Efficiency determination of the neutron detector ball at the S-DALINAC *

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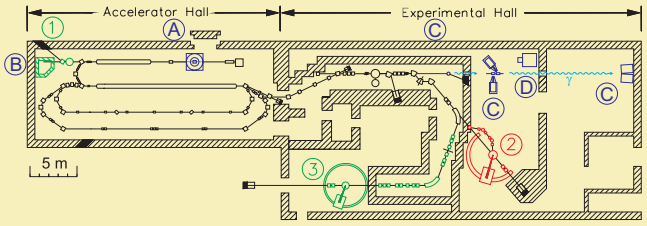
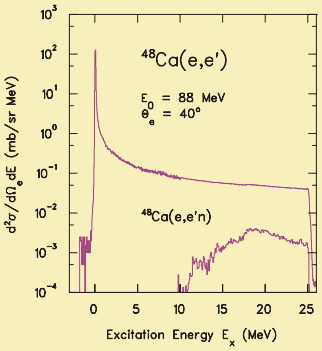
S-DALINAC



① Nuclear resonance fluorescence
② (e,e´) and 180° experiments
③ High-resolution (e,e´) experiments

Ⓐ Polarized electron source
Ⓑ 14 MeV bremsstrahlung
Ⓒ 100 MeV bremsstrahlung for polarizability of the nucleon
Ⓓ Photon tagger

Motivation



- Study of ISGDR using electron scattering
- Extraction of nuclear incompressibility
- Coincidence measurements for radiative tail suppression
- Background free spectra above neutron separation threshold

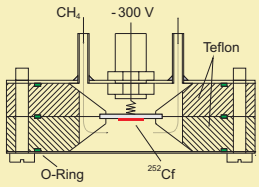
S. Strauch, Doctoral thesis, D17, TU Darmstadt (1998)

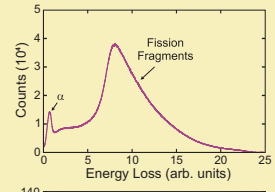
Neutron Ball

- Liquid scintillators BC501A
- Solid angle 1.3π
- High neutron efficiency
- n/γ discrimination
- Fast detector response
- Compact geometry

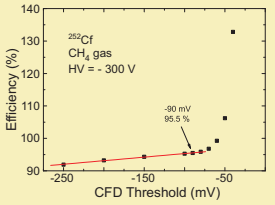
M. Chernykh, Doctoral thesis, D17, TU Darmstadt (2008)

Fission Chamber

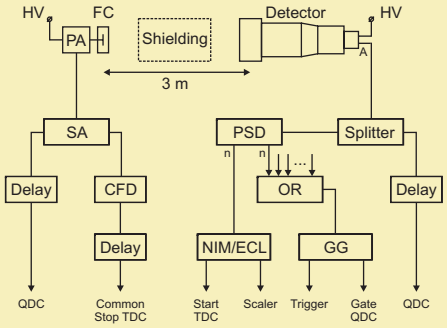




- ^{252}Cf source
- Fission rate 98400 s^{-1}
- 3.76 neutrons/fission
- Fragment efficiency 95.5%

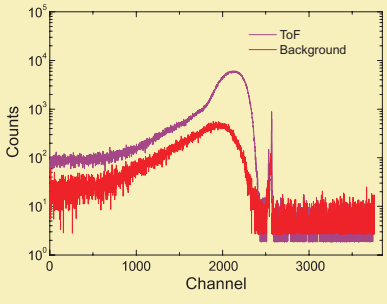


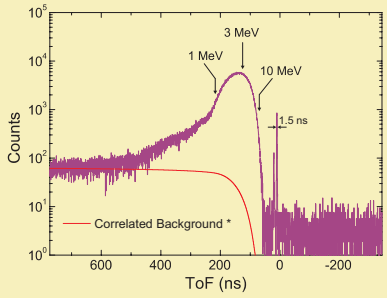
Experiment



- Online γ suppression
- Low dead time
- Time resolution 1.5 ns
- Random background negligible

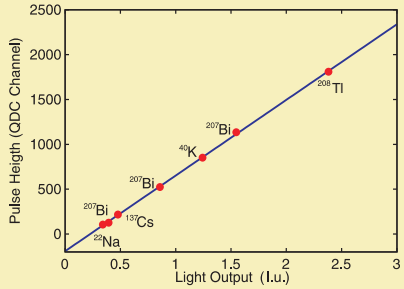
Spectra





* R. Böttger *et al.*, Nucl. Sci. Eng. 106 (1990) 377

Results



A.M. Heilmann, Bachelor thesis, TU Darmstadt (2007)