Atomic masses play an important role in nuclear astrophysics. The lack of experimental values for nuclides of interest has triggered a rapid development of new mass measurement devices around the world, including Time-of-Flight (TOF) mass measurements.

The TOF technique, with access to the most exotic nuclides (minimum rate requirement of the order of 0.01 particles/s and a measurement time shorter than ~1 µs), is a complementary method to the very precise but more limited Penning trap mass measurements.

Recently, the TOF-B technique that includes a position measurement for magnetic rigidity correction has been implemented at the NSCL facility using the A1900 separator and the S800 spectrograph.

The first experiment, focused on the neutron rich isotopes in the Z = 20-30 region, important for r-process calculations as well as for calculations of processes occurring in the crust of accreting neutron stars, has been successfully performed.

An experiment with a similar TOF-B technique for nuclei in the rp-process path is approved and planned by the same collaboration at the next generation radioactive beam facility RIBF at RIKEN. The BigRIPS separator and the zero degree spectrometer will be used to provide the cocktail beam of interest and the magnetic rigidity correction.

In this presentation details of both techniques, together with the final results from the first NSCL experiment, will be presented. The impact on nuclear astrophysics as well as future plans will be discussed.