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Development of the High-Resolution Neutron Detector HIME

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High-resolution neutron detection plays a key role in spectroscopic measurements, in particular since in the past decades, the research focus shifted towards extremely neutron-rich nuclei. A prototype of a high-resolution neutron detector, called HIME, has been constructed at SAMURAI with an active area of $40 \times 40 \, \text{cm}^2$ for precise measurements of two-neutron correlations in decays of states beyond the neutron dripline. However, its current size and active volume strongly limit the geometrical acceptance and the neutron-reconstruction efficiency.

In this talk, a status report will be given on the ongoing upgrade of the HIME prototype. The existing part of the detector is being extended to an active area of $100 \times 100 \, \text{cm}^2$ and to a larger total depth, which will enhance significantly both acceptance and efficiency. In addition, it was equipped with the new TRB3 readout electronics, developed at GSI. The high granularity of the detector and the time precision of the new electronics guarantee high invariant-mass resolution. First data with the prototype and the new readout electronics were taken in 2022 using cosmic radiation, which showed promising performances.

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