

# R-process experiments at the National Superconducting Cyclotron Laboratory

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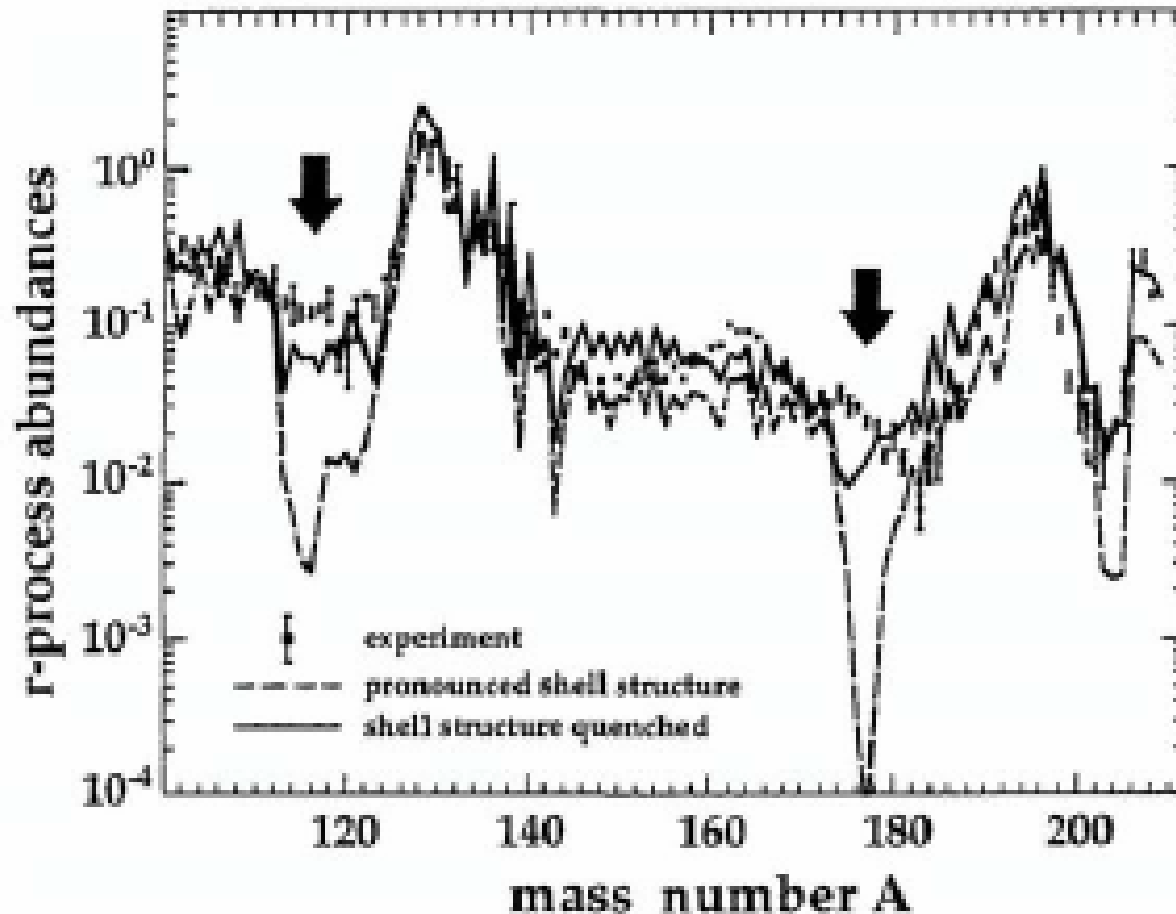




Models aimed to reproduce the observed r-process abundances are sensitive to:

- astrophysical conditions
- the nuclear properties of the neutron-rich nuclei involved in the process
  - Masses of nuclei near the drip line
  - $\beta$ -decay-properties
    - »  $\beta$ -decay-half lives
    - »  $\beta$ -delayed neutron emission probabilities

