

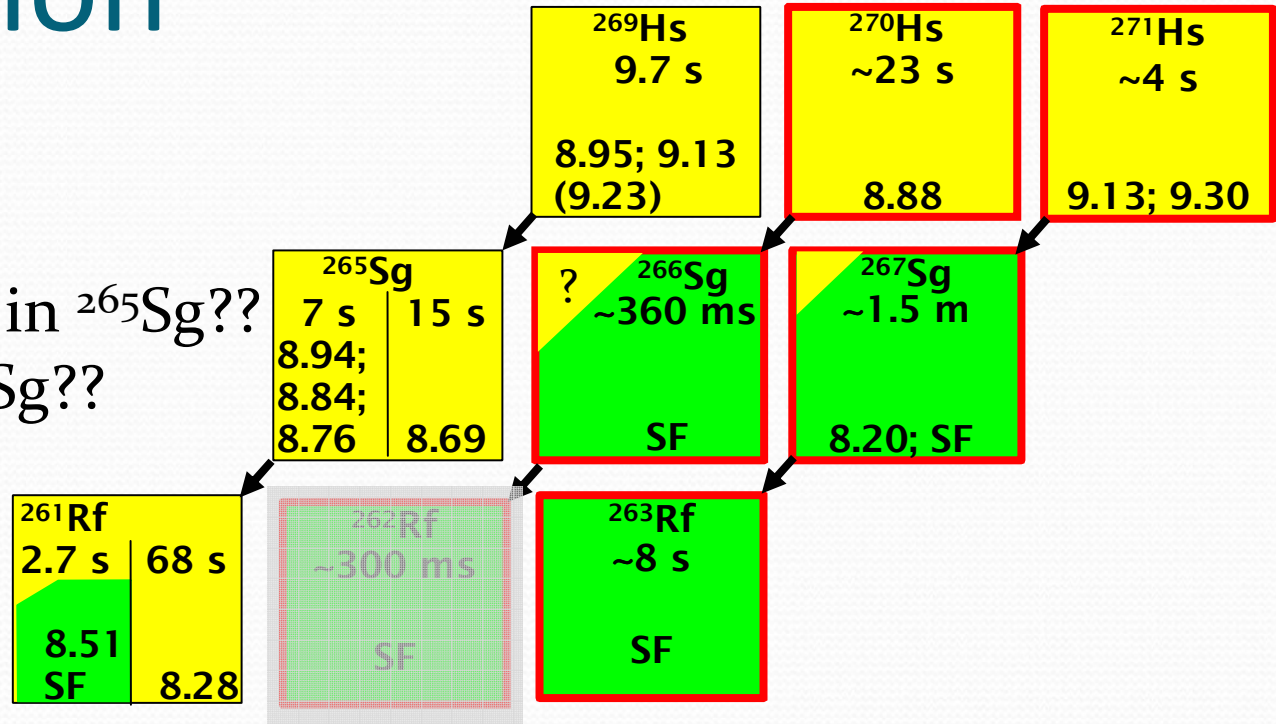
Hassium spectroscopy experiments at TASCA

