

Experimental Studies of Space-Charge Dominated Beams using Laser-Cooling, P. BOWE, M. DREWSEN, J.S. HANGST, L.H. HORNEKÆR, N. KJÆRGAARD, N. MADSEN, J.S. NIELSEN, P. SHI, Institute of Physics and Astronomy, University of Aarhus, Denmark; J.P. SCHIFFER, Argonne National Laboratory, Chicago, Illinois, USA; V.A. LEBEDEV, Thomas Jefferson National Laboratory, USA - Laser-cooling a stored beam of heavy ions in the ASTRID storage ring has enabled us to create and sustain strongly space charge dominated beams, both for coasting and bunched beam operation. In the talk we will present the most recent results from these experiments and discuss the implications for the attainment of a crystalline ion beam. A recently developed technique for transverse beam profile diagnostics, utilizing the fluorescence from the laser-cooled ion beam, has enabled us to study simultaneously all spatial dimensions of the ion beam. Using this technique we have monitored the particle density profile of the space charge dominated ion beams. These profiles are of importance to many high intensity beam applications, where the beam dynamics depends strongly on the particle density profile.