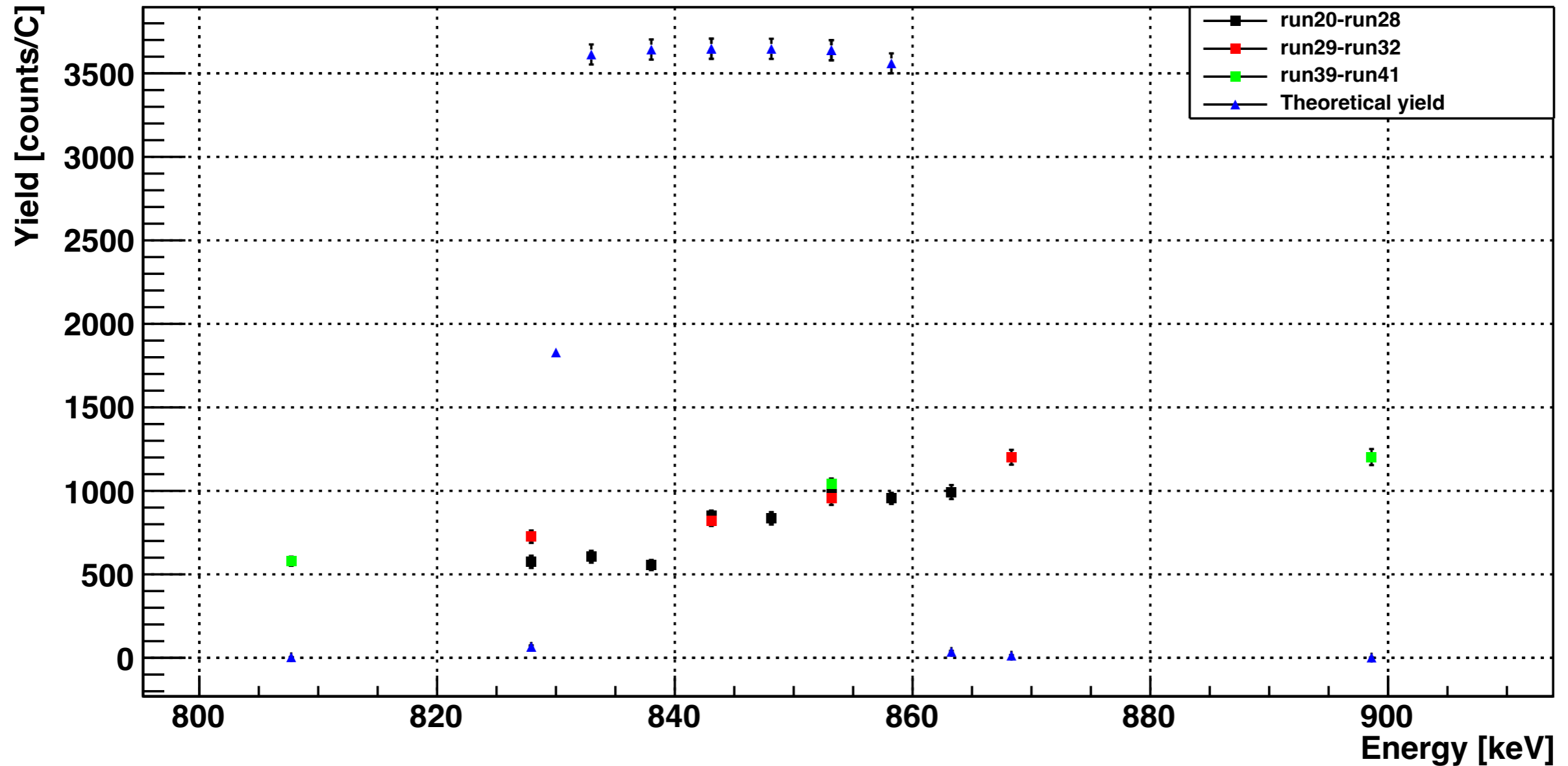
1st Neutron beam time



³He counter spectrum

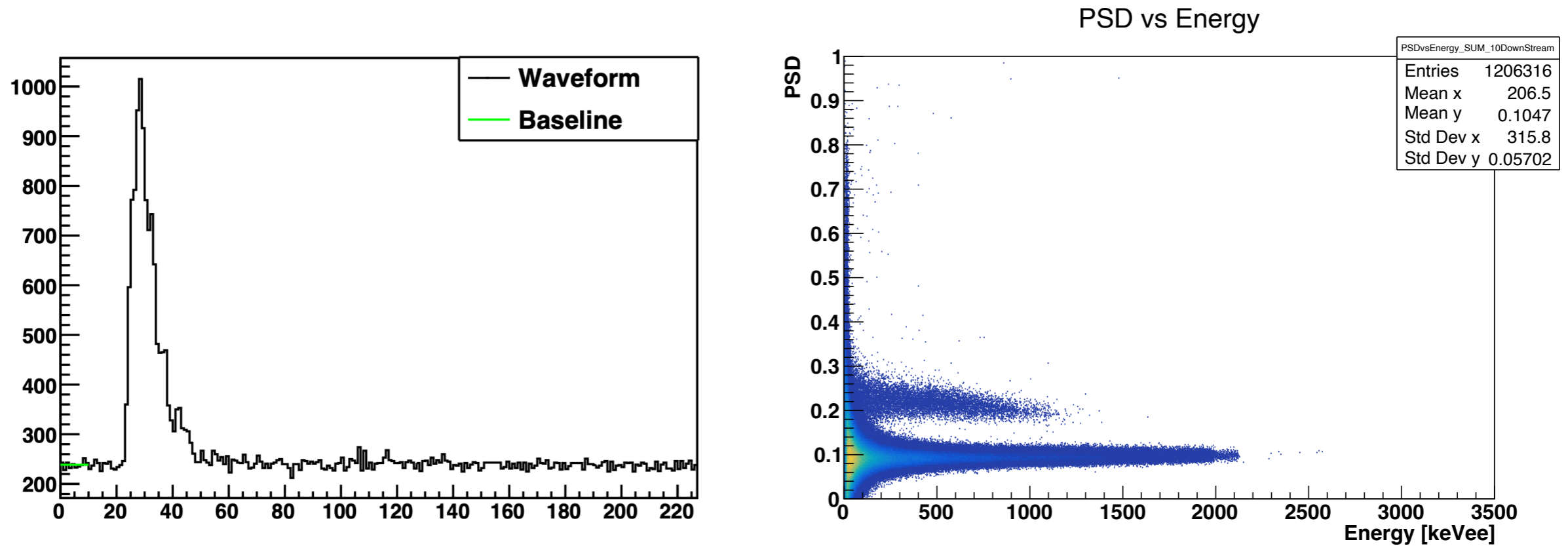
- ³He counters sees thermalized neutrons
- Scanned entire resonance region and 1100 keV for higher neutron yield and beam induced background