Alexander Yakushev /RCM TU München/

for GSI-TUM-Uni Mainz-Uni Oslo-
Uni Lund-LBNL-FLNR-..... collaboration

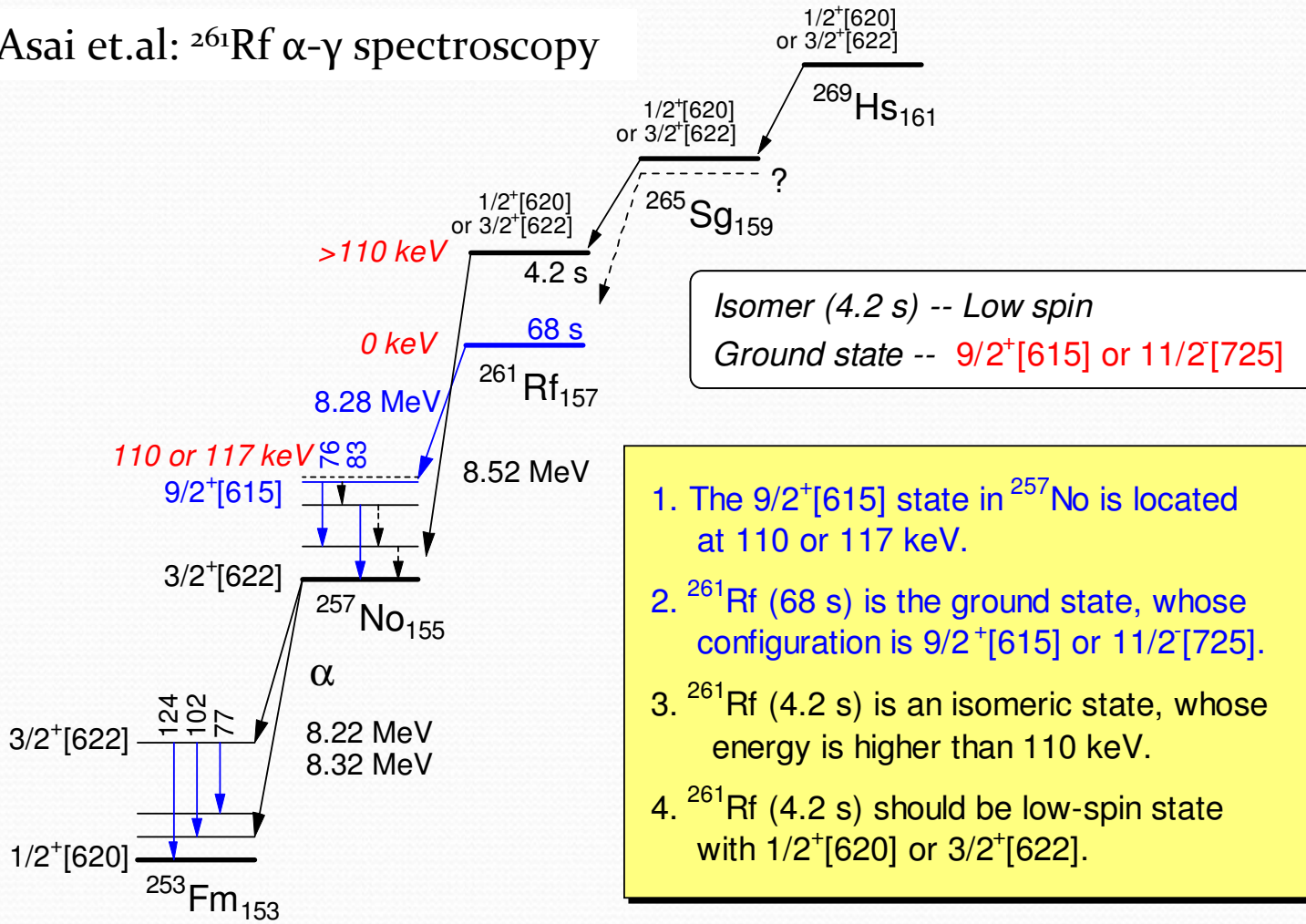
