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## Quasi free scattering in inverse kinematics - From GSI – via RIBF – to FAIR

Quasi free scattering in inverse kinematics is a powerful tool allowing to explore the nuclear landscape at its outskirts.

The inverse kinematics allows the full detection of weakly and strong bound states in complete kinematics (1) through the detection of gammas and particle unstable states through the invariant mass method.

The ALADiN-LAND reaction setup fed by the FRS fragment separator has evolved to the R3B reaction experiment with relativistic rare isotope beams. GSI is currently evolving in the FAIR facilities where the R3B experiment will be installed at the high energy branch (HEB) of the novel Super-FRS superconducting large acceptance fragment separator. The very clean selection criteria for the QFS mechanism have recently allowed for the population of the  $4n$  system at a missing mass study (2) at the SAMURAI experiment at the RIBF facility in Wako, Japan. At the same reaction setup the first of series prototype of the NeuLAND neutron detector for the R3B experiment at GSI and FAIR has been tested and could be used in the detection of  $28\text{O}$  (3) with coincident  $4n$  even reconstruction. Future prospects of the full R3B setup at the FAI facility will be presented with a status of the facility.

1) Panin, V., et al., Phys. Lett. B797, 134802 (2019)

2) Duer, M., et al., Nature 606, 678 (2022)

3) Kondo, Y. et al., Nature 621, 17 (2023)

### Attendance Type

In-person

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