

Filamentation Effects and Image Charges in High β Proton Transfer Lines, K. BONGARDT, M. PABST, KFA Juelich; A.P. LETCHFORD, RAL Didcot; V.G. VACCARO, L. VEROLINO, Univ. of Naples & INFN Naples - The transfer line after a high intensity proton linac can be quite complicated due to either target illumination requirements or the matching conditions for loss free ring injection afterwards. In most cases, it is neither possible nor necessary to keep the beam bunched. Space charge forces are small but still effective due to the high bunch current. For transfer lines without bunching, they cause an increase in energy spread and filamentation longitudinally. Due to the increase in phase width, image charges in all three planes can no longer be neglected. As an example, the 1.33 GeV, 200 mA bunch current transfer line between the linac and compressor ring of the European Spallation Source (ESS) is studied in detail. Monte Carlo simulations with 50000 fully interacting particles are presented. Special emphasis is given to image forces for a realistic particle distribution with 'soft' edges as comes out of the ESS linac.