Motivation

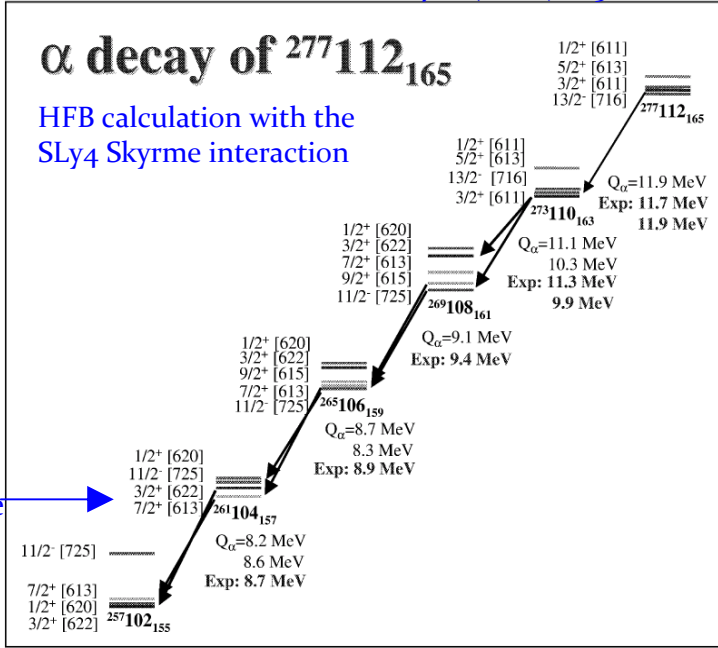
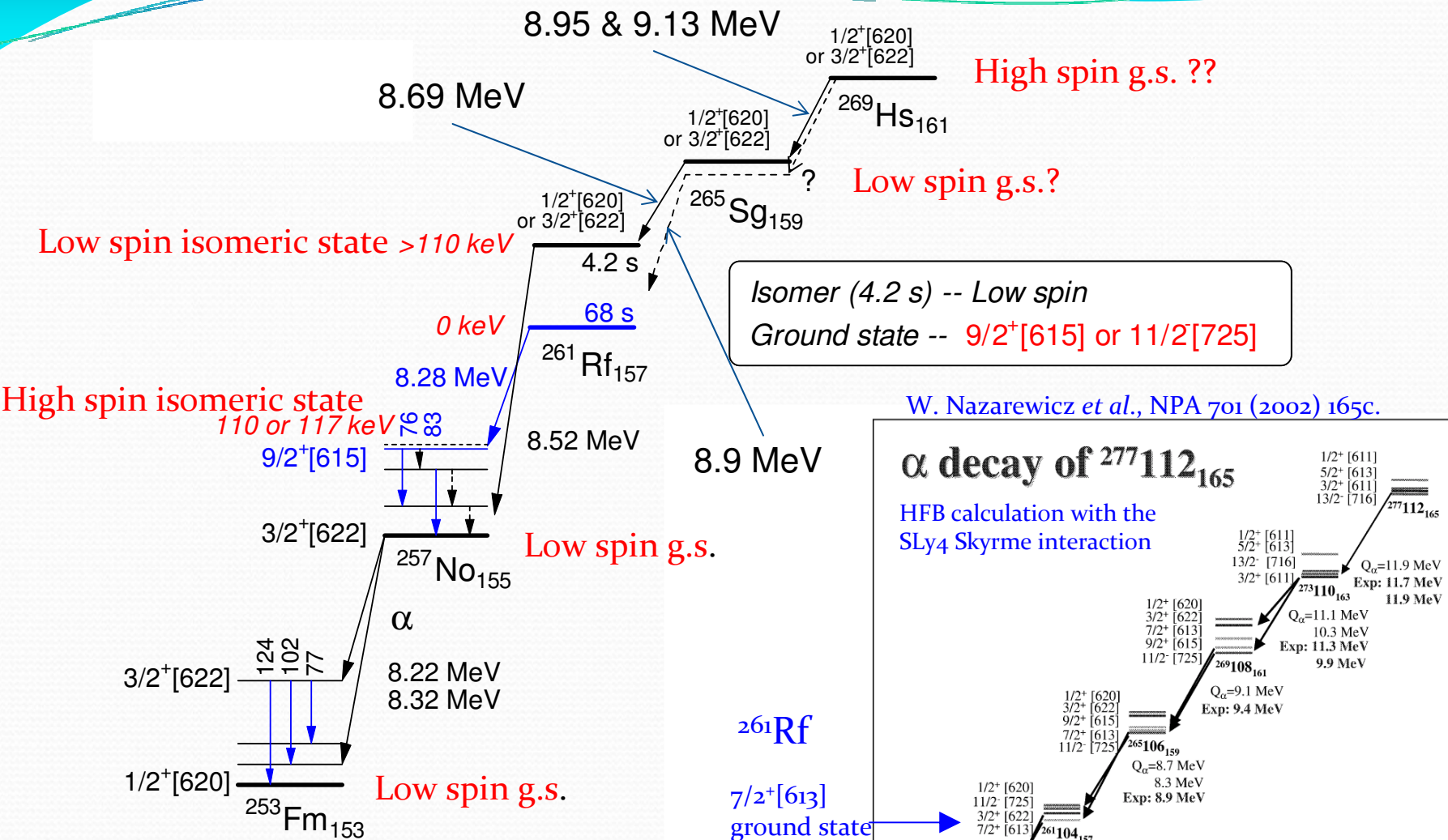
Isomeric state in ^{265}Sg ??
 α branch in ^{266}Sg ??



