FRAGMENT IDENTIFICATION AND HIGH PRECISION ALIGNMENT

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The R3B collaboration at GSI/FAIR uses a complex detector system to make kinematically complete measurements of reactions with relativistic radioactive beams. The neutrons, fragments and protons produced in the collisions are separated with a large-acceptance dipole magnet behind the target and several detectors are used to determine the 4-momentum vector, mass and charge of the fragments. The directions of both the incoming beam and the outgoing reaction products are measured using several detectors with high spatial resolution. The resolution of the mass measurement requires high-precision tracking of the fragments; hence the alignment of the detectors is crucial. However, achieving an alignment with the same precision as the resolution of the detectors is a challenging task. An alternative is to align the detectors with as high an accuracy as possible and move the detectors virtually based on the data collected. This can be done in different ways and I will present a combination of two alternatives, one for the detectors in front of the magnet and one for those behind the magnet. The first method is based on the use of the straight trajectories of the incoming ions, while the second method exploits the result of the first to track the fragments through the magnet. The combination of these two methods both improves the mass resolution of the fragments and gives a more consistent alignment between different magnet settings, compared to previous methods.