synchrotron radiation sources. In order to allow easy before-hand estimates for the application to other accelerators we determine scaling relations for achievable accuracies as a function of BPM resolution and used number of BPM and dipole correctors.

TPPH068 Measurement of the Longitudinal Microwave Instability in the APS Storage Ring

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We studied a longitudinal, single-bunch instability in the Advanced Photon Source (APS) storage ring. The previous measurements of bunch lengthening had showed significant bunch lengthening without a comparable growth in energy spread [A.H. Lumpkin et al., NIM A393, 50 (1997)]. Since the small dispersion at a bending magnet source point made it difficult to resolve the small change in the energy spread, we adjusted the lattice to make a dispersion bump within a sector in order to have a large dispersion at the source point. With the enhanced beam size we could measure the energy spread with greater accuracy. We observed anomalous growth in the energy spread beyond a threshold current of 7.2 mA with rf voltage of 9.4 MV. The amount of energy spread increased from 9.0E-4 to 9.8E-4 above the threshold current up to 10 mA. We also observed the appearance of the coherent signal at four times the synchrotron frequency beyond the threshold current, which indicates that the growth in energy spread is due to a longitudinal instability.

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TPPH069 Broad-Band Model Impedance for the Advanced Photon Source Storage Ring

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The vacuum chamber components of the Advanced Photon Source (APS) storage ring has been modified since the facility's initial construction. A notable modification includes narrow-gap chambers for insertion devices. We used the Bane-Heifets model to describe the broad-band longitudinal impedance of new and old vacuum components in the ring. We found that the model with a few expansion terms fitted the wake potential well. In this paper we present the impedances of individual components and the impedance of the ring.

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TPPH070 Measurement of Local Transverse Impedance of Narrow Gap ID Chambers in Storage Rings by Local Bump Method

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A local bump method has been proposed to determine the transverse impedance of narrow gap ID vacuum chambers. As a stored bunch passes through an impedance section, the bunch receives a small transverse kick, which depends on the bunch total charge, the bunch length and the transverse position. The kick can be measured as a function of orbit by applying a four-magnet bump and forcing closure by running orbit correction. We measured the ID vacuum chambers with apertures of gaps 5 mm and 8 mm, and a straight section with regular 42 mm aperture extrusion.Two types of local bumps are applied: a parallel and an angle bump, each of which emphasizes the impedance of different parts of the straight section.

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TPPH071 Transverse Coupling Impedance of the VEPP-4M Collider: Measurements and Simulations

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Large amount of the VEPP-4M transverse impedance (~2MΩ/m) is determined by places of vacuum chamber non-uniformity such as sharp change of cross section, vertical electrostatic separators and cavities HOMs. Computer code GdfidL is used for the estimate of impedances in some of these structures. Measurements of transverse impedances are performed by using of our method, which is based on measuring of closed orbit deviation caused by localized impedance. Transverse impedance acts on the beam as a defocusing quadrupole, strength of which depends on the beam current. If a local bump of closed orbit has been created at the impedance location then the orbit deviation occurs while varying the beam current. The local impedance can be evaluated using the orbit deviation measured. The results of measurements and numerical calculations are presented and compared.

TPPH072 Measured Transverse Coupling Impedance of RHIC Injection and Abort Kickers

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Concerns regarding observed transverse instabilities in RHIC pointed to the need for measurements of the transverse coupling impedance of ring components. The transverse coupling impedance of the RHIC injection kicker was measured using the conventional method based on the S21 forward transmission coefficient. A standard 300Ω TV cable served as the two-wire Lecher line. The ratio of S21(DUT)/S21(Ref) was interpreted via the lumped impedance as well as the log formula. Two injection kicker types, a transmission line and an all-ferrite kicker, are used in RHIC. The measured transverse impedance of each of the four 1m-long units was for both types found to be ~1.4 MΩ/m at frequencies up to 200 MHz. The source of resonances at higher frequencies remains to be studied. The abort kicker impedance seen at its terminals was measured insitu and interpreted as a transverse coupling impedance of 0.33 MΩ/m for each of the five meter long units, but was significantly higher at a 7 MHz resonance, attributed to the PFN stray capacity.

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TPPH073 RHIC Beam Components Impedance Analysis with MAFIA

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RHIC proton beam programs require detectors to be installed in both ring's warm sections. For the high intensity and short beam bunch runs, a high narrow-band coupling impedance of these devices may lead to a beam emittance blowup and a possible beam loss due to the coupled bunch instability. The beam parasitic loss on these components is also a concern. The polarimeter target box and the PP2PP's Roman Pot have been simulated by the MAFIA 3D to calculate the impedances in frequency domain. The calculation method was first cross-checked with the analytics for a pillbox cavity. The results for the polarimeter were second confirmed by the bead-pulling measurement. With an optimum design, the shunt impedances for both components are under the limits set by the instability consideration. No special cooling on these components is needed due to the parasitic loss.

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