

# Frontiers in Gamma Ray Spectroscopy FIG18

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## FAIR and NUSTAR - Status and opportunities

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### Content :

The international FAIR project at GSI aims for an unprecedented facility for research with stable and radioactive ion and anti-proton beams. It will comprise of ion beam accelerators, storage rings, an anti-proton source, a fragment separator and experimental set-ups for four research pillars. These pillars are organized in large collaborations involving almost 3000 scientists: APPA for atomic and plasma physics, biology and material science, CBM for studies of compressed baryonic matter, NUSTAR for nuclear structure, reactions and astrophysics investigations, and PANDA for anti-proton studies. After a reorganisation in 2015 the FAIR project is progressing vigorously. Construction of the buildings and production of the machine and experiment components have started. Moreover, preparations for a scientific phase-0 program are on-going. From 2018 almost until 2024/25, when the full FAIR facility will become operational, experiments can be performed with the upgraded GSI accelerators and the already available FAIR sub-systems, e.g. the many NUSTAR set-ups.

NUSTAR is the largest collaboration for nuclear structure, astrophysics and reactions studies in the world. It was founded 12 years ago to develop a science programme and build instrumentation for the planned FAIR facility at GSI Darmstadt, Germany. A versatile suite of state-of-the-art detection system has been developed and is being employed already now at GSI and other facilities in the world.

NUSTAR relies primarily on the availability of exotic rare isotope beams produced by fragmentation reactions and fission of relativistic heavy ions. The fragment separator FRS and a versatile set of instruments, including gamma arrays, particle spectrometers and a storage ring enable unique experiments at GSI. The Super-FRS at the FAIR facility will provide several orders of magnitude stronger beams, enabling access to the extremes of nuclear stability. Continuous R&D; efforts result in improved detectors and enable the NUSTAR collaboration to steadily enhance the sensitivity and selectivity limit of their experiments.

The status of FAIR and NUSTAR will be reported and the opportunities for NUSTAR experiments in FAIR phase-0 at GSI and at Day-1 at GSI will be discussed.

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