Experiment S323:
β-Decay of very neutron-rich Rh, Pd, Ag nuclei including the r-process waiting point ^{128}Pd

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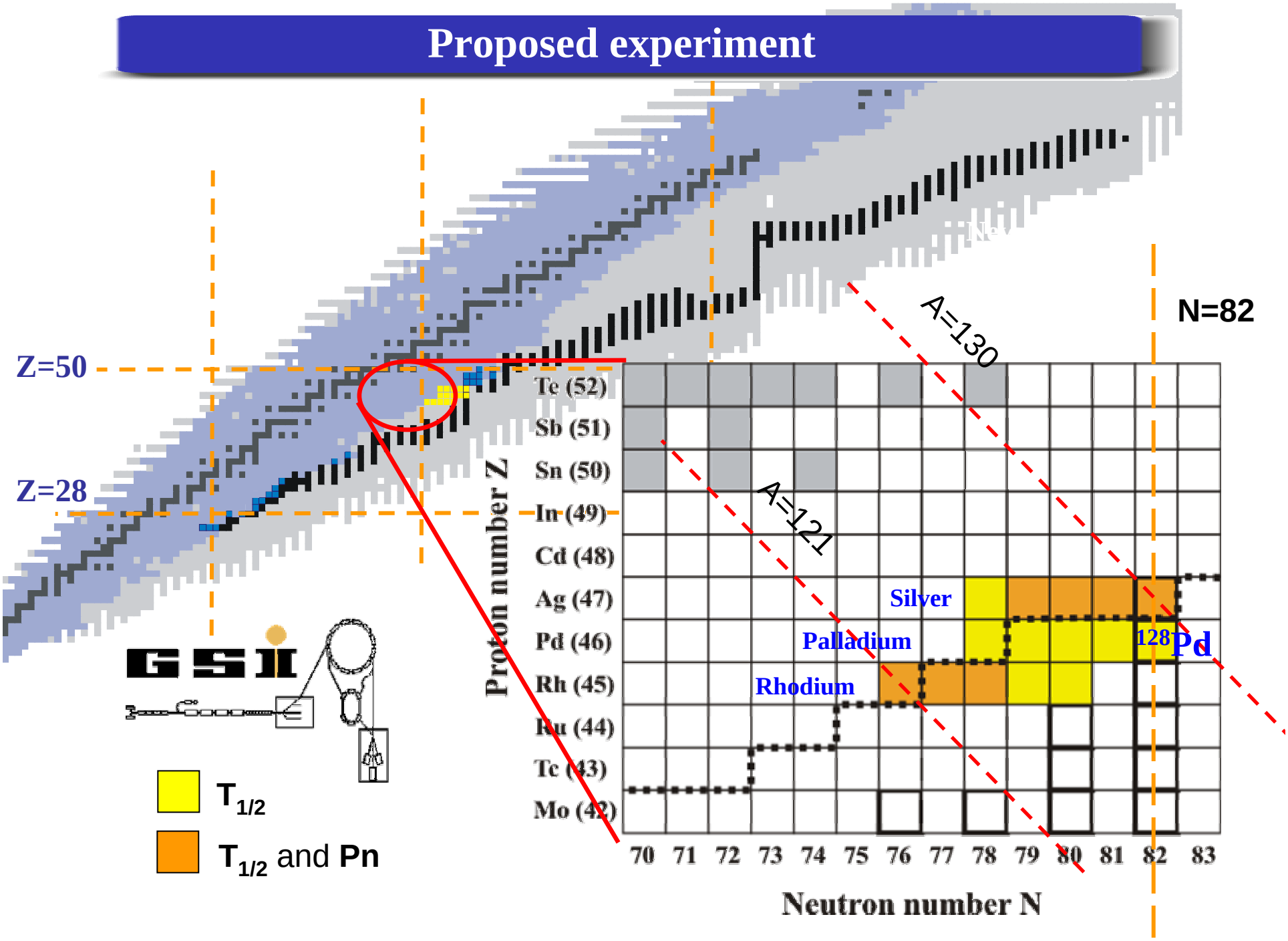
- Year of Approval: 2006

