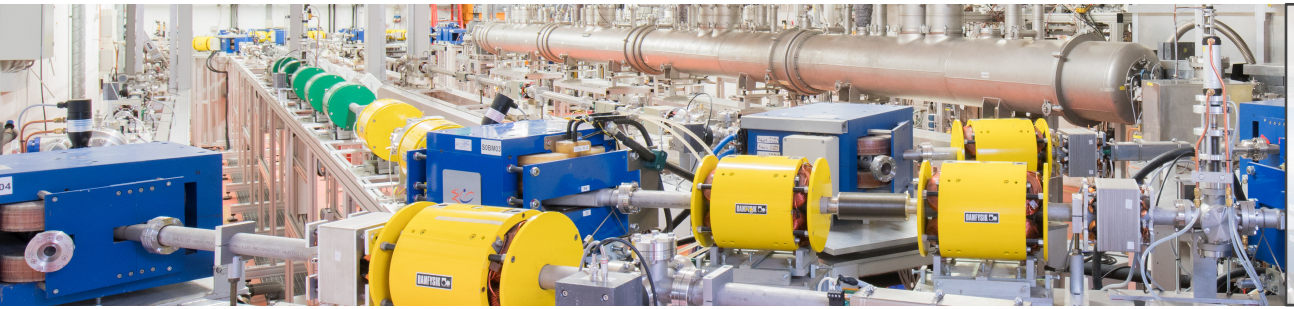
Investigation of the B(E2; $0_1^+ \rightarrow 2_1^+$) value of ^{116}Sn

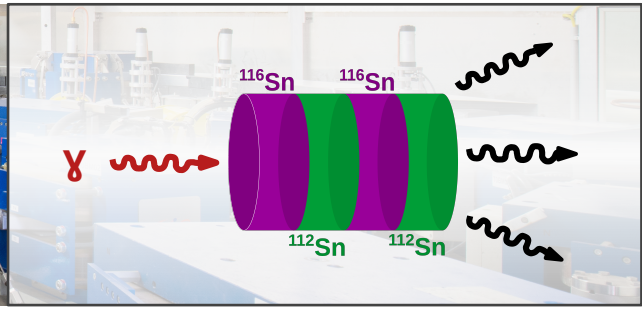
Presentation by Maike Beuschlein

M. Beuschlein[1], O. Papst[1], J. Kleemann[1], V. Werner[1], N. Pietralla[1], T. Beck[1,3], M. Berger[1], I. Brandherm[1], A. D'Alessio[1], U. Friman-Gayer[1,2], M. Hilcker[1], K. E. Ide[1], J. Isaak[1], R. Kern[1], P. C. Ries[1], G. Steinhilber[1], J. Wiederhold[1], and R. Zidarova[1]

1 TU Darmstadt, Department of Physics, Institute for Nuclear Physics, Darmstadt, Germany
2 Duke University and TUNL, Durham, NC, USA
3 FRIB, East Lansing, MI, USA

