

## PhD position in experimental nuclear physics

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### Study of drip-line phenomena in neutron-rich nuclei

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The physics at the drip line (limit of particle stability) is currently offering many new discoveries related to shell evolutions, clustering or halo formation and their medium dependence, evolution of pairing and nuclear superfluidity at the drip line, with direct connections spanning from others open quantum systems to nuclear astrophysics. In this project, we wish to study the evolution of superfluidity towards the drip-lines, in particular searching from its evolution from a traditional BCS nuclear pairing towards the formation of Bose Einstein Condensates in more dilute systems. We also plan to study if the Ikeda conjecture, that was proposed from the systematic observation of narrow resonant alpha cluster-states states close to the corresponding alpha emission-thresholds (such as in  $^{12}\text{C}$  and  $^{16}\text{O}$  in which their location is crucial to govern the  $^{12}\text{C}/^{16}\text{O}$  abundance ratio in the universe), can be generalized to two or four nucleons clusters. These studies will be carried out at the FAIR facility using the instrumentation available at the R<sup>3</sup>B beam line, which allows detecting all reaction products (ions, light charged particles, gamma and neutrons) that are requested to evidence these new fascinating phenomena.

#### Expected skills:

Ideally good skills in detection, software analysis and simulations

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