Theme group for β-delayed neutron measurements

- Setups (BELEN, MONSTER ⇨ D. Cano-Ott/ CIEMAT)
- Implantation detector (SIMBA, AIDA (>autumn 2010))
- Beams

  N=50 (78Ni): 124Sn (?)
  N=82 (132Sn, 130Cd): 136Xe, 238U, others (150Nd,154Sm?)
  N=126: 238U, 208Pb, (197Au)
- Timeline for tests and experiments

(Near) Timeline

• Summer 2010: Neutron background test at S4 (5 single BELEN detectors): Implementation of BELEN and SIMBA into the GSI DAQ

• Spring 2011?: Setup and test of BELEN-30 at GSI, first parasitic in-beam tests, then min. 2 weeks break (no exp. @ S4)

• Early summer 2011?: Beamtime (6 days S323, 7 days S410)

• >end of 2011- mid 2013: AGATA is coming, no BELEN measurements possible!
⇨ Move BELEN to other labs

• 2016(?): during construction of Super-FRS: experiments possible

N=82: Approved experiment (S323)

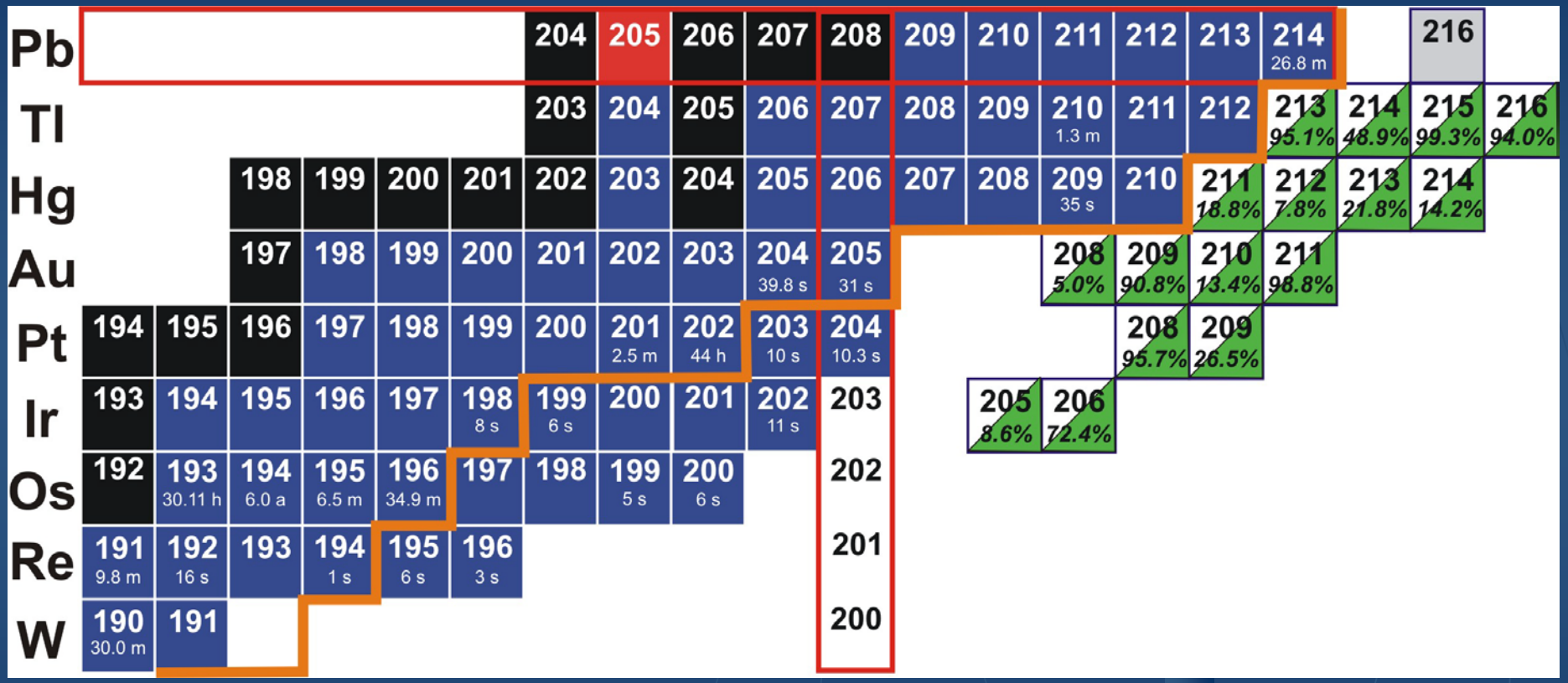
$t_{1/2}$ exists

identified

GSI proposal

P_n (%) QRPA

N=126: Approved experiment (S410)



