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Charge Breeding Experiences with an ECR and an EBIS for CARIBU

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The efficient and rapid production of a high-quality, pure beam of highly charged ions is at the heart of any radioactive ion beam facility. An ECR charge breeder, as part of the Californium Rare Ion Breeder Upgrade (CARIBU) program at Argonne National Laboratory, was developed to fulfill this role. The charge breeding efficiency and high charge state production of the source were at the forefront of ECR charge breeders, but its overall performance as part of the accelerator system was limited by a pervasive stable ion background and relatively long breeding times. Steps were taken to reduce the level of background contamination but met with limited success. As such, an EBIS charge breeder was developed and tested in an off-line configuration. The EBIS demonstrated good breeding efficiencies, shorter residence times, and reduced background. The ECR charge breeder was decommissioned in late 2015 and the installation of the EBIS has been proceeding. The experiences with these breeders, possible paths forward, and the current status of the EBIS installation will be discussed. This work was supported by the U.S. Department of Energy, Office of Nuclear Physics, under Contract No. DE-AC02-06CH11357 and used resources of ANL's ATLAS facility, an Office of Science User Facility

Auteur principal: VONDRASEK, Richard (Argonne National Laboratory)

Orateur: VONDRASEK, Richard (Argonne National Laboratory)

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