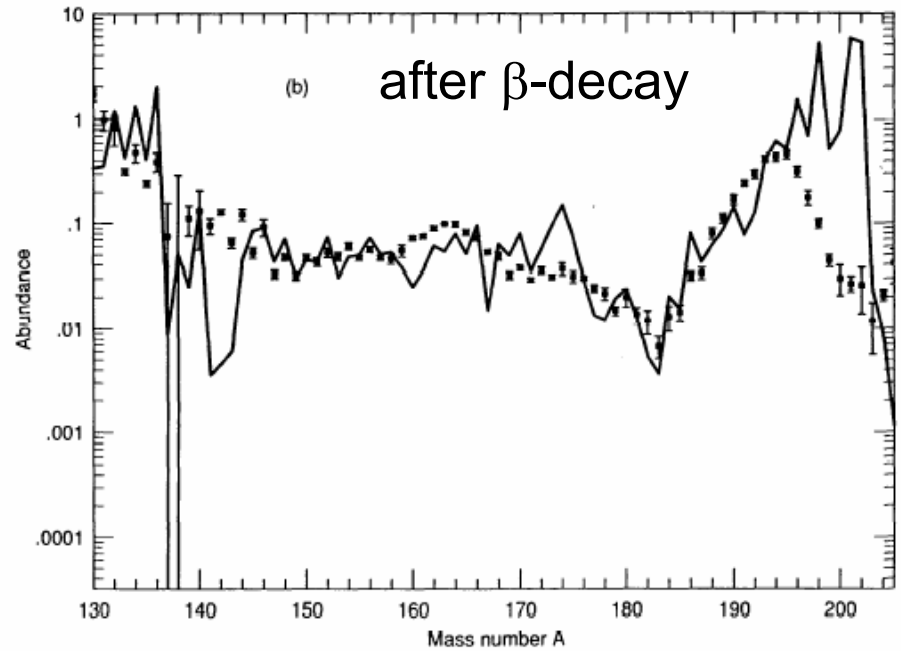
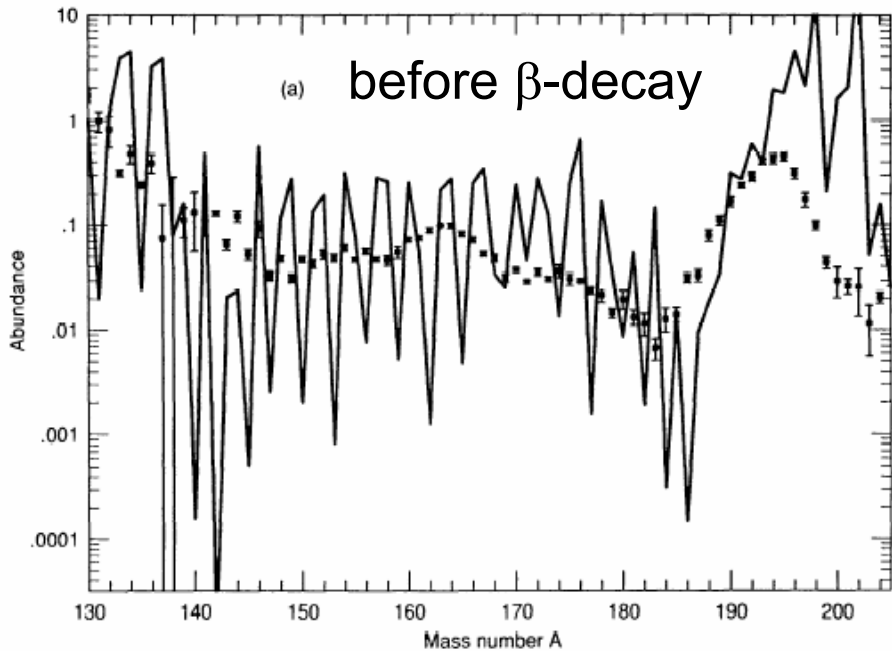
# Effect of shell quenching



