

**Nonlinear Beam Dynamics Effects in Heavy Ion Transport Line,** Y. BATYGIN, A. GOTO and Y. YANO, RIKEN - Beam quality of a high-intensity heavy-ion accelerator is mostly defined by the extraction region of the ion source where nonlinearity due to space charge and focusing field are significant. Beam optics in the extraction system of the ECR ion source are examined both analytically and numerically, by taking nonlinear effect due to aberrations of einzel lens into account. It is shown that this effect can cause beam intensity redistribution and strong emittance growth. Simple formula has been derived to estimate the significance of spherical aberrations on the beam profile redistribution. Analysis of the formula shows that the beam profile is conserved if  $C_a R^2 < 0.2$  where  $C_a$  is a spherical aberration coefficient and  $R$  is a beam radius. Emittance growth and optimal matched conditions of the beam with the subsequent acceleration structure are examined.