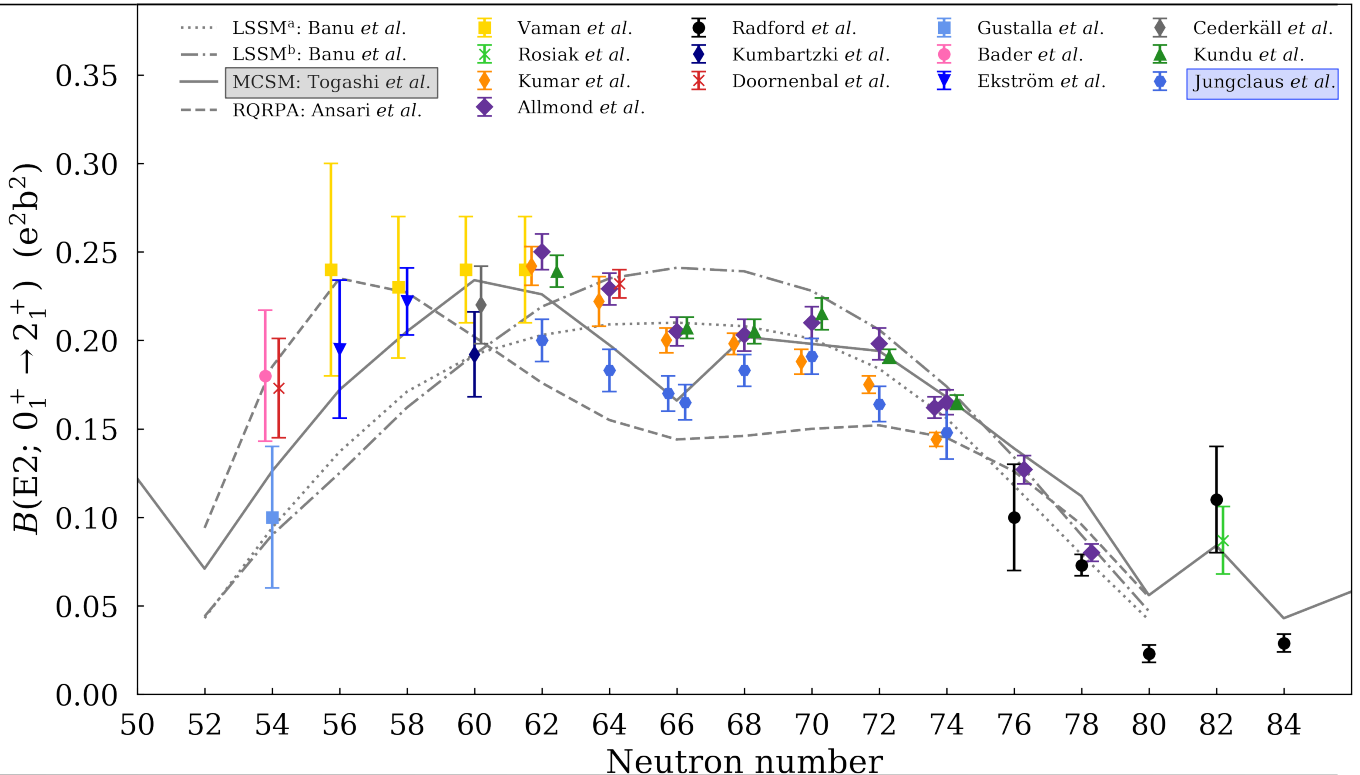
M. Zielinska
B. Maheshwari
S. Prill





Systematics of B(E2) values

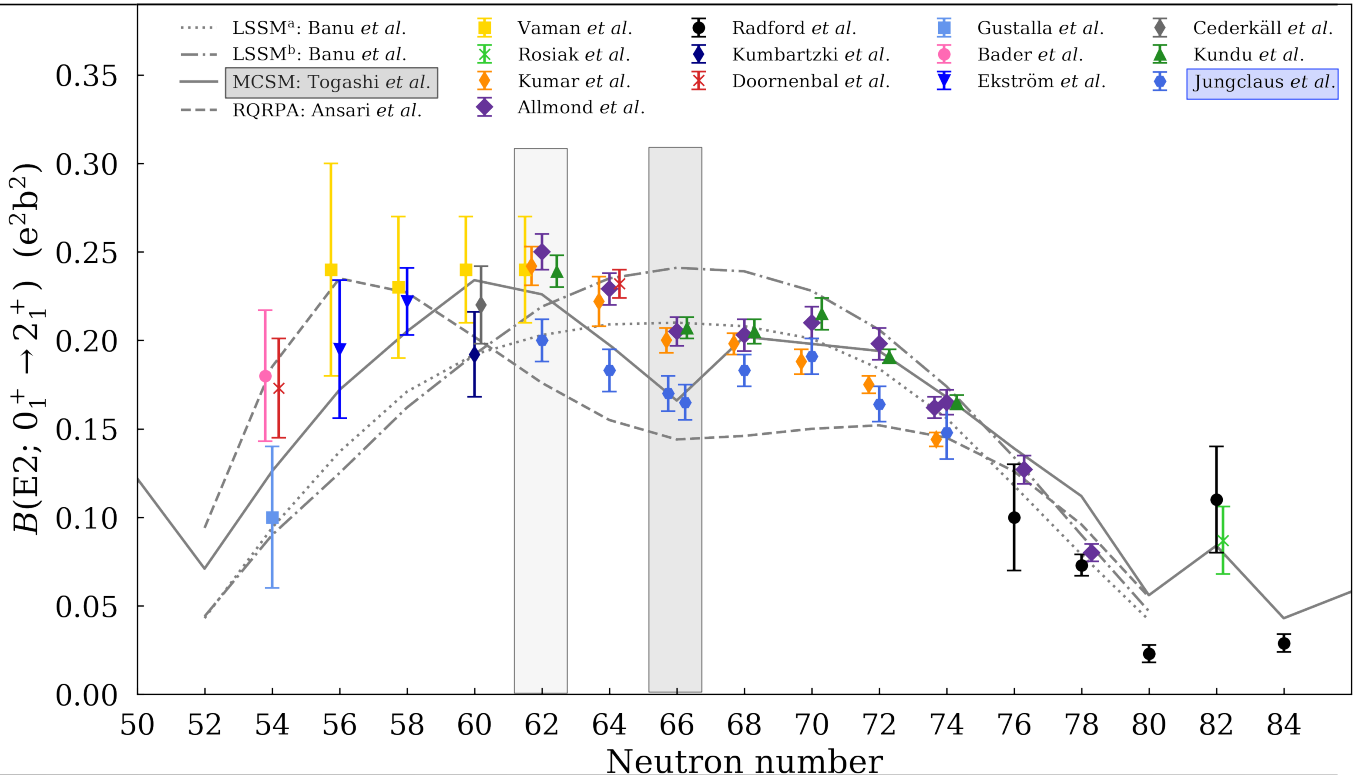
- Discrepancies between different exp. methods and model predictions
- QPT around ^{116}Sn?



A. Jungclaus *et al.*, Phys. Lett. B **695** (2011) 110
T. Togashi *et al.*, Phys. Rev. Lett. **121** (2018) 062501

Systematics of B(E2) values

- Discrepancies between different exp. methods and model predictions
- QPT around ^{116}Sn?
- ➔ Relative measurement of **^{116}Sn vs. ^{112}Sn** with **N**uclear **R**esonance **F**luorescence (NRF) in 2020
- ➔ High precision (~5%)



