

# First results from the new isotope search experiment at GSI in FAIR Phase-0

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By 2023 a totality of 3337 nuclides have been discovered by mankind [1] of which 445 have been discovered at GSI in its various experimental areas (FRS, SHIP, TASCA, Online Mass Separator etc..) which ranks it as a second place in worldwide discoveries. Continuing this tradition, we report in this paper of an experiment performed at the GSI in FAIR Phase-0 where new isotopes were identified with the FRagment Separator [2] using an high intensity, high duty cycle <sup>208</sup>Pb beam fragmentation on a beryllium target. The experiment, part of the scientific program of the Super-FRS Experimental collaboration [3], focused in the neutron rich region between terbium and rhenium, close to the N=126 line. This region is of particular interest for the NUSTAR collaboration [4] and close to the third waiting point of the r-process. As such, we used the reported experiment as a benchmark for the production of heavy ions in this region for further studies during the FAIR phase 0 NUSTAR program.

During the experiment, we utilized two ancillary setups, the FRS Ion Catcher [5] to perform mass measurement and the active stopper from the RISING collaboration [6] to perform measurement of beta half-lives in parallel to the production of new isotopes. Preliminary results of this new measurements including 20+ new isotopes and new masses measurement will be presented. The new isotopes will be discussed in the context of abundance models.

[1] Discovery of Nuclides Project: <https://people.nsl.msu.edu/~thoennes/isotopes/>

[2] H. Geissel et al., Nucl. Inst. Meth. B 70, 286 (1992)

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[4] N. Kalantar-Nayestanaki, A. Bruce, Nucl. Phys. News, 28, 5 (2018)

[5] W. R. Plaß et al., Nucl. Inst. Meth. Phys. Res. B. 317, 457 (2013)

[6] R. Kummer et al. Nucl. Inst. Meth. Phys. Res. A. 598, 754 (2008)