- Transmission basically reaches 100% without gas

Yield



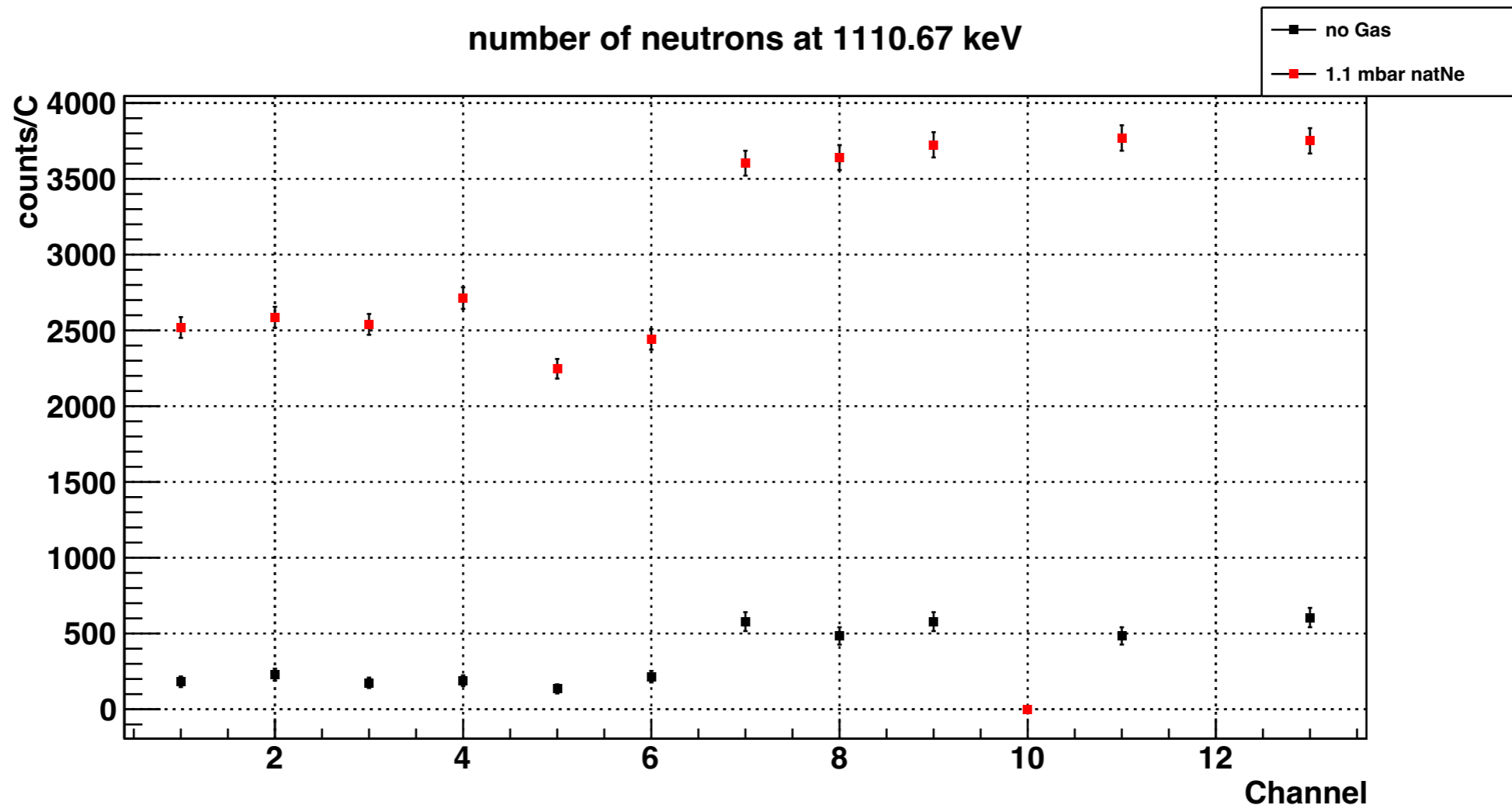
- Reminder: res. Energy 832 keV
- Thickness ca. 30 keV
- We see no resonance structure at all, but neutrons *headscratch*

