Phys. Rev. C **94**, 044304 (2016)

Dipole Strength in ^{80}Se below the neutron separation energy for the nuclear transmutation of ^{79}Se

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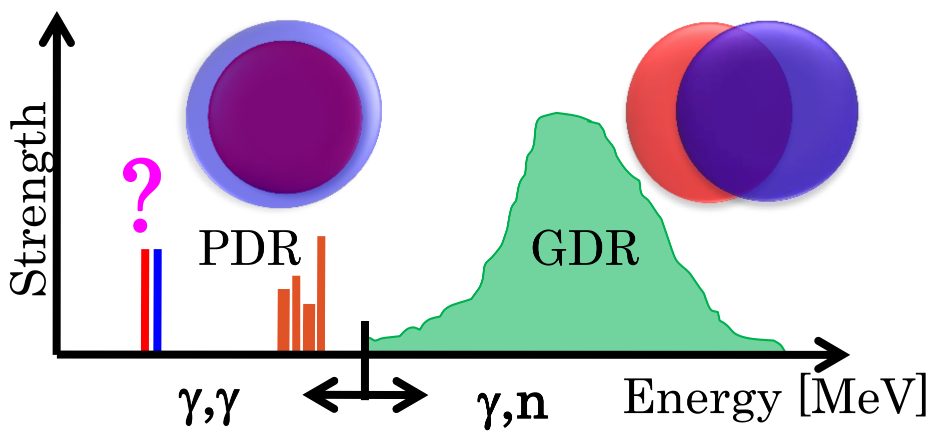
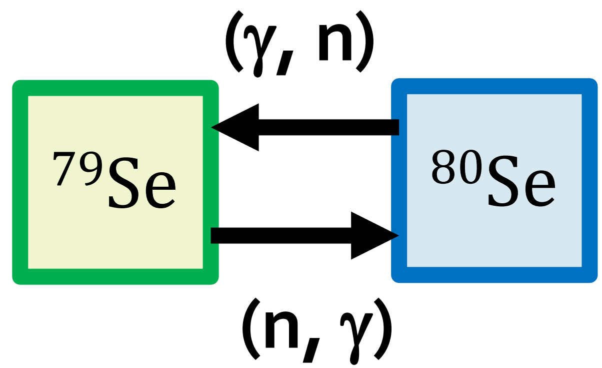
◆Introduction: γ-ray strength function of ^{80}Se for nuclear transmutation

- The g-ray strength function (GSF) in ^{80}Se is an important parameter for the estimate of ^{79}Se(n,γ), which is one of the long-lived fission products (LLFPs).

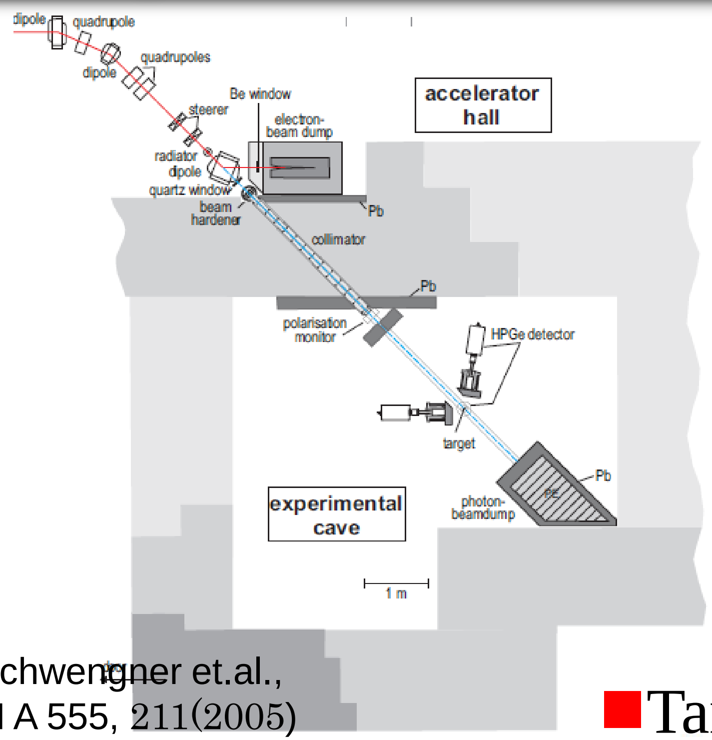
- Until now, the so-called GSF method for ^{80}Se was applied only above the neutron separation energy (Sn), and the evaluated ^{79}Se(n, γ) cross section has uncertainties caused by the GSF below Sn.

