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Structural investigation at the boundary of gamma-ray spectroscopy: investigation of extremely neutron rich ^{84,86,88}Ge

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Neutron rich Ge isotopes represent a puzzle so far as the few existing data yield a contradicting picture. A recently determined large $B(E2; 2^+ \to 0^+)$ value with a large uncertainty in ^{84}Ge hints for a completely unexpected shape transition from soft triaxiality in neutron rich Se isotopes with Z=34 to prolate deformation for neighboring Ge with Z=32 [1]. Such an "island of inversion" is not expected. The shell model only predicts such for much lighter systems (Z<28) [1]. On the other hand, recent investigations of the level schemes of ^{84,86,88}Ge hint for a new region of rigid triaxiality similar to ^{76}Ge [2]. However, these interpretations suffer heavily from the lack of knowledge on transition strengths between the lowest states. Therefore, we aim to determine transition strengths between the lowest states from level lifetimes in the picosecond range in extremely neutron-rich ^{84,86,88}Ge. These observables will be determined at the RIBF facility at RIKEN with the recoil distance Doppler-shift method after proton knockout using fast (v/c~60%) secondary beams of ^{85,87,89}As, a dedicated Cologne plunger device and a segmented highly efficient gamma-ray spectrometer coupled to the zero degree spectrometer for recoil identification. It should be stressed that ^{88}Ge is the most neutron rich Ge isotope where excited states are known so far at all.

[1] C. Delafosse et al., Phys. Rev. Lett. 121, 192502 (2018)
[2] M. Lettmann et al., Phys. Rev. C 96, 011301(R) (2017)

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