$t_{1/2}$ exists

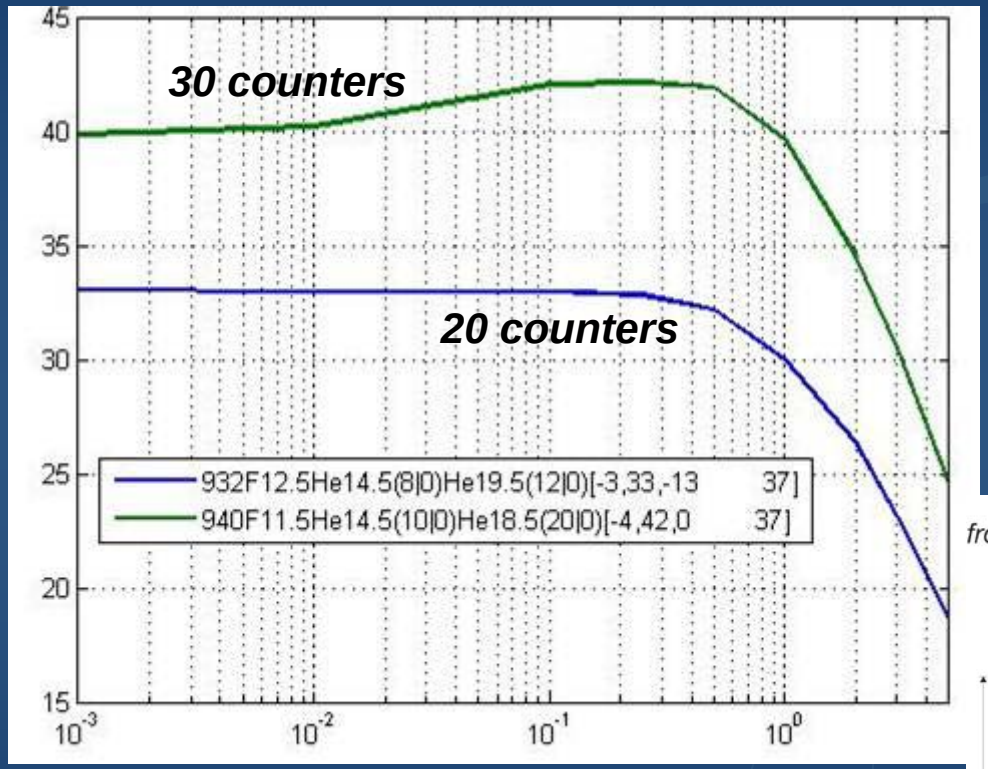
identified

GSI proposal

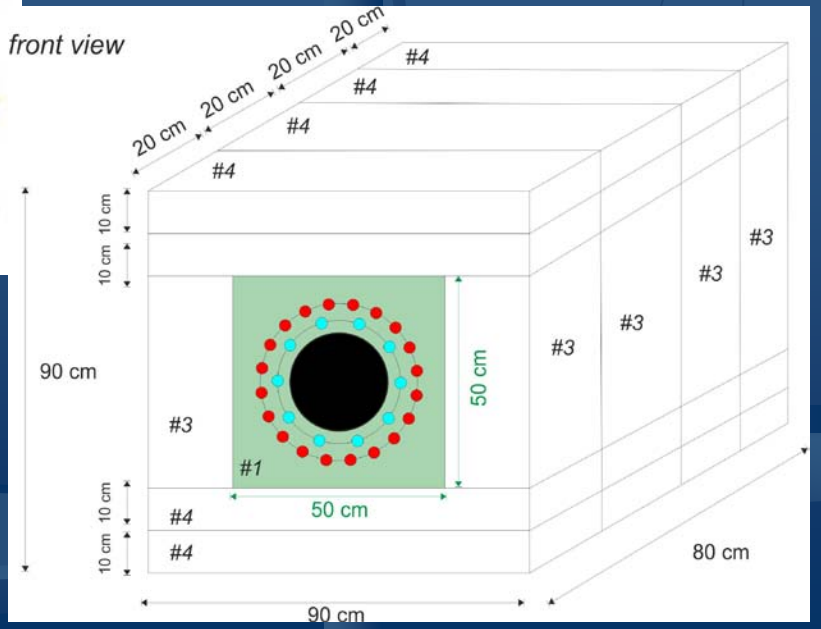
P_n (%) QRPA

BEta deLayEd Neutron detector (BELEN)

Efficiency for setup at GSI 2011

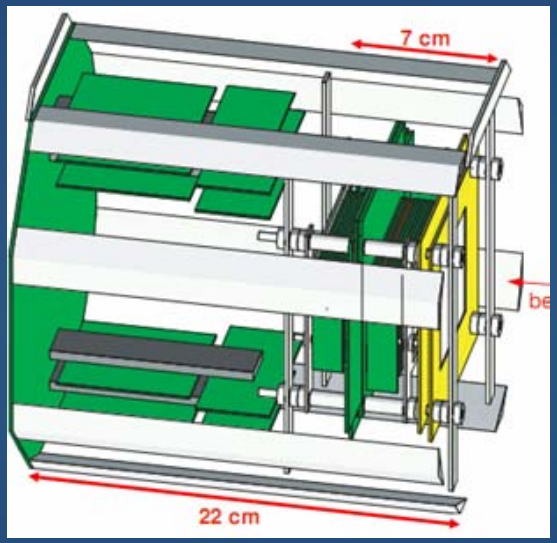


New BELEN-30 for GSI

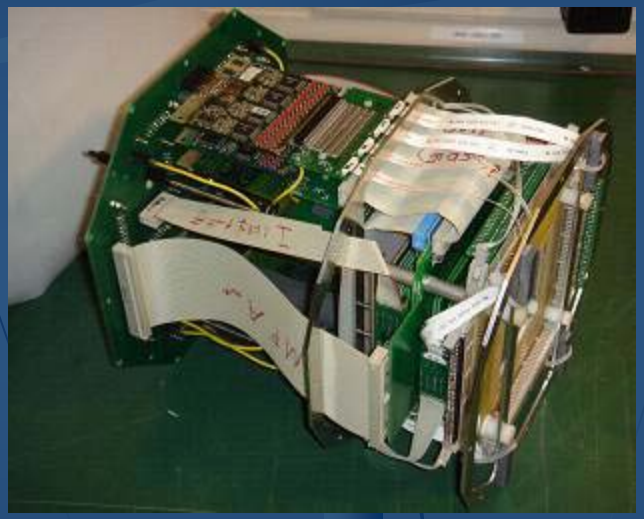


Silicon IMplantation detector and Beta Absorber (SIMBA)

Constructed and developed at
TU München



Pictures: K. Steiger



- 1 x and 1 y-detector, 60x60x0.3 mm^3, 60fold segmented each
- 2 SSSSD, 60x40x1 mm^3, 7fold segmented in x
- 3 DSSSD (implantation area), 60x40x0.7 mm^3, 60fold segmented in x-, 40fold in y-direction
- 2 SSSSD, 60x40x1 mm^3, 7fold segmented in x