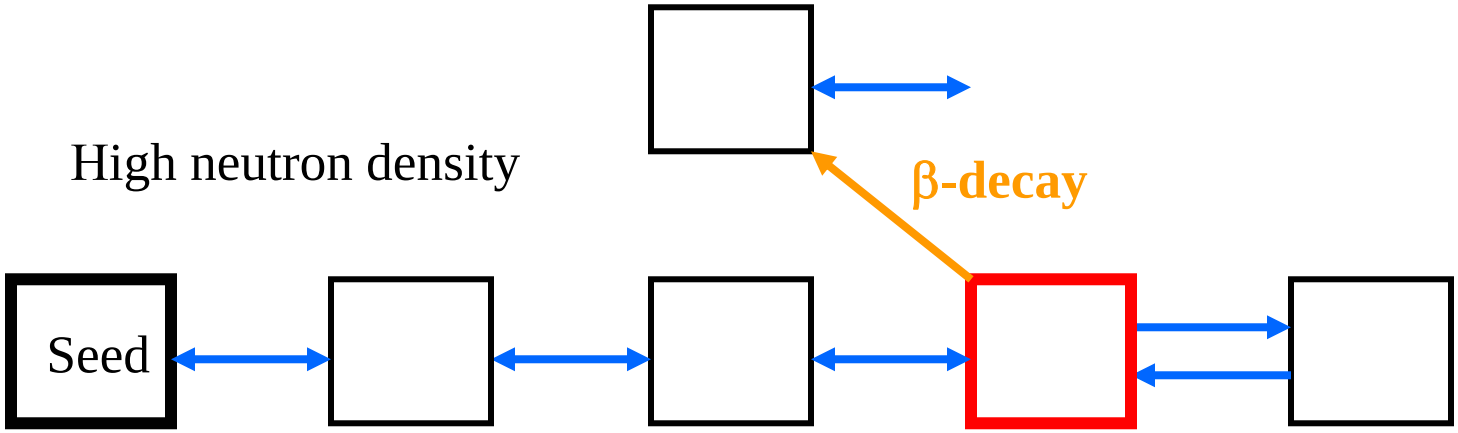
- Beamtime: 8 days approved (6 main + 2 parasitic)
  0 used

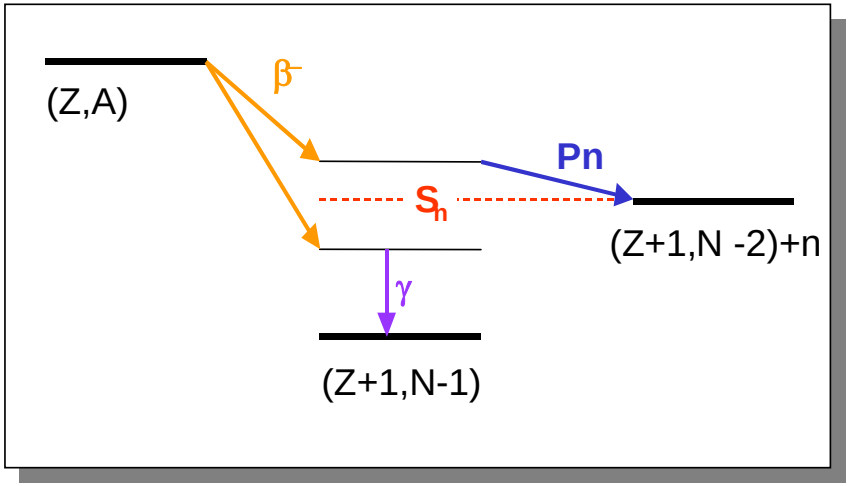
Proposed experiment



r-process and β-delayed neutron emission branchings

Element formation beyond iron involving rapid neutron capture and radioactive decay