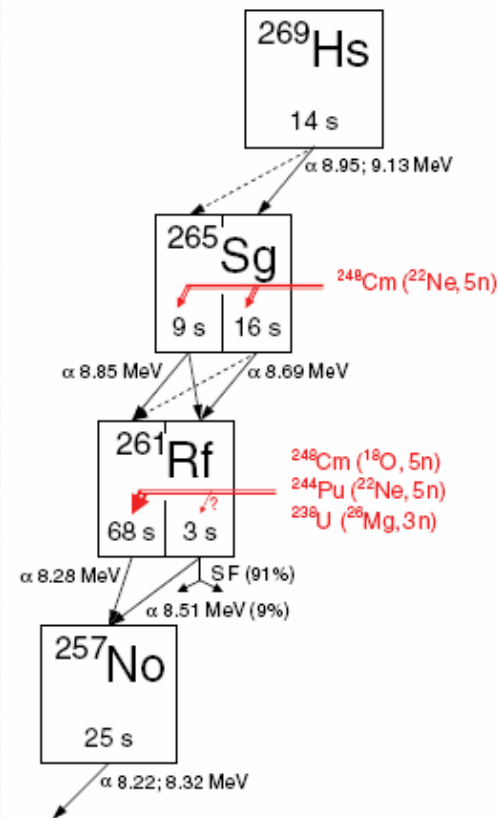
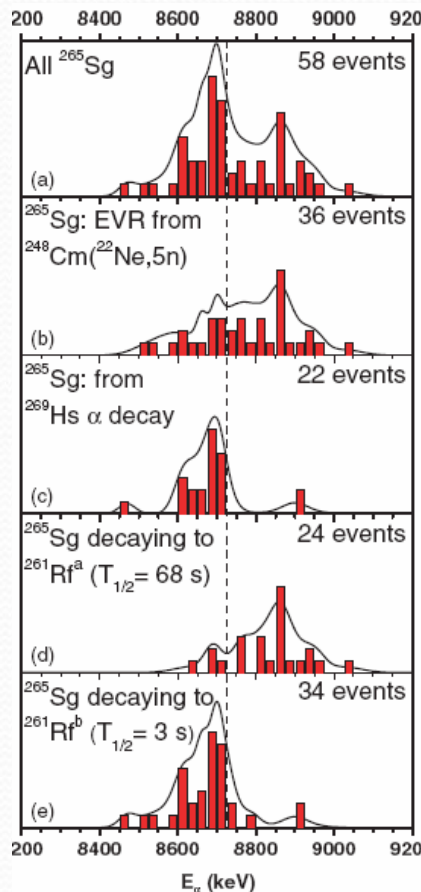
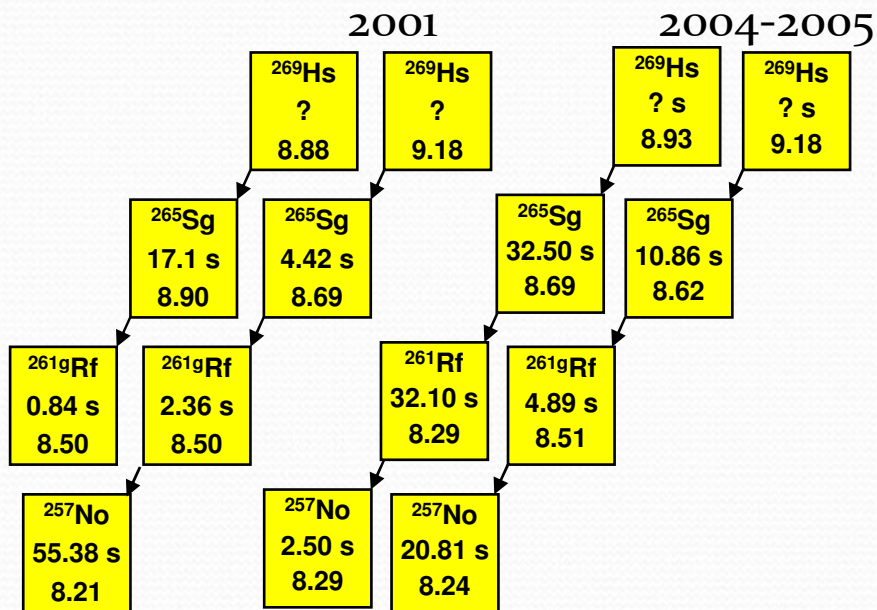
Isomeric state in ^{261}Rf !

Asai et.al: ^{261}Rf α - γ spectroscopy





Does ^{265}Sg have an isomeric state?



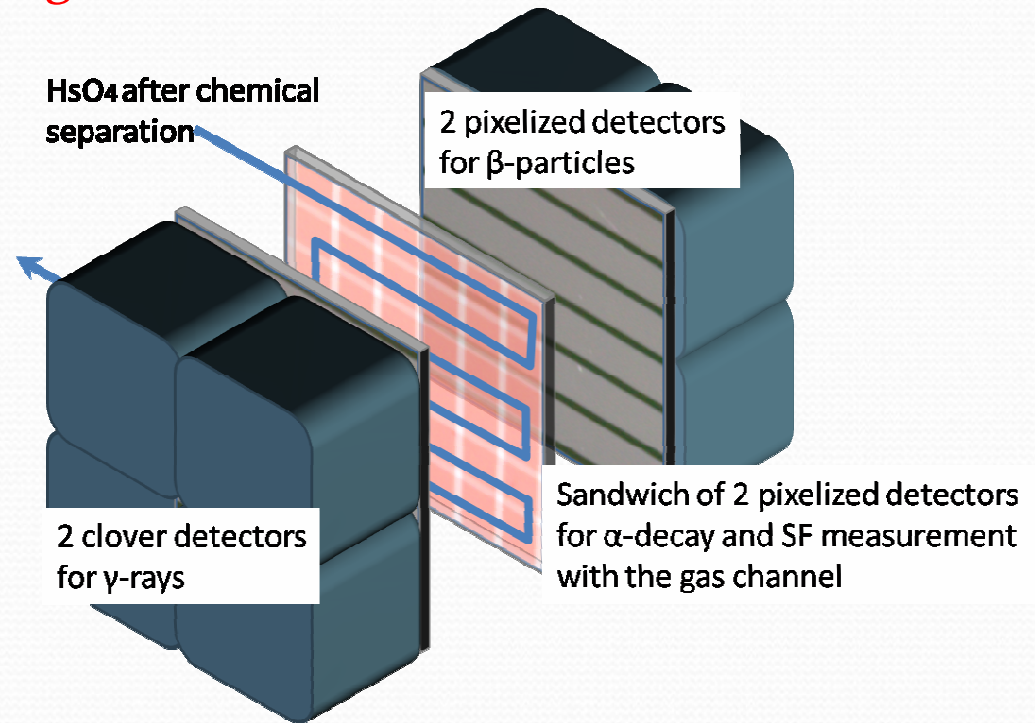
Ch. E. Düllmann and A. Türler
 Phys. Rev. C **77**, 064320 (2008)

Decay spectroscopy after chemical separation

TASCA + Hs chemistry allow background free measurement!