A. Jungclaus *et al.*, Phys. Lett. B **695** (2011) 110
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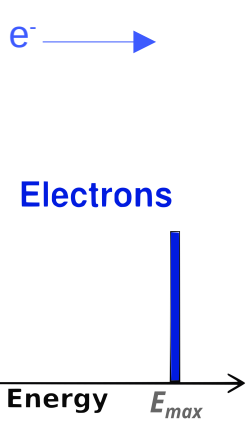
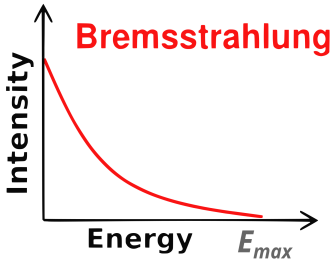
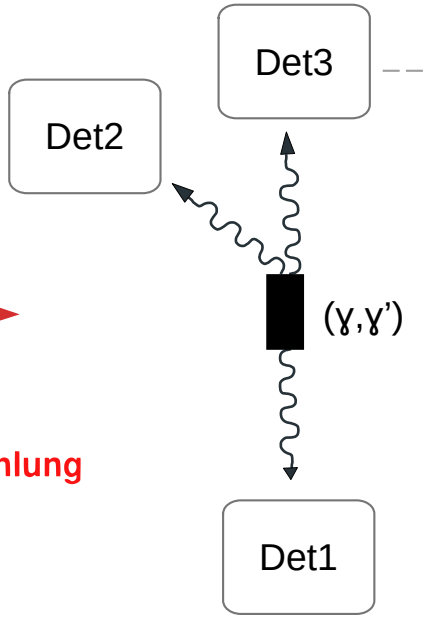
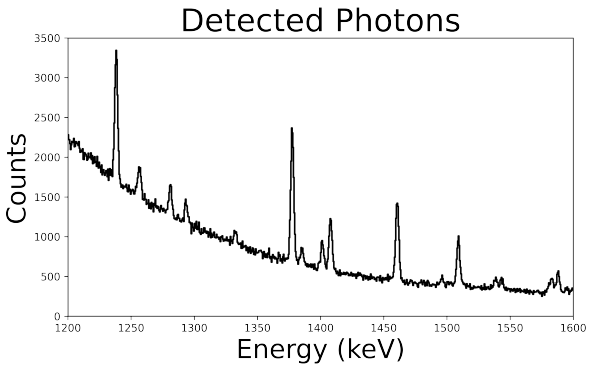
Nuclear Resonance Fluorescence

- DHIPS @S-DALINAC
- Absorption of real photons + de-excitation by photon emission



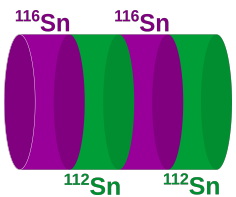


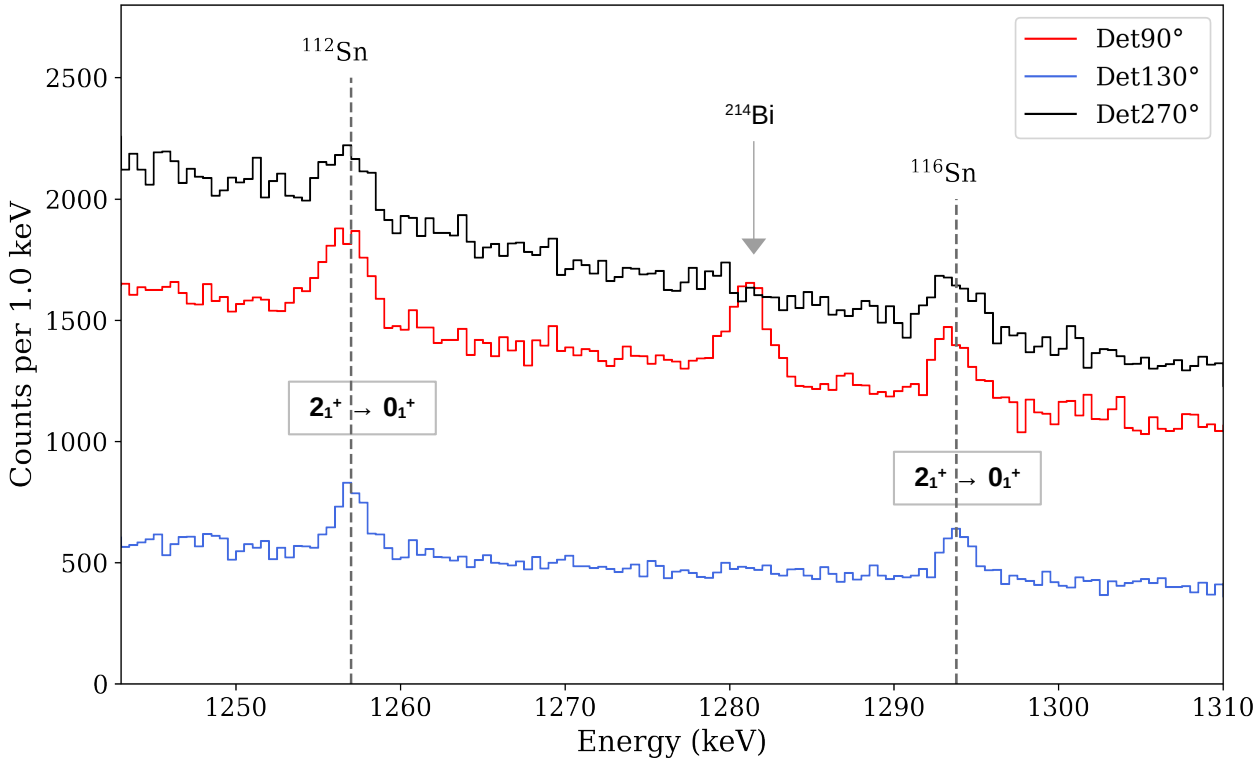




Experimental Data - ^{116}Sn

- B(E2) of ^{116}Sn measured relative to ^{112}Sn
- NRF experiment (2015) on ^{112}Sn used to set B(E2, ^{116}Sn) to absolute scale

