

Experimental Study of Impedances and Instabilities at the VEPP-4M Storage Ring,

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- Beam current in the VEPP-4M electron-positron collider is limited by the fast head-tail instability, occurred due to an interaction between the beam and wake fields. Threshold current is determined by the transverse impedance of the vacuum chamber. The transverse impedance was measured by beta function variation. For study of the longitudinal and transverse impedances in frequency domain, deviation of equilibrium RF phase and coherent betatron tune shift were measured in dependence on various beam length. Longitudinal and transverse local energy loss factors were studied also, using measurements of closed orbit and betatron phase advance deviations in dependence of beam current. Beam evolution after injection was observed by a beam position monitor using turn-by-turn measurement technique. Beam motion was studied by computer simulation based on the two particle model. Results of the simulation are in good agreement with the experimental data. The way to suppress the instability is a feedback system for stabilization of coherent dipole beam oscillations.