Scintillators



- Good thing there are also scintillators
- Up/downstream asymmetry?
- Energy of neutrons?
- Yield shows similar behaviour as in ^3He counters

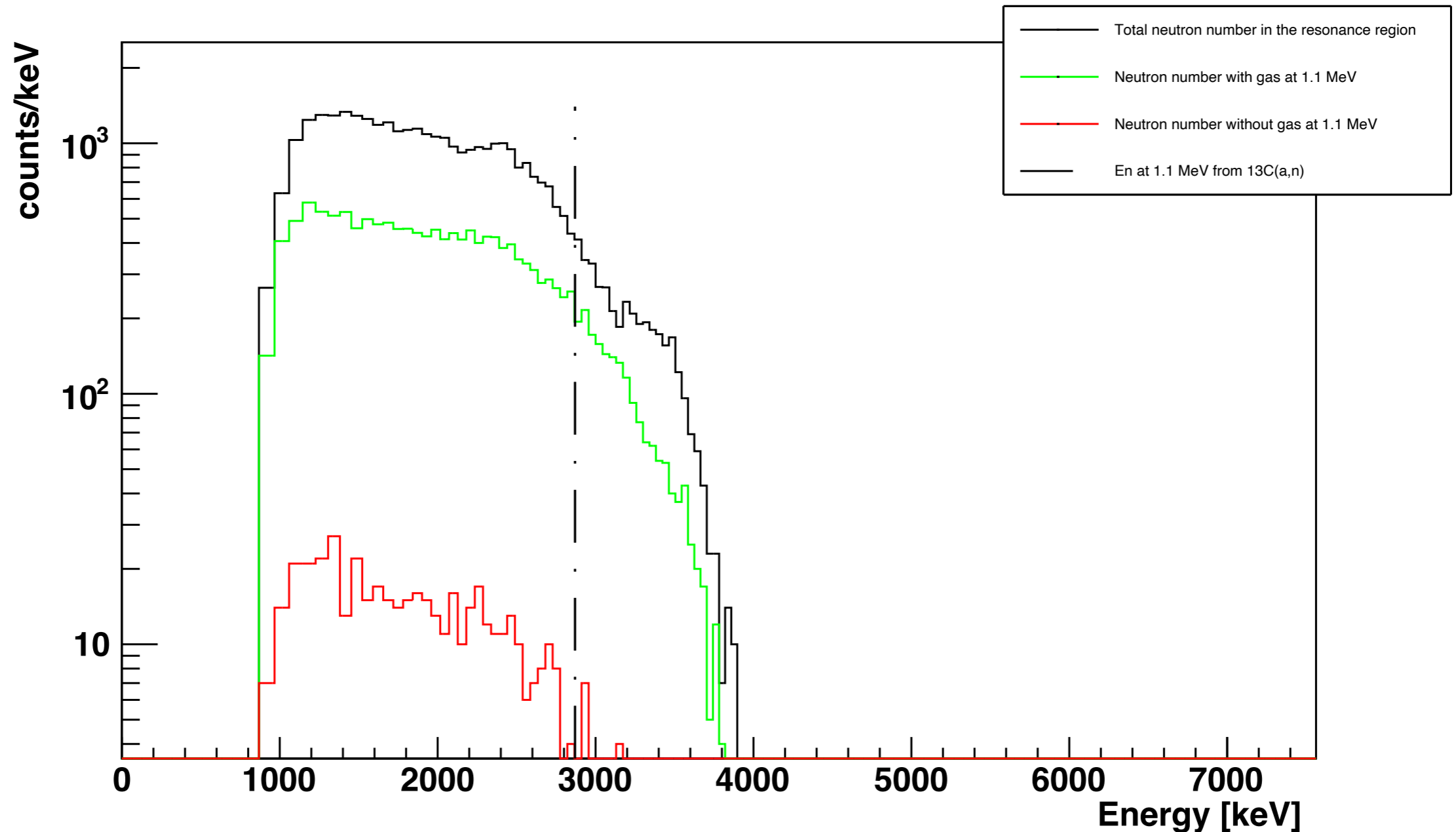
Up/down



Run	Upstream	Downstream	D/U
9 (without gas)	1123	2730	~2.4