PhD thesis C. Hinke, TUM (2010)
Diploma thesis K. Steiger, TUM (2009)

to be replaced by AIDA in >2012

Future

- Similar proposals @ other labs?
- Upgrades of the setup (more ^{3}He counters, +γ-det., AIDA…)
- New proposals
- Evaluation/ compilation of βdn
- Workshop? (astrophysicists, reactor physicists, …)

BELEN detector can/will be moved to other labs for experiments

- Jyväskyla
- ?GANIL?

Possible future proposals:

^{78}Ni (N=50, Z=28)

^{134}In, … (β2n emitters, check GANIL, ALTO program)

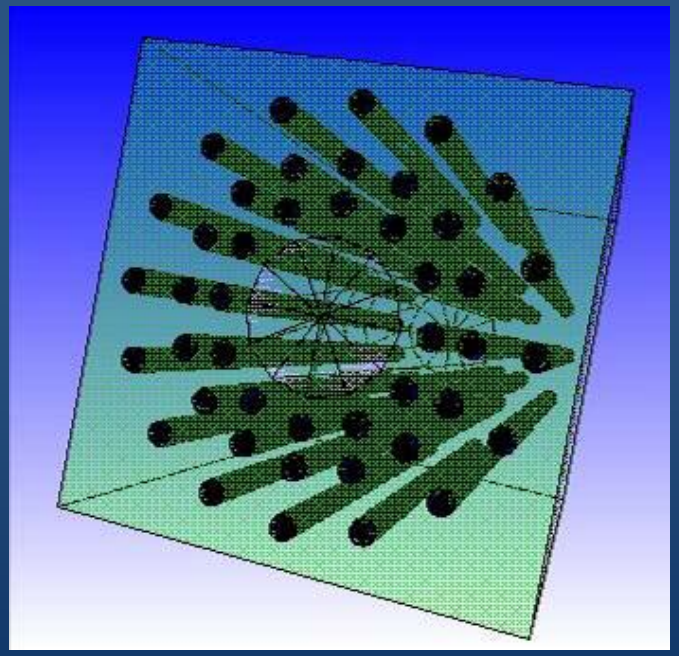
^{194}W, ^{192}Hf (deformed, P_n~10% predicted)