- We studied the dipole strength distribution of ^{80}Se with a photon-scattering experiment using bremsstrahlung produced by an electron beam of an energy of 11.5 MeV at the linear accelerator ELBE at HZDR.

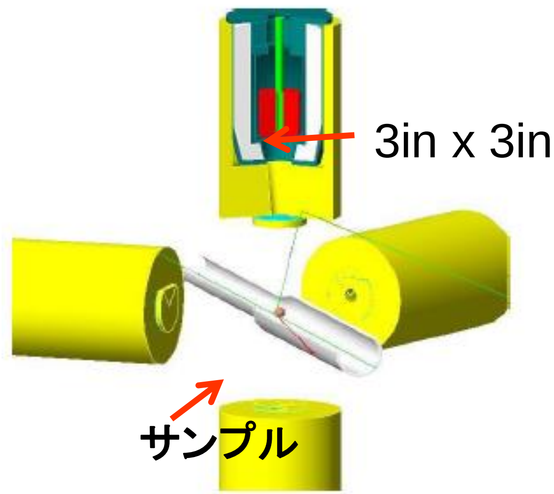




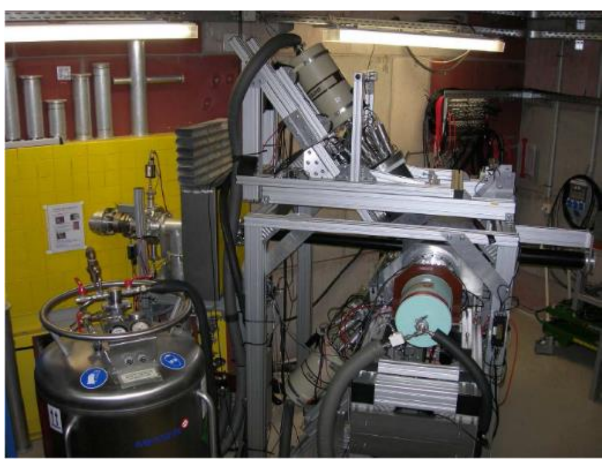
◆ Experimental Set Up at ELBE facility



R.Schwengner et.al.,
NIM A 555, 211(2005)



R.Massarczyk



■Target :^{80}Se.(99% enriched 1.95 g)

■Bremsstrahlung :7μm Nb radiator with electron beams of 11.5MeV

■ Average currents :~500μA

■4 100%HPGe detectors with BGO escape-suppression. >>90 degrees and 127 degrees: = angular distributions