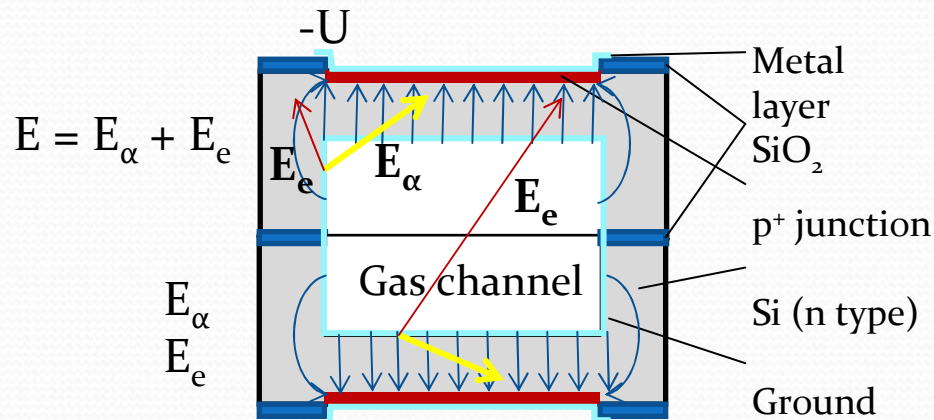
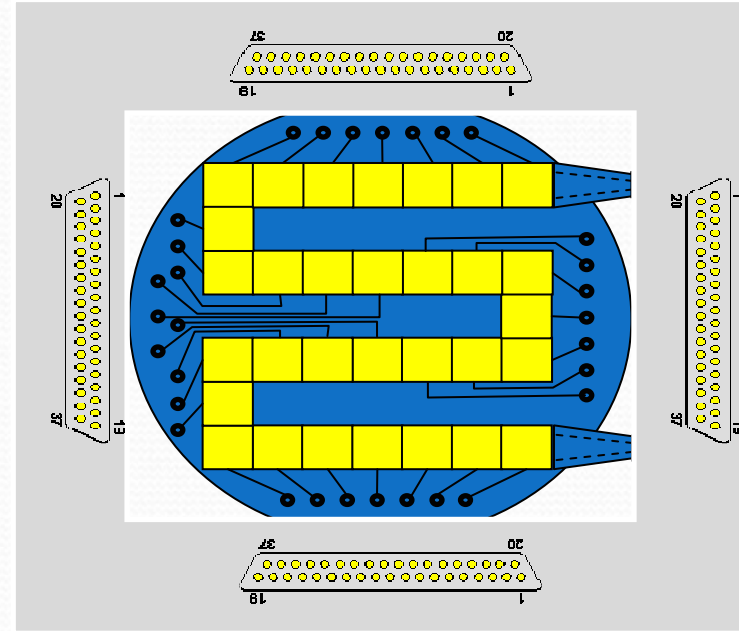
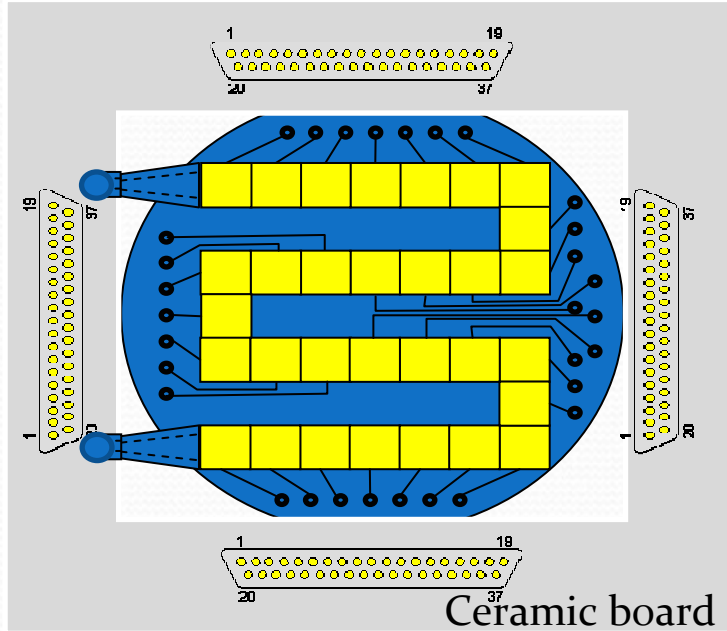
$^{26}\text{Mg} + ^{248}\text{Cm}$ vs. $^{48}\text{Ca} + ^{226}\text{Ra}$:

- beam & target
- cross section
- TASCA and RTC efficiencies



Measurement of alpha decay (or SF) in coincidence with conversion electrons and photons

Pixelized Si sandwich detector



**~ 100% efficiency
for α and SF detection
(under development now)**

Single sided silicon strip detector

First prototypes of DSSD and SSD detectors developed for the new TASCA FPD have been manufactured in Warsaw and tested in Dubna



Large internal
conversion coefficients →

Measurement of conversion
electrons is important!!