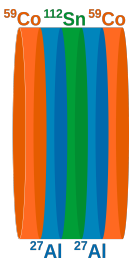


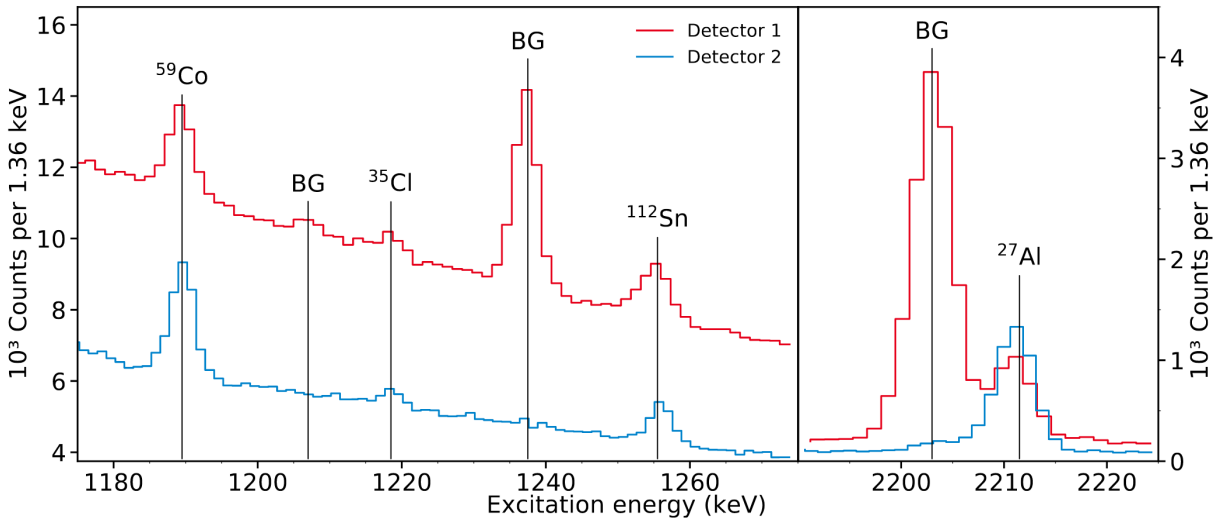


Experimental Data - ^{112}Sn

- B(E2) of ^{116}Sn measured relative to ^{112}Sn
- NRF experiment (2015) on ^{112}Sn used to set B(E2, ^{116}Sn) to absolute scale

➔ ^{112}Sn measured relative to ^{59}Co state @1190 keV:





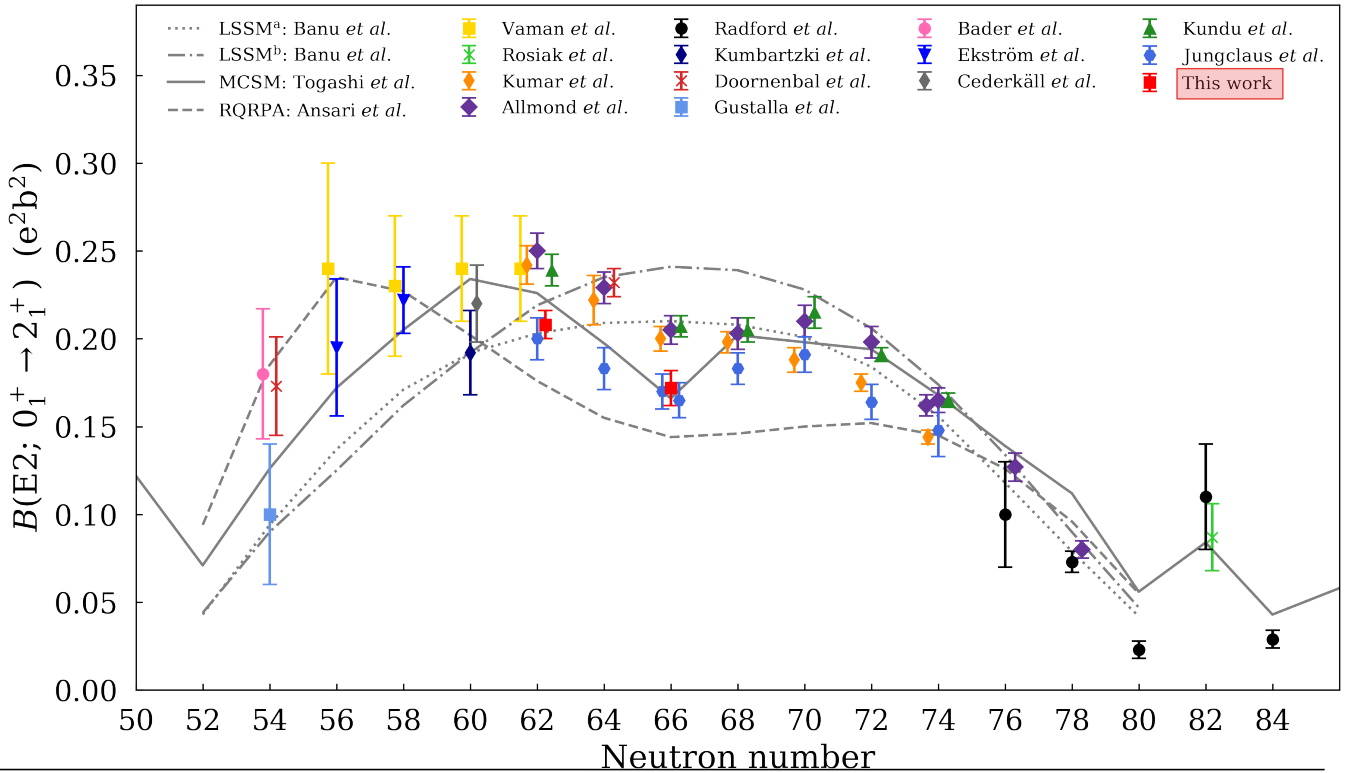
M. Berger, Dissertation, TU Darmstadt (2020)