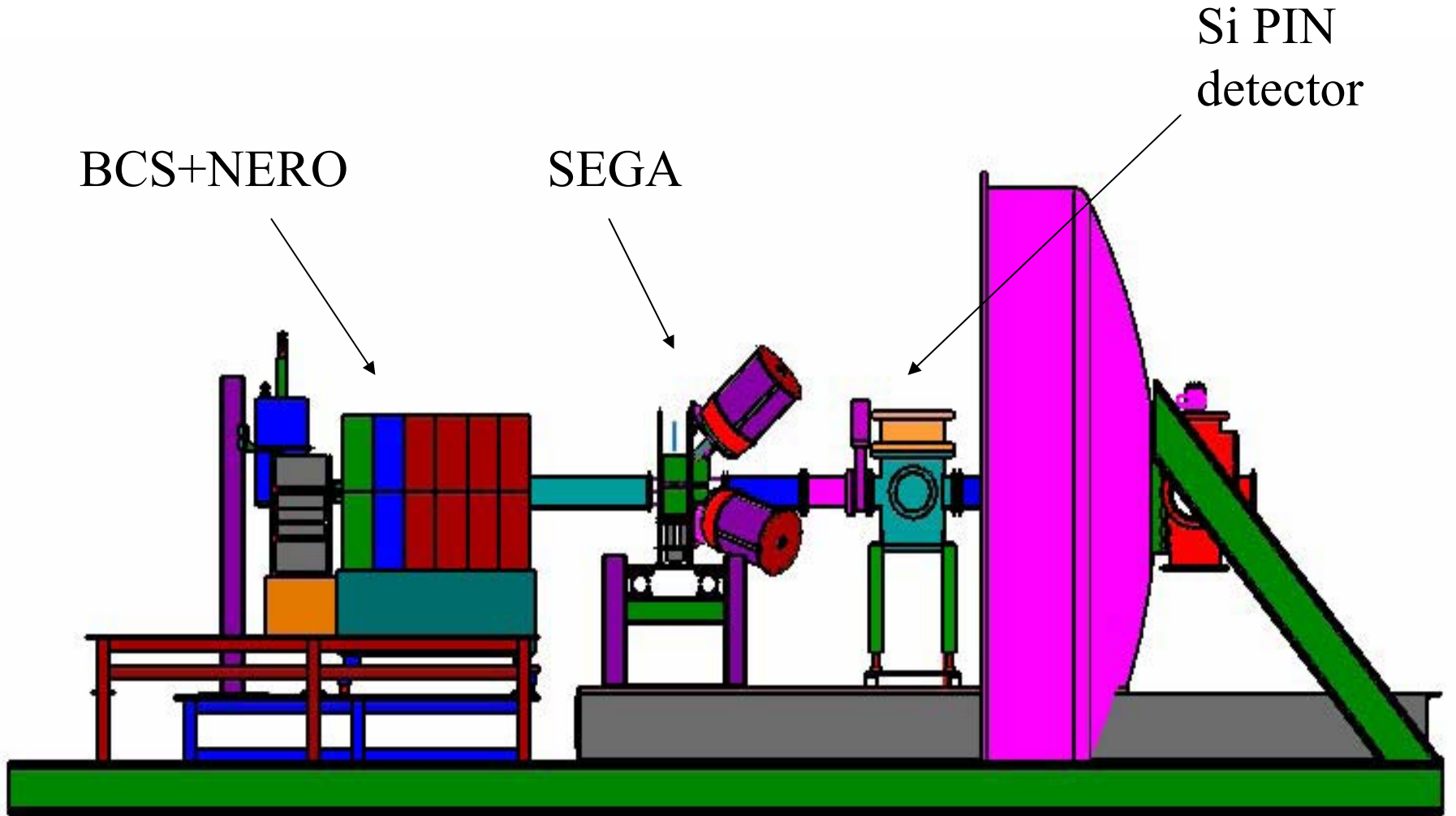


# Effect of $\beta$ -delayed neutron emission probabilities