SSD structure:

48 x 72 mm, 8 strips

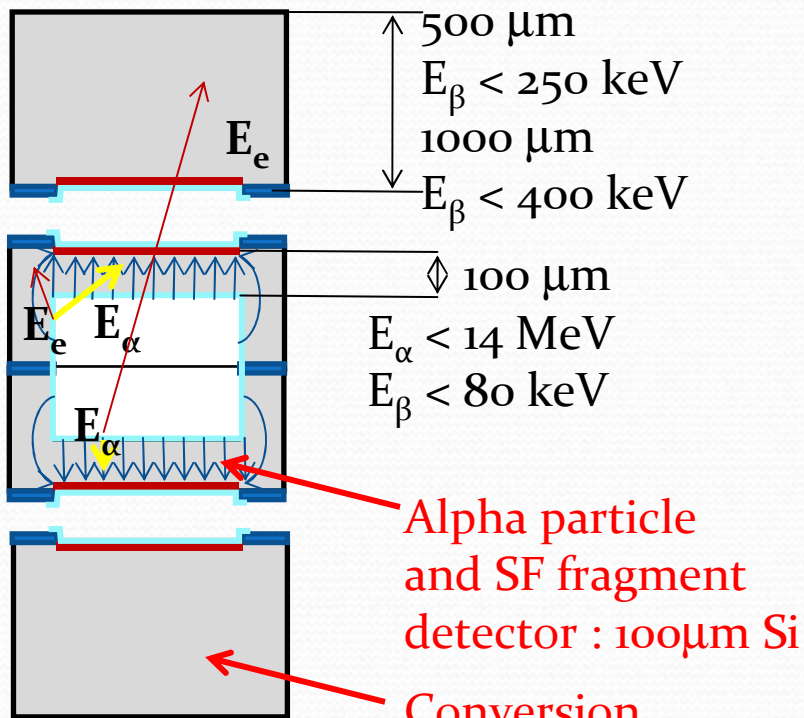
Thickness 500 μm

Full depleted @ -50 V

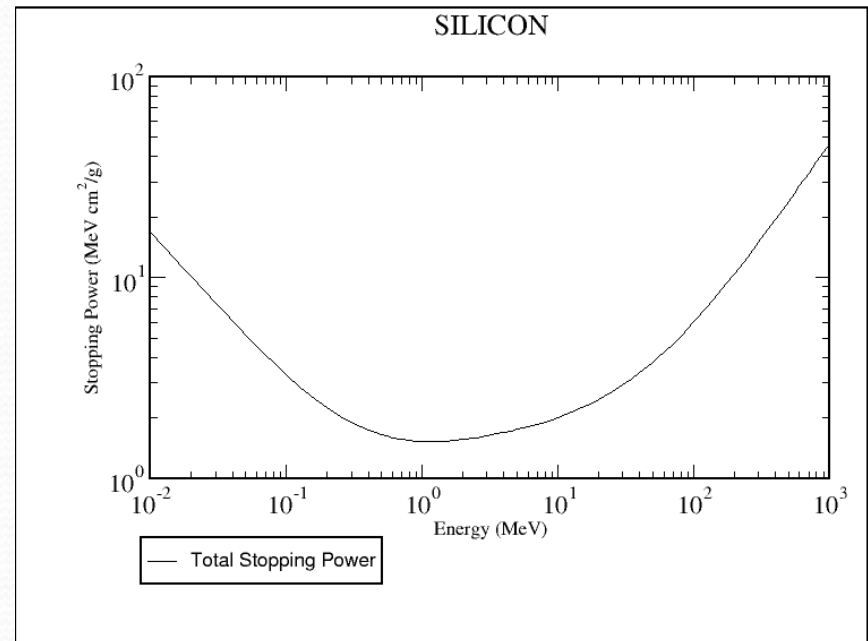
β resolution 8 keV @ 356 keV
(w/o cooling)