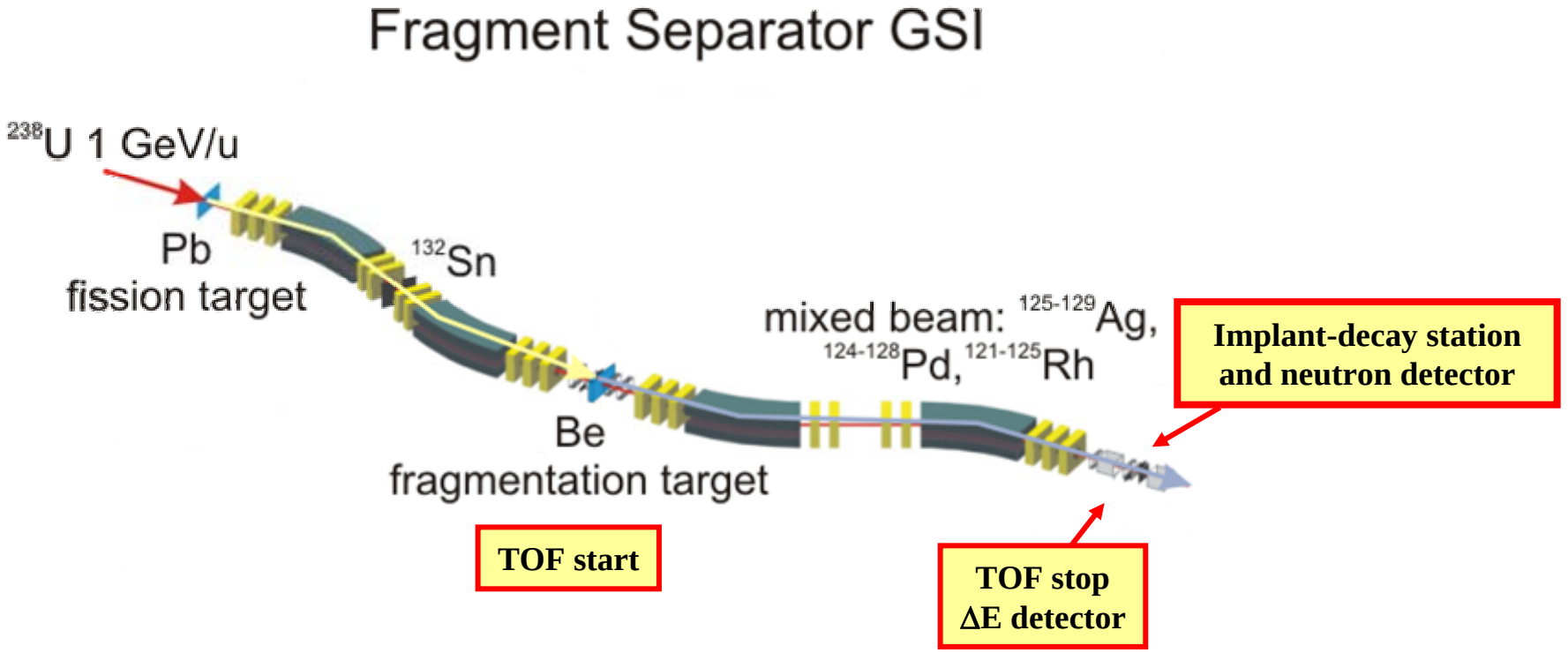


Waiting point
(n,γ)-(γ-n) equilibrium

Motivation

1. β-delayed neutron emission probabilites (Pn) are direct inputs in r-process calculations: set abundances in the important A=115-125 region
2. ^{128}Pd is first bottleneck isotope of the N=82 abundance peak (sets timescale for following nucleosynthesis)
3. ^{128}Pd half-life affects predictions of Th, U cosmochronometers in ultra-metal poor stars
4. Both half-lives and Pn values are rough indicators of nuclear structure (reliable extrapolations to more exotic nuclei)

Experimental setup



Some simulated numbers for $2 \cdot 10^9$ ^{238}U/spill :

