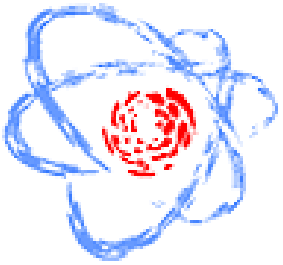

Contribution ID: **230** Type: **not specified**

Theory and simulations of highly charged ion beam emittance, extracted from EBIS\ESIS ion source: influence of the magnetic field, the dip of the electron beam\string potential and the ion beam space charge.

Friday 10 June 2022 14:15 (10 minutes)

Ion beam emittance is vital for the evaluation of the extracted beam properties. The transverse emittance, horizontal or vertical, is a measure of the parallelism of the beam and it is proportional to the area filled by the ion trajectories in the phase space plot. In this study we use both analytical and numerical approaches towards definite understanding of a transvesre dynamics for highly charged ion beams extracted from ESIS Krion-6T - main ions source for injection complex of NICA\MPD project. We study beam dynamics and its contribution into transverse ion beam emittance, caused by three, rather independent, factors: 1) crossing of ESIS solenoid magnetic flux by the ion beam extracted from ESIS paraxially; 2) ions temperature prior their extraction from ESIS ion trap; 3) ion beam space charge contribution in to emittance. For the p.-p 1)- 2) above we found a good correspondence between the analytical estimates and our numerical calculations for various essential parameters. We have confirmed that for sources of the EBIS/ESIS type, the contribution to the transverse emittance from the temperature of ions significantly exceeds the "magnetic field contribution". Space-charge contribution to the transverse emittance is a strongly nonlinear problems and it was attacked numerically with use of CST code. Final results will be discussed in framework of injection efficincy estimation for the present configuration of NICA injection complex: transverse ion beam emittance, extracted from Krion-6T ESIS, versus RFQ-HILAC acceptance.

Summary

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Session Classification: Sectional talks