10 (1.1 mbar natNe)	15046	18488	~1.2

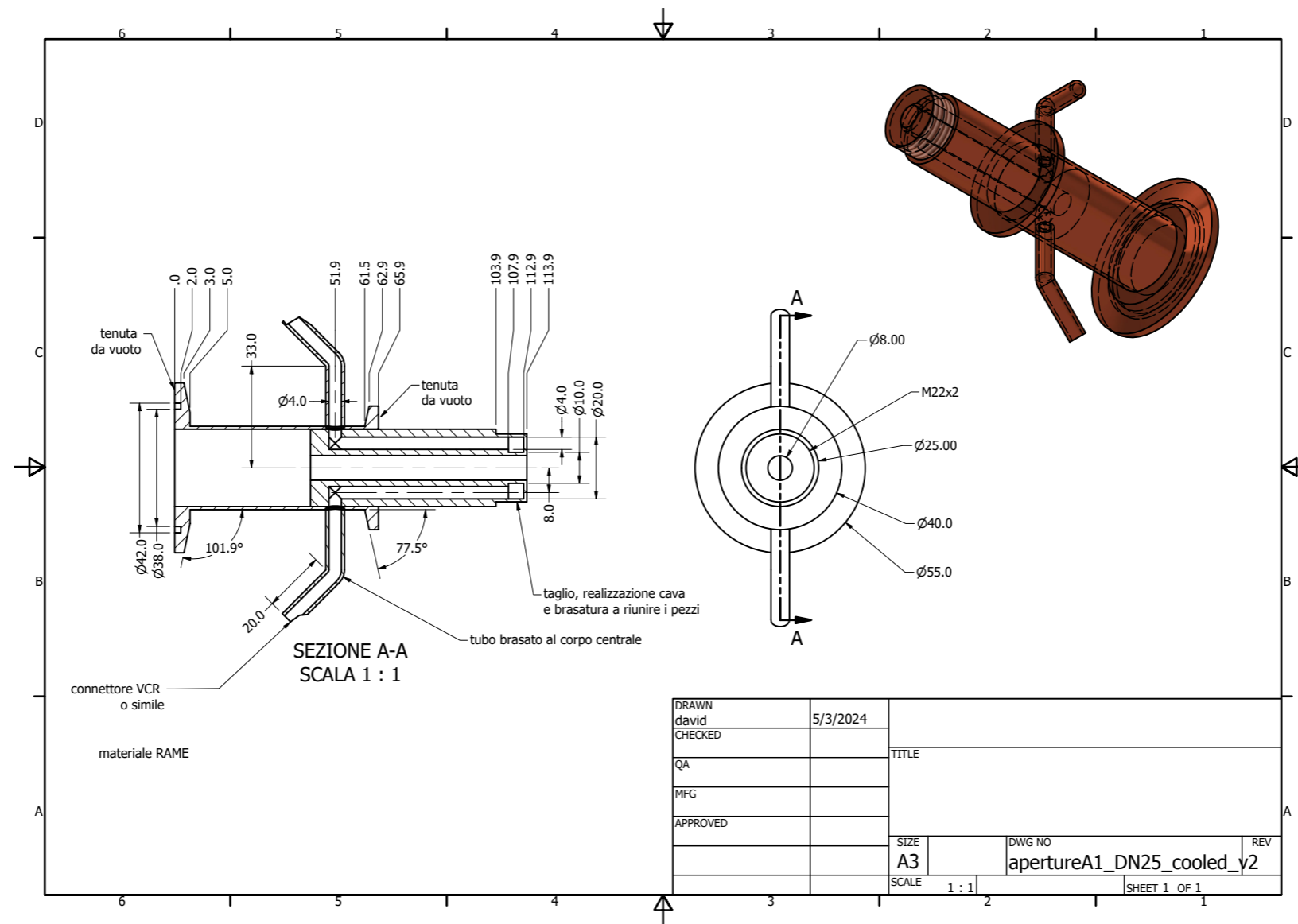
- Always more counts in downstream half – more pronounced without gas
- Hypothesis: $^{13}\text{C}(\alpha, n)$, with gas straggled beam on 1st collimator, w/out gas beamstop or other downstream source

