The FAIR Project: Status and Perspectives for NUSTAR Studies

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The present physics program with exotic nuclear beams at GSI will be extended to new dimensions with the advent of the international facility FAIR. The NUclear STructure Astrophysics and Reaction (NUSTAR) collaboration will build and use a new projectile fragment separator, the Super-FRS, equipped with novel experimental setups. The Super-FRS will be the most powerful in-flight separator for exotic nuclei up to relativistic energies corresponding to 20 Tm. It is a large-acceptance super-conducting fragment separator with three branches serving different experimental areas including a new storage ring complex.

Reaction studies under complete kinematics, similar to the present ALADIN-LAND setup, will be performed at the High-Energy Branch. Unique studies will be performed in the Ring Branch consisting mainly of a collector ring CR, the NESR, RESR and an electron collider (eA). Precision experiments with a brilliant electron-cooled exotic beam including reaction studies with the atoms of an internal target will be done in the NESR. A novelty will be electron scattering from exotic nuclei in the eA collider section. The Low-Energy Branch of the Super-FRS is mainly dedicated to precision experiments with energy-bunched beams stopped in a gas cell.

In this contribution the status and prospects of the NUSTAR facilities and experimental goals will be presented.