Mounting on ceramic or PCB

How thick should be detectors for detection of alpha particles and conversion electrons

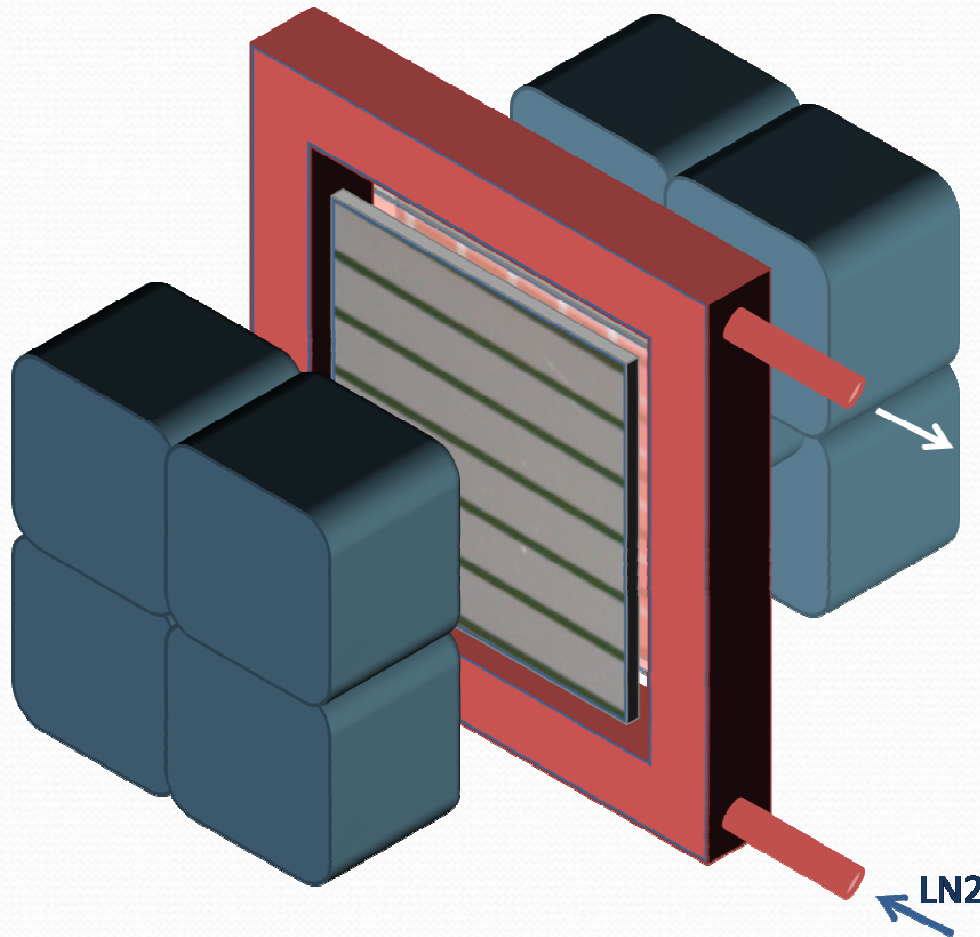


Cross section of the silicon detector array



Total stopping power of electrons in silicon

Detector for Alpha-Beta-Gamma Spectroscopy - ALBEGAS



Si array $\sim 70 \times 70 \text{ mm}^2$ active area consists of :

- „sandwich“ detector with 2×32 single diodes
- thick strip detector for conversion electrons

Array is cooled down to $\sim -100 \text{ }^\circ\text{C}$

„ALBE“ part will be provided by TU Munich group

+ 2 clover detectors $\sim 100 \times 100 \text{ mm}^2$ can be provided by GSI

Conclusion

- Decay spectroscopy of Hs isotopes and their daughters under background free conditions is possible
- Very high detection efficiency for α , β and γ decays
- Silicon detectors are under development now
- The best nuclear reaction for ^{269}Hs production has to be chosen taking into account efficiency of TASCA
- One detected decay chain every day
- Two or three weeks of the beam time is needed to get statistics