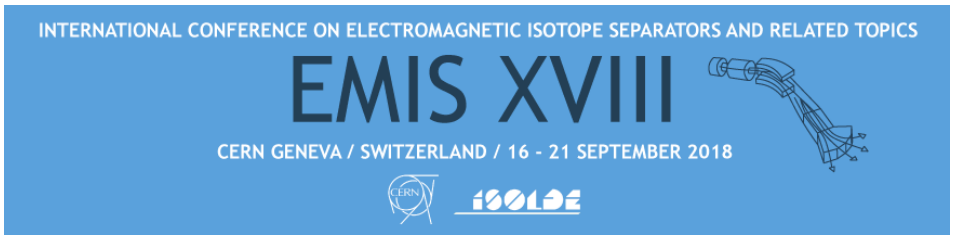

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New ion-optical modes of the BigRIPS and ZeroDegree Spectrometer for the production of high-quality RI beams

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The BigRIPS projectile fragment separator[1,2] is presently the most powerful device for the research of exotic nuclei separated in flight. The scientific merits and potential of the BigRIPS and its combination with the ZeroDegree spectrometer[2] have been demonstrated in many dif-ferent experiments since more than 10 years[3]. The intensity of the primary beam provided by the Superconducting Ring Cyclotron (SRC)[4] has been increased in the recent years by more than 2 orders of magnitudes which directly yields higher intensities of spatially separated exotic nuclei at the final focal plane of BigRIPS, but inevitably it causes also higher background. The spatial separation of fragments is per-formed by a two-fold $B\rho - \Delta E - B\rho$ method using two wedge-shaped degraders placed at the central focal planes of the first-stage (F0 to F2) and second-stage (F3 to F7). In the standard operating mode of BigRIPS, the 2 $B\rho - \Delta E - B\rho$ spatial separations are subtractive in resolving power, we present here an additive mode which has been developed and realized in first machine tests. The calculated significantly increased spatial separation power has been demonstrated in measurements and examples of experiments will be presented in this contribution where the additive mode is essential. In addition to the higher separation power, the additive mode has a favorable image condition at F6 which allows for a back-ground reduction via application of slits and diagnostics. Higher ion-optical resolving power modes at dispense of slightly lower transmission are also investigated and discussed. The lat-ter will give access to heavier elements. The coupling of BigRIPS and ZeroDegree is presently realized via two independent achromatic systems. A dispersion-matched mode and also a higher angular acceptance of the ZeroDegree are also presented in this report.

References:
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