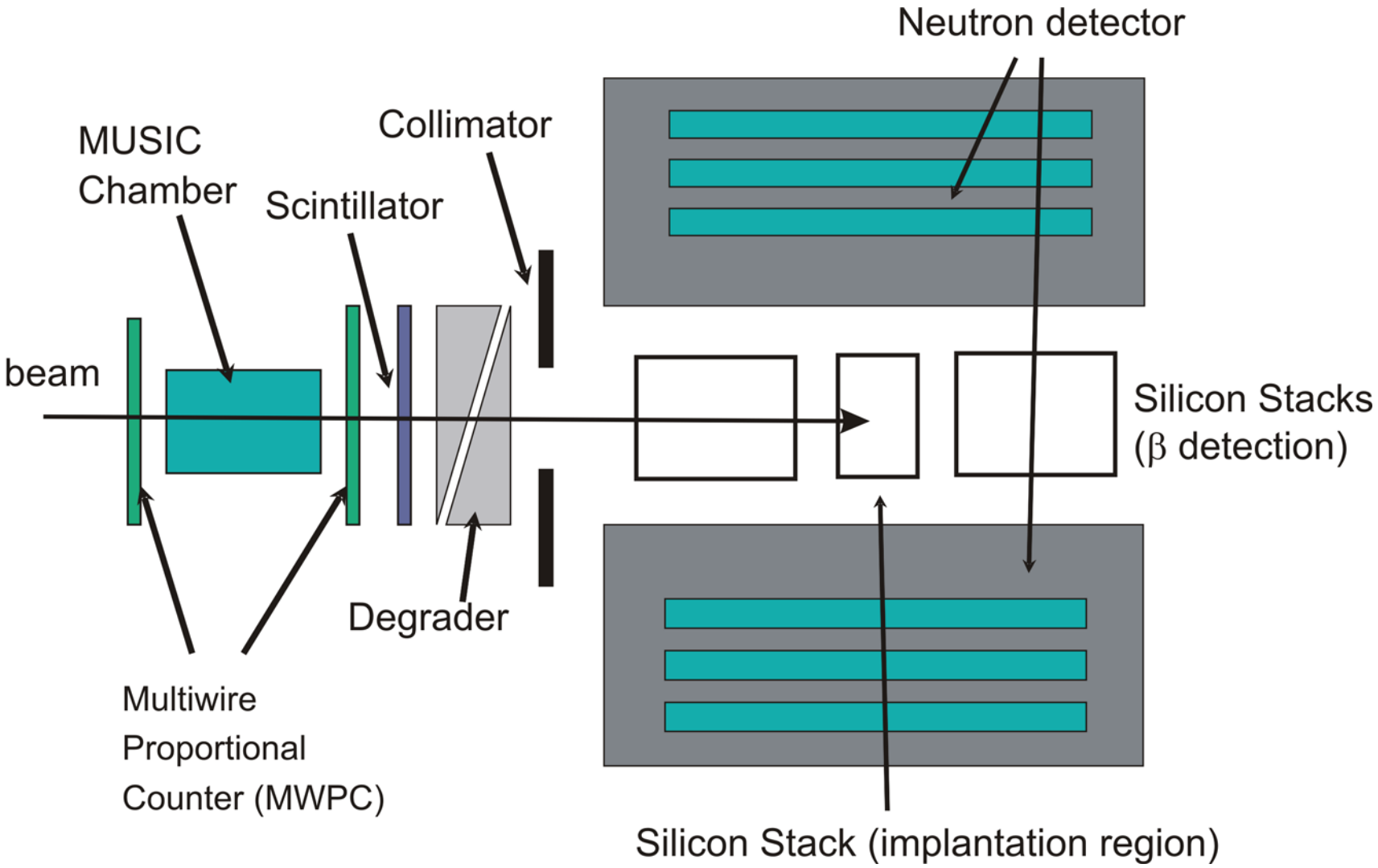
Transmission to S2 ~ 8%

Transmission S2-S4 ~ 40%

10^4 ions/spill ^{132}Sn

total implantation rate ~10 ions/s

Implant-decay station at S4 and neutron detector



Neutron detector

Beam time request

Parasitic beam time	
projectile	beamtime
^{136}Xe(1AGeV)	2days

Main beam time			
projectile	1st FRS section	2nd FRS section	beamtime
^{238}U(1AGeV)	FRS calibrations		1day
^{238}U(1AGeV)	^{132}Sn	cocktailbeam	5days

Total requested beam time	
main beam time ^{238}U	6days
parasitic beam time ^{136}Xe	2days

We request beamtime any time after July 2008