C.P. Swann *et al.*, Nuc. Phys. A **172** (1971) 569
Γ_{gs} = 8.2(4) meV (NRF)
Y. Cauchois *et al.*, J. Phys. G: Nucl. Phys. **7** (1981) 1539
Γ_{gs} = 9.0(4) meV (Self absorption)

C.P. Swann *et al.*, Nuc. Phys. A **172** (1971) 569
δ = - 0.16(9) (NRF)
K.L. Coop *et al.*, Nuc. Phys. A **150** (1970) 346
δ = - 0.25(5) (α,pγ)
P. Haupt *et al.*, Atoms and Nuclei **295** (1980) 135
δ = - 0.16(5) (p, p'γ)

Results

- B(E2;^{116}Sn)/B(E2;^{112}Sn) = **0.83(4)**
  → 4.8% relative uncertainty
- B(E2;^{112}Sn) = **0.208(8) e²b²**
  Preliminary result =0.214 e²b² †
- B(E2;^{116}Sn) = **0.172(10) e²b²**



† M. Berger, Dissertation, TU Darmstadt (2020)

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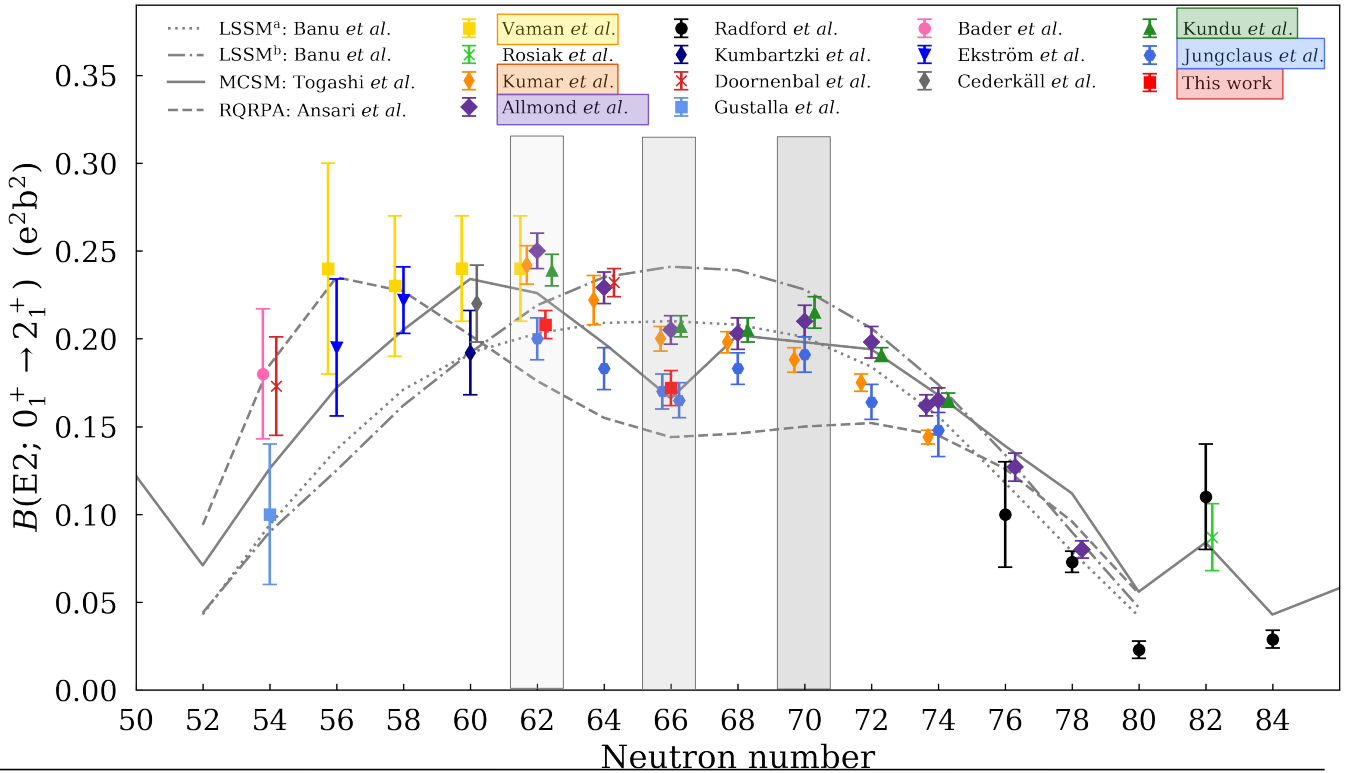

