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CONSIDERATION OF PARTICLE CHARGE AT SHIELDING ANALYSIS OF HEAVY ION ACCELERATOR

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A shielding analysis was carried out for 90 degrees bending section of heavy ion accelerator of RISP (Rare Isotope Science Project). A projectile beam is 18.5 MeV/u, 9.5 pμA U-238 with charges of 33+(50%) and 34+(50%). A thin carbon stripper is placed to generate higher positive charged U beam at the front of the 90 degrees bending section. The bending section consists of many quadrupole magnets, two dipole magnets and two two-cell type superconducting RF cavities. The charge state with maximum intensity was found as 79+ using LISE code. We used two Monte Carlo codes, FLUKA and PHITS for this shielding analysis. Both codes have a subroutine of particle transport in a magnetic field but don't have a subroutine to treat multi-charged particle except of fully-ionized particle like U92+. Therefore, we applied simple technique to consider the relationship of charge-magnetic field and charge-energy of U beam. Finally, much precise results like the dose distribution depending on particle charge was produced and the effect of this approach is discussed in this paper with benchmarking results of U-beam induced reactions.

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