◆ Experimental Spectrum and Result

Gamma spectrum of ^{80}Se

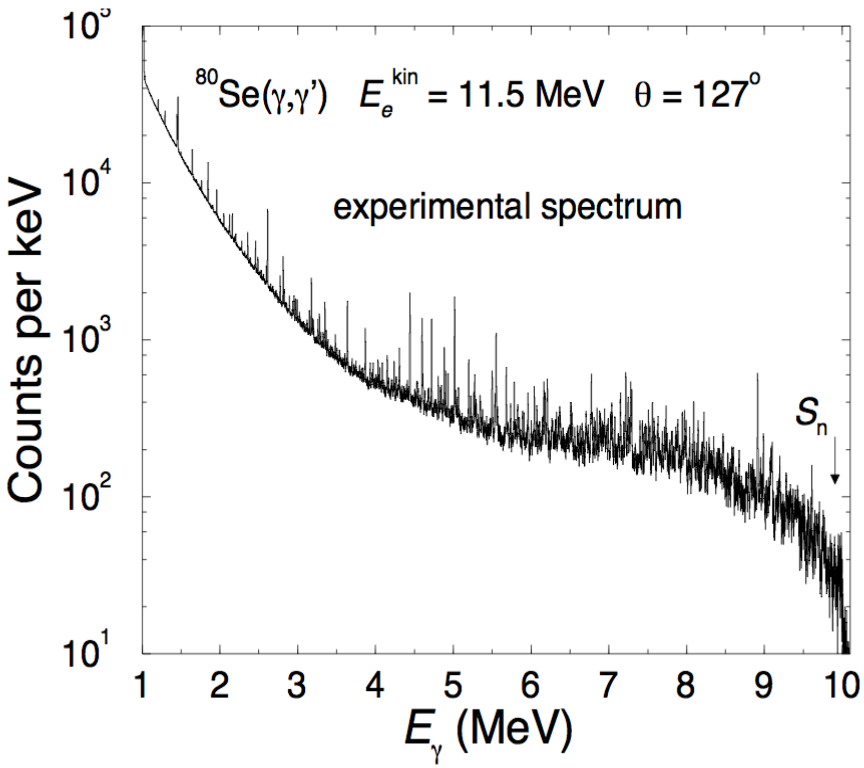
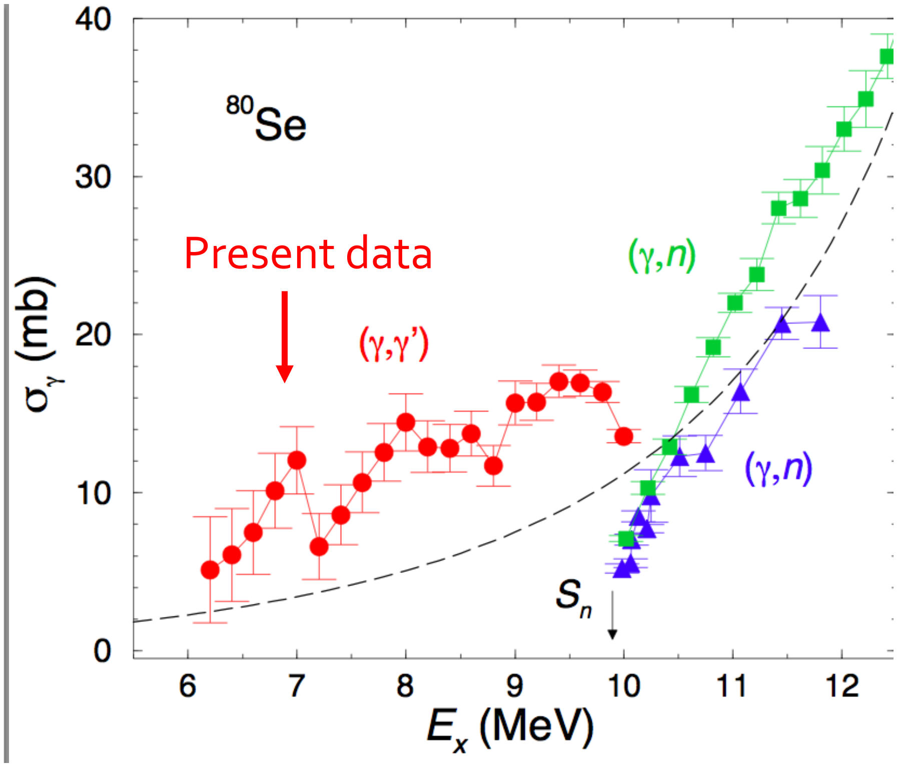
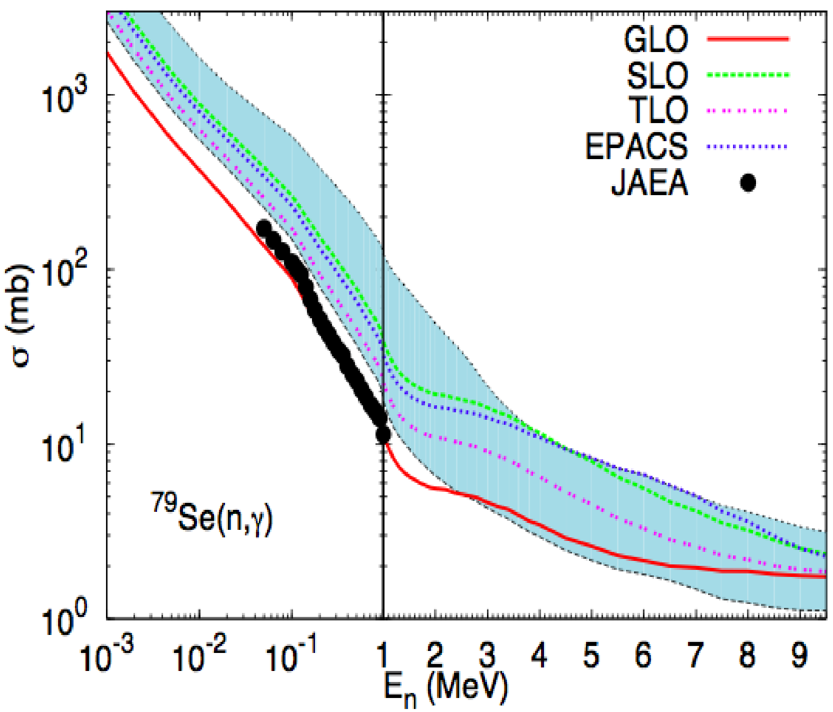