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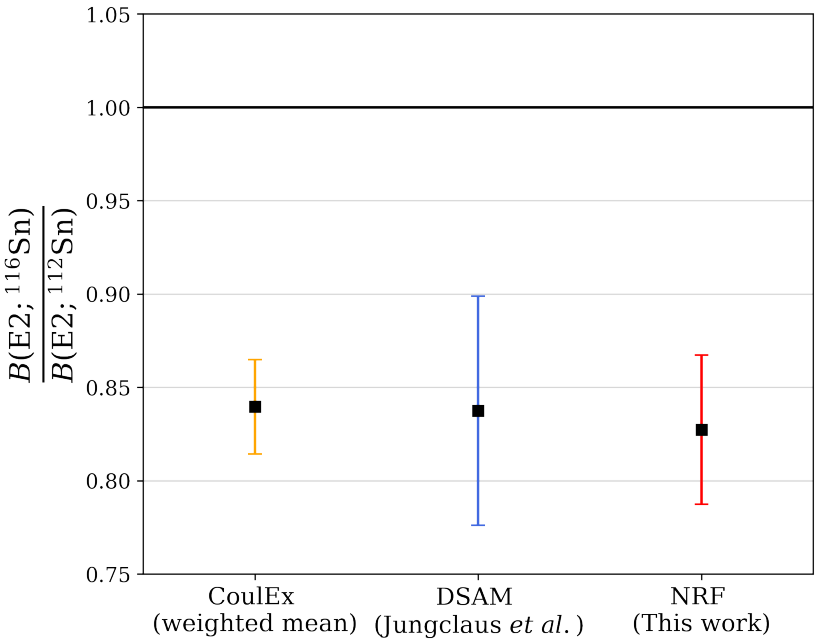
B(E2) Ratios

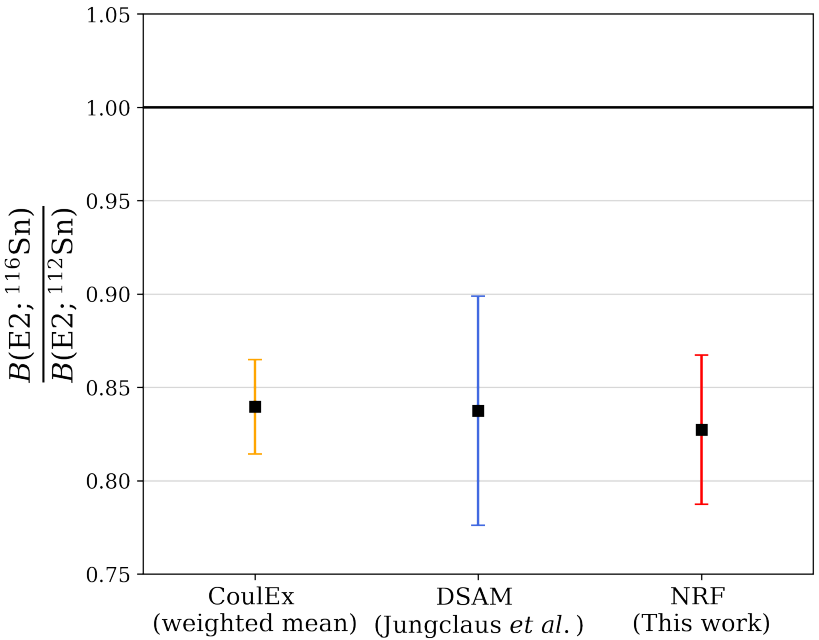


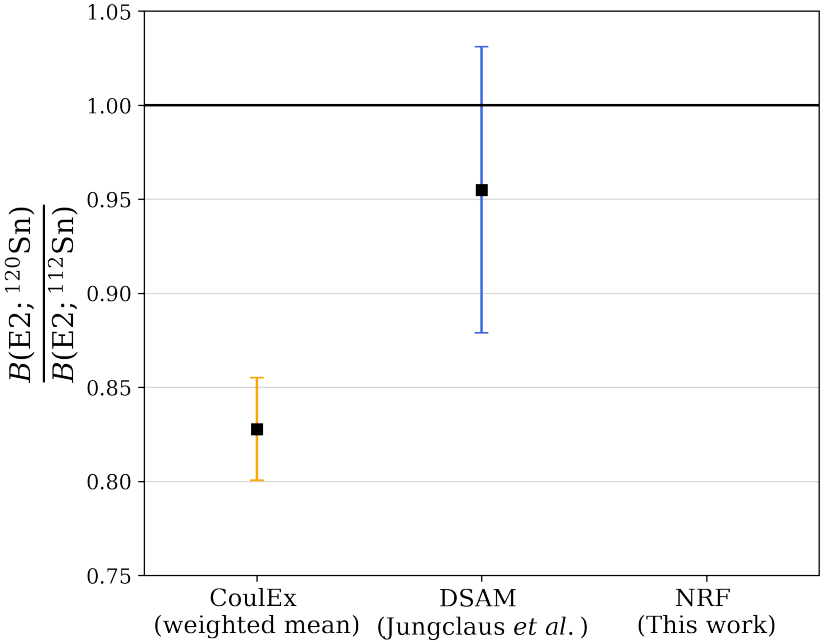
CoulEx:
J. Allmond *et al.*, Phys. Rev. C **92** (2015) 041303
A. Kundu *et al.*, Phys. Rev. C **99** (2019) 034609