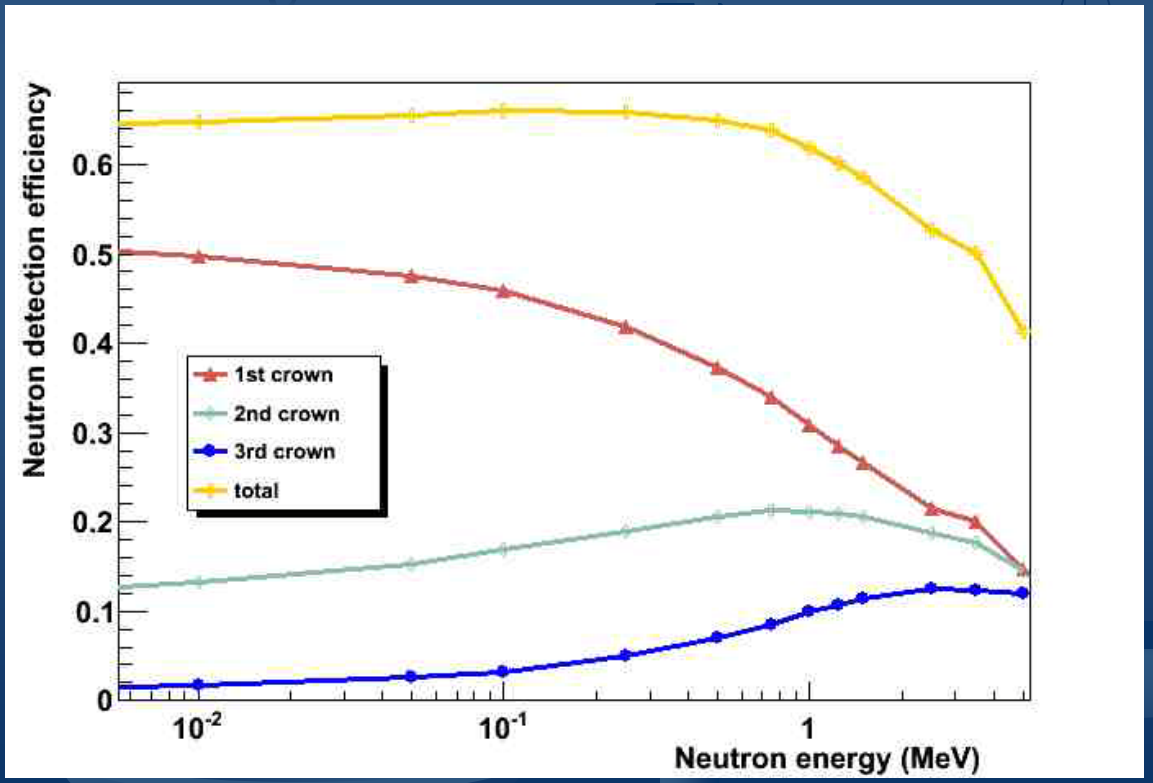
(Main) institutions

- UPC Barcelona
- IFIC Valencia
- CIEMAT Madrid
- Santiago de Compostela
- Jyväskyla
- JINR Dubna
- GSI-Giessen
- Surrey
- ...

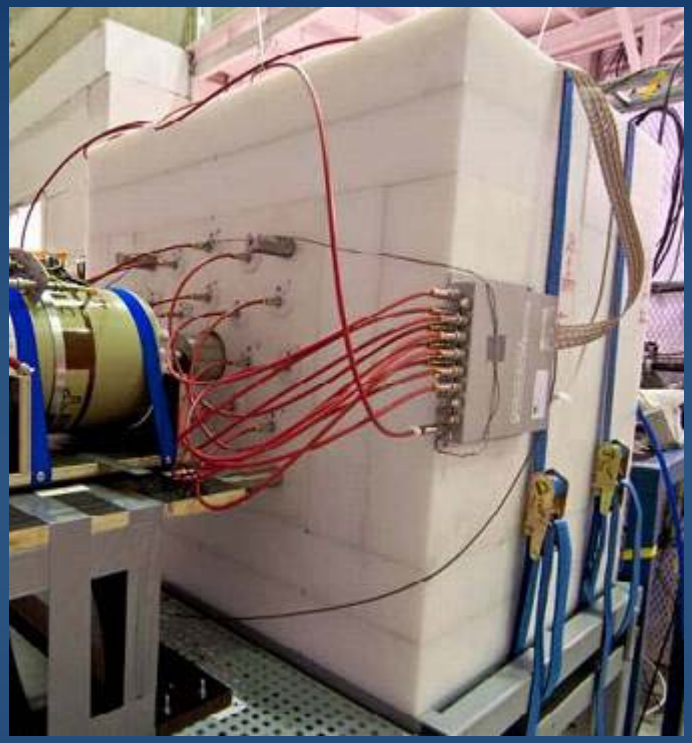
Setup: BELEN for DESPEC

- 44 ^{3}He counters arranged in 3 crowns ~65% efficiency
- 90cm×90cm×70cm PE block
- ∅16cm hole for AIDA implantation detector
- Triggerless DACQ: independent (t,E) for every counter, no ADC gate, minimum dead time, freedom to construct time correlations





BEta deLayEd Neutron detector (BELEN)



BELEN-20 Collaboration

Universidad Politecnica de Cataluna, Barcelona

IFIC Valencia

CIEMAT Madrid

BELEN-30 Collaboration: additionally