

FAKULTÄT für PHYSIK  
LUDWIG-MAXIMILIANS-UNIVERSITÄT  
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PHYSIK-DEPARTMENT  
TECHNISCHE UNIVERSITÄT MÜNCHEN  
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## MLL-KOLLOQUIUM

Donnerstag, 03.07.2014, 16<sup>15</sup> Uhr

Seminarraum 127, TUM, Physik II, Erdgeschoss/Nord  
Treffen zum gemeinsamen Kaffee 16 Uhr

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### Beta-delayed neutron measurements for astrophysics

Beta-delayed neutron- ( $\beta n$ -) emitters play an important, two-fold role in the stellar nucleosynthesis of heavy elements in the rapid neutron-capture process" (r process). On one hand they lead to a detour of the material beta-decaying back to stability. On the other hand, the released neutrons increase the neutron-to-seed ratio, and are re-captured during the freeze-out phase and thus influence the final solar r-abundance curve.

A large fraction of the isotopes for r-process nucleosynthesis are not yet experimentally accessible and are located in the 'terra incognita'. With the next generation of fragmentation and ISOL facilities presently being built or already in operation, one of the main motivation of all projects is the investigation of very neutron-rich isotopes at and beyond the border of presently known nuclei. However, reaching more neutron-rich isotopes means also that multiple neutron-emission becomes the dominant decay mechanism.

The investigation of  $\beta n$ -emitters has recently experienced a renaissance. I will show some recent results from a GSI campaign with the BELEN detector, and introduce the program planned for 2015/16 at RIKEN with the 'BRIKEN' detector. 'BRIKEN' ('Beta-delayed neutron measurements at RIKEN for nuclear structure, astrophysics, and applications') is a worldwide effort which combines  $^3\text{He}$ -neutron counters from groups in Germany, Japan, Russia, Spain, and the USA and the implantation detector AIDA from the UK to the presently largest and most efficient neutron detection setup. Planned first experiments comprise the first-time measurements of 48  $\beta$ -delayed one-neutron and 24  $\beta$ -delayed two-neutron emitters in the regions around doubly-magic  $^{78}\text{Ni}$  and  $^{132}\text{Sn}$ . Even some  $\beta$ -delayed three-neutron emitters in the heavier mass region will be tackled for the first time.

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