R. Kumar *et al.*, Phys. Rev. C **96** (2017) 054318
C. Vaman *et al.*, Phys. Rev. Lett. **99** (2007) 162501

DSAM:
A. Jungclaus *et al.*, Phys. Lett. B **695** (2011) 110

B(E2) Ratios





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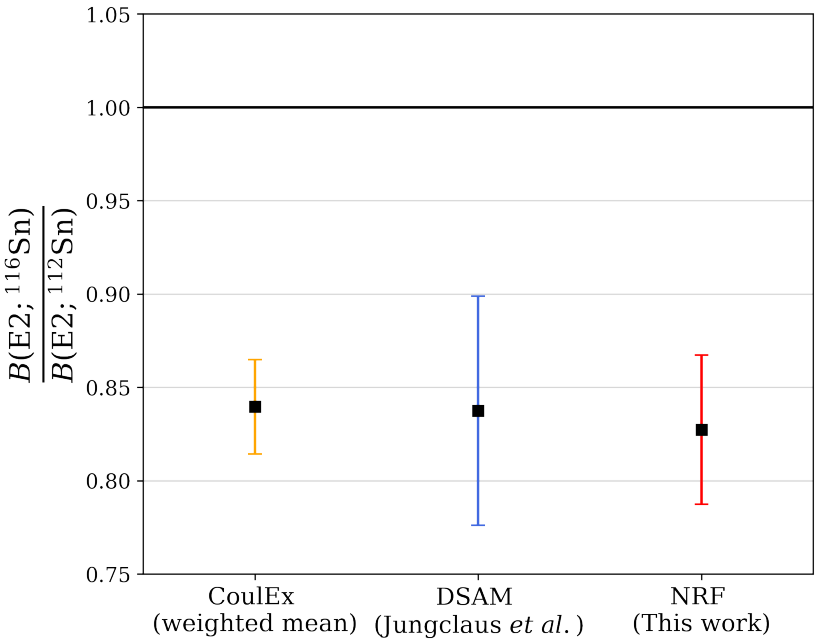

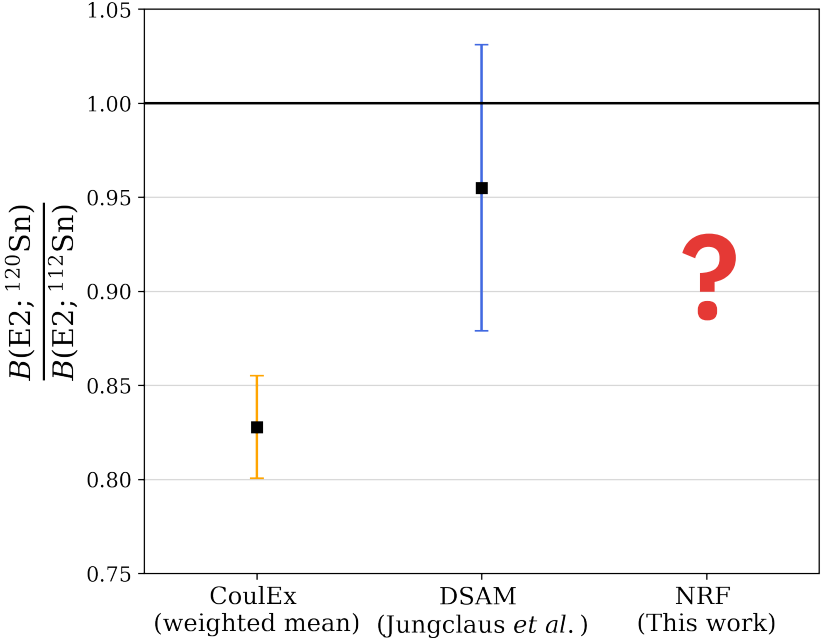

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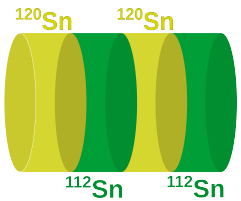
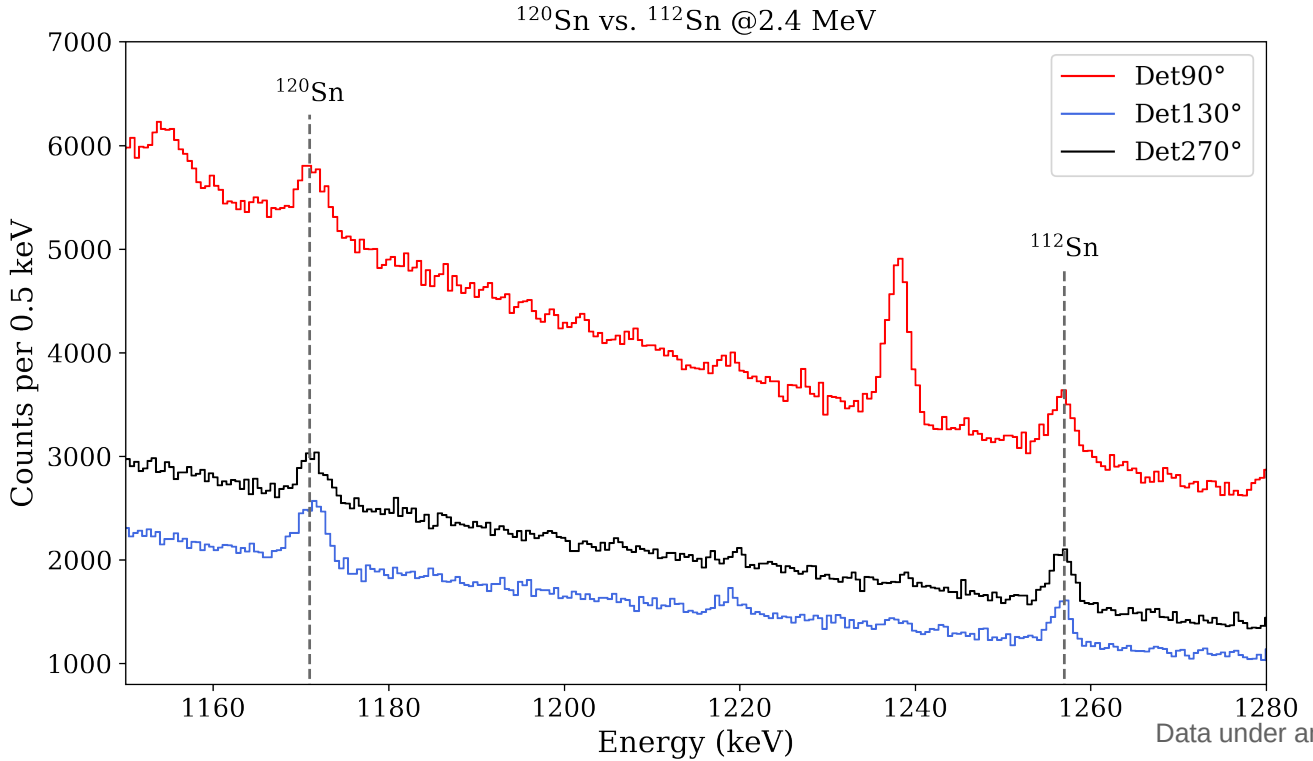
C. Vaman *et al.*, Phys. Rev. Lett. **99** (2007) 162501