Photo-absorption cross section of ^{80}Se

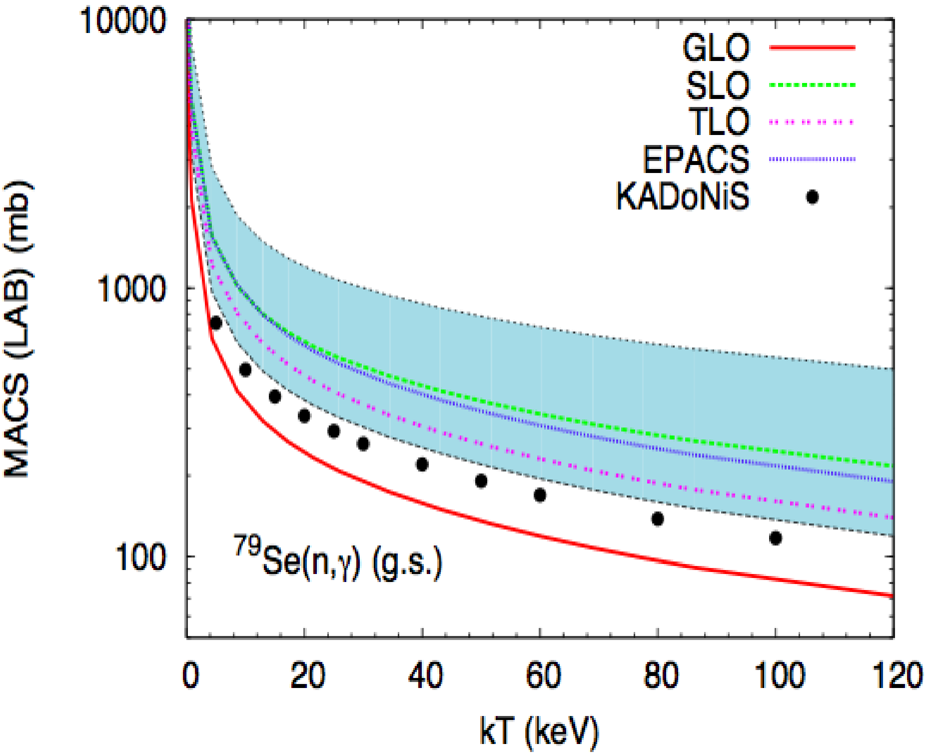


◆ Neutron capture cross section on ^{79}Se

Neutron capture cross section



Maxwellian – Averaged neutron capture cross section



- The uncertainty of the EPACS shown as a blue band results from the use of various nuclear level density models

◆ Summary

■**Photo-absorption experiment on ^{80}Se was performed at ELBE facility in Helmholtz Zentrum Dresden Rossendorf.**

■**We identified new 180 gamma transitions below 9.6 MeV.**

■**The photo-absorption cross section of ^{80}Se is combined with the ^{80}Se(g,n) and compared with results of calculations using TALYS. We also calculated the ^{79}Se(n,γ) cross section using the present experimental GSF as an input.**

■**The present calculations have still uncertainties caused by model parameters such as level densities and optical potential parameters.**