Energy



- $^{13}\text{C}(a,n)$ Q value 2.2 MeV + c.m. E 840 = 3 MeV
- Under Geant investigation if low E fully due to this or other sources
- Higher E yet unclear where from

1st ds Collimator



- 1st downstream collimator sits at end of gas target – straggled beam hits
- There's a steel screw holding a Ta backing on front – steel contains carbon
- Straggled beam created background and heats up collimator too much
- New cooled collimator w/out any exposed steel designed, ordered

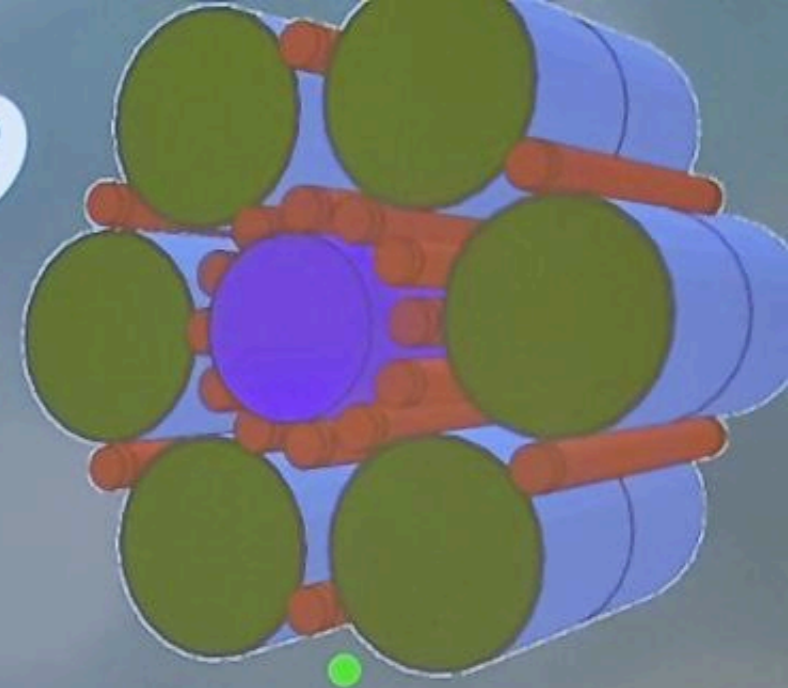
To-do

- Silicon detector was sitting in wrong feedthrough, new one to be installed and tested (to arrive this week)
- Synchronisation ^3He -EJ301 was faulty – cables now checked and tested with AmBe source
- Collimator to be installed
- Beam-induced background measurement <- **Critical as soon as possible**
- New members M. Vagnoni (Sapienza magistrale), T. Chillery, Shades-LNGS postdoc

Next beamtime

- Assuming BIB solved
- Beam heating with final setup
- Scrubber and ^{22}Ne circulation
- 832 keV
- ...
- Presumably Nov/Dec Irena visiting student 4 wks

Characterization of EJ-309 liquid scintillators for the SHADES* experiment



By : **Chemseddine ANANNA**

Supervisors: Gianluca, IMBRIANI
Andreas, BEST

$e(\alpha,n)^{25}\text{Mg}$ direct measurement.