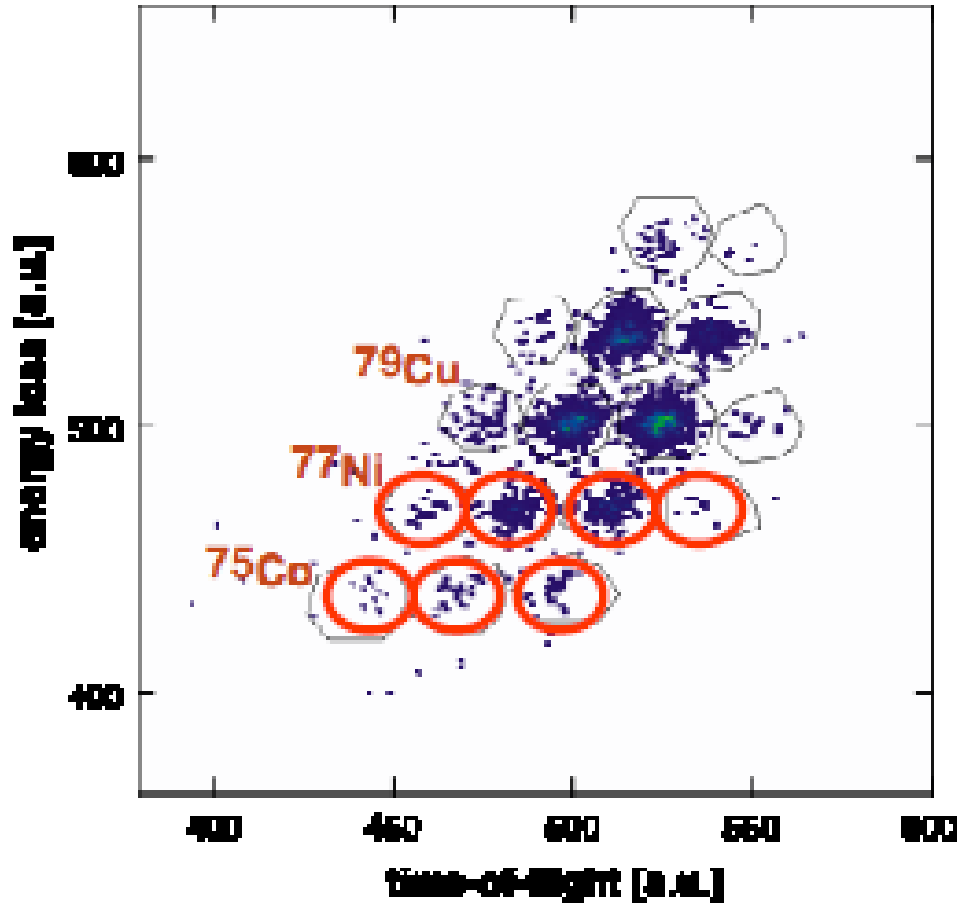
Calculated r-process production of elements  
(Kratz et al. ApJ 403 (1993) 216):