DSAM:
A. Jungclaus *et al.*, Phys. Lett. B **695** (2011) 110

Experimental Data - ^{120}Sn



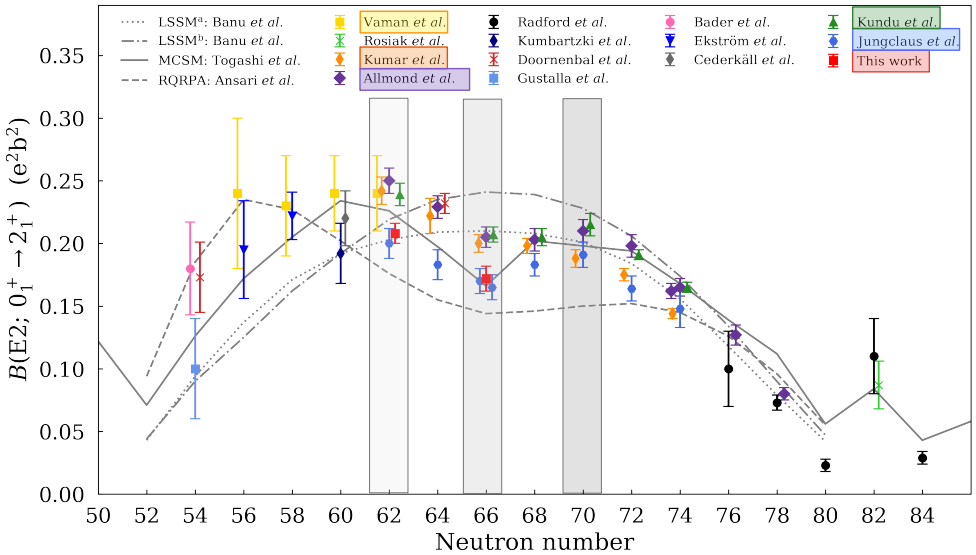


Data under analysis

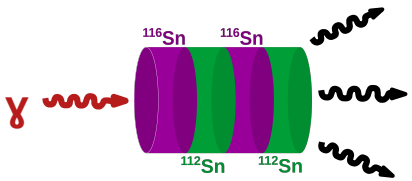
Investigation of the B(E2; $0_1^+ \rightarrow 2_1^+$) value of ^{116}Sn

Presentation by Maike Beuschlein

TECHNISCHE UNIVERSITÄT DARMSTADT



Thanks for your attention!



SFB 1245 DFG LOEWE Nuclear Photonics

Order parameter: S_{2n}

Control parameter: N

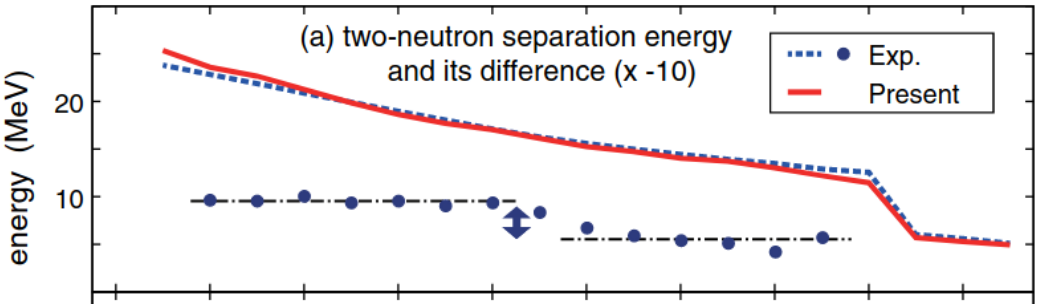


FIG. 1. (a) Two-neutron separation energy, $S_{2n}(N)$.

T. Togashi *et al.*, Phys. Rev. Lett. **121** (2018) 062501