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Momentum spread measurement method for the space charge-dominated ion beams

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The evolution of charged particle distribution function is described by Fokker-Planck equation. The stationary solution of Vlasov-Fokker-Planck equation that takes into account space charge induced field and predicts the equilibrium line density of circulating bunch is the Haissinski equation. In this work we have described the method of rms momentum spread measurement from longitudinal bunched beam profiles obtained with fast current transformer on NICA Booster synchrotron. The method of transcendent Haissinski equation derivation for the fitting of data, as well as the evolution of momentum spread and space charge impedance Z/n for circulating Xe ions in the presence of electron cooling are demonstrated.

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