# Implantation set up

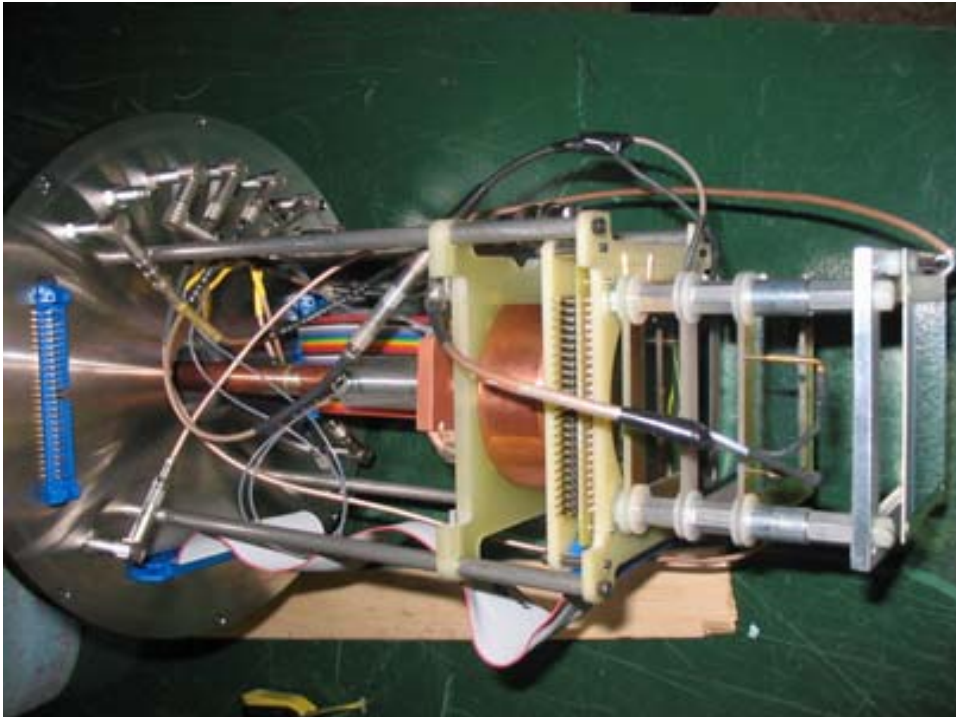


# Particle Identification

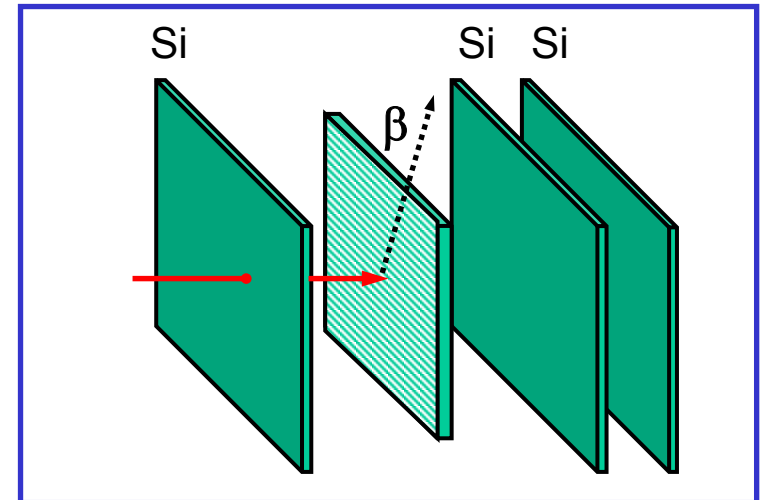


Transmitted species are identified according to their position in the particle-ID matrix with respect of nuclei of reference

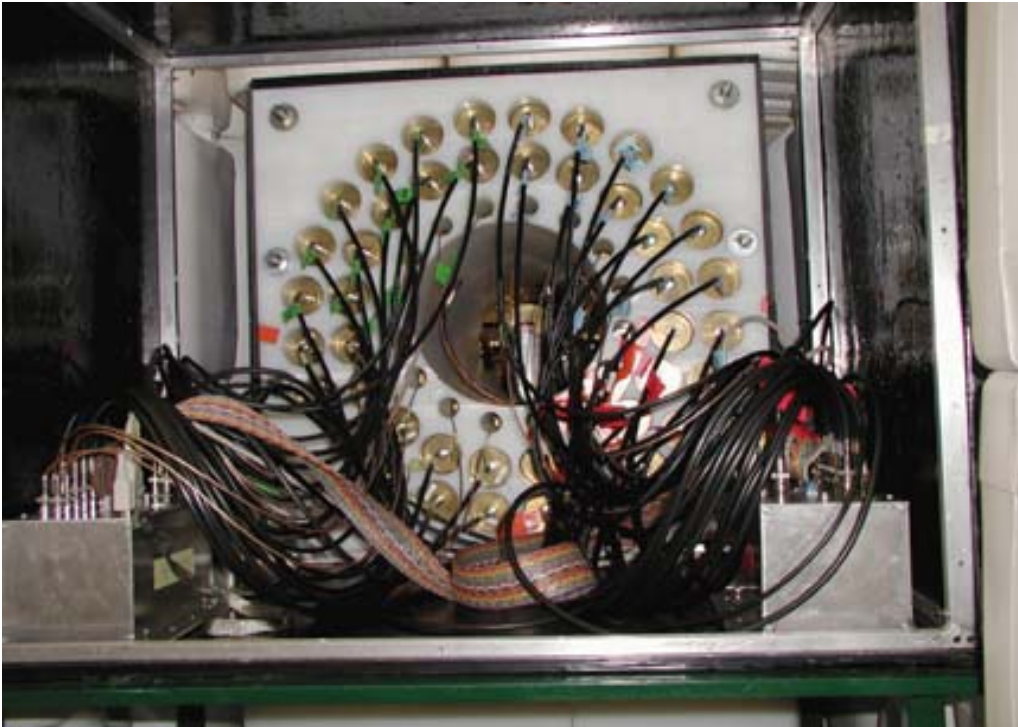
# Beta Counting System



- 4 cm x 4 cm active area
- 1 mm thick
- 40-strip pitch in x and y dimensions -> 1600 pixels



# Neutron Emission Ratio Observer



## Specifications:

- 60 counters total (16  $^3\text{He}$  , 44  $\text{BF}_3$ )

- 60 cm x 60 cm x 80 cm

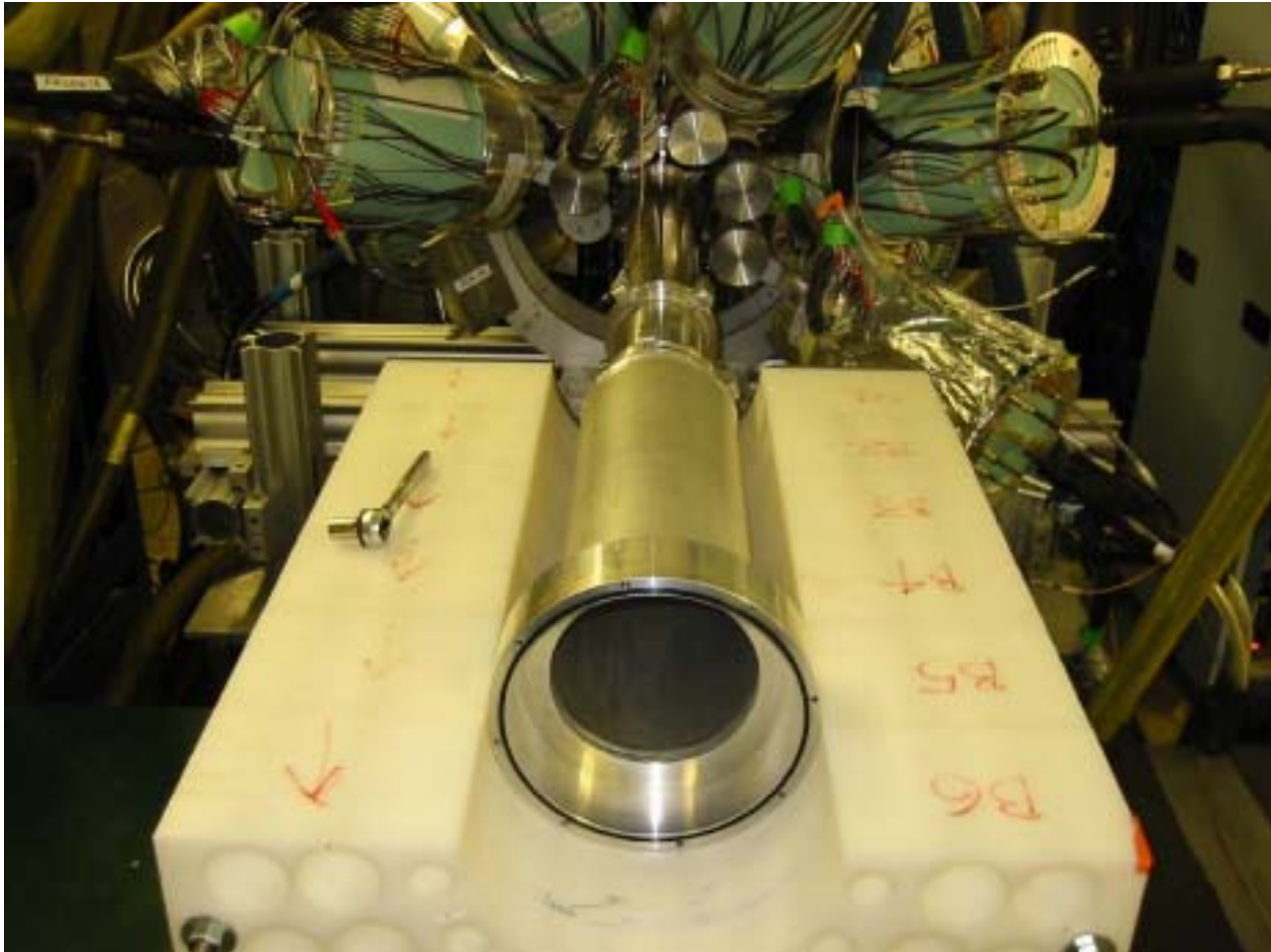
polyethylene block

- Extensive exterior shielding

- 45% total neutron efficiency



# BCS + NERO



# Half-lives

