

**Halos and Chaos in Space-Charge Dominated Beams**, J-M. LAGNIEL, CEA-Saclay - For the high-current ion accelerators which are needed as drivers to produce high neutron flux in numerous new projects, beam losses must be extremely low in order to avoid an unacceptable radioactivity level in the machine area. The mechanisms leading to the formation of a diffuse halo around the beam core are then extensively studied since some years. The first aim of this paper is to summarize the main results obtained from both analytical studies and numerical simulations related to halo formation in continuous and periodic focusing channels. The nonlinear resonances and the chaotic particles trajectories which are induced by the space-charge forces are analysed. Finally, some preliminary results concerning the longitudinal motion will be presented.