

The NUSTAR project at FAIR: status and opportunities



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The NUSTAR (NUclear STructure, Astrophysics, and Reactions) collaboration [1] is aimed at exploiting the opportunities offered by the FAIR facility. The FAIR-0 experimental campaign, using detection systems built for the future facility, is ongoing at the existing GSI accelerator complex since 2021. Preparation for moving from the present experimental areas to the new facility have started. It is foreseen that the higher transmission of the Super-FRS separator and the higher primary beam intensities of the SIS-100 synchrotron will be exploited from around 2028 and 2029, respectively.

The overarching physics case of the NUSTAR collaboration is centered around the fundamental question of how heavy elements are synthesised in the universe, especially in the rapid-neutron capture process. This needs information on a large number of observables, including nuclear masses, beta-decay lifetimes and beta-delayed neutron emission probabilities. In many of these experiments the HISPEC/DESPEC project, with essential Indian contributions, plays a central part. I will present recent scientific and technical highlights, as well as the details on the transition from the existing GSI to the FAIR facility.

[1] <https://fair-center.de/user/experiments/nustar>

About the speaker: Prof. Zsolt Ferenc Podolyák, Professor at the University of Surrey, is a distinguished nuclear physicist specializing in nuclear structure, reactions, and astrophysics. He has led high-impact research at GSI, CERN, RIKEN, and other major international facilities. His expertise spans neutron-rich nuclei, shape transitions, and fragmentation reactions, with significant contributions to experimental nuclear physics. He is currently serving as a spokesperson of the NuSTAR collaboration at FAIR, overseeing a global network of researchers..