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Shunt impedance calculations for an in-vacuum undulator at Petra IV

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A new in-vacuum undulