

Electromagnetic Resonances near BPMs: Impact of Vacuum Chamber Discontinuities on BPM Signal Integrity

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Electromagnetic resonances localized near Beam Position Monitors (BPMs) can significantly distort the beam induced signal on the electrodes and compromise BPM readings. At the European Synchrotron Radiation Facility (ESRF), a detrimental resonance was identified in the vicinity of a BPM. It originates from a small break in the electrical continuity ($\sim 2\text{-}3\mu\text{m}$) due to the nearby RF gasket that expands and deforms during the bakeout. But other small gaps (for example from welds) may create similar resonances.

To prevent such a situation in SOLEIL II under-design storage ring, we are investigating the situation around the BPM that are integrated on bending magnet vacuum chamber. There is indeed a welding between two pieces of vacuum chambers located 30 mm from the BPM buttons creating a possible cavity. In collaboration with colleagues from ESRF, we have initiated simulation studies to assess the influence of such welding on nearby BPM readings. This contribution does not present results, but aims to trigger a discussion and gather feedback from the community, particularly regarding experience with possible resonances at welding location, simulation practices, and strategies to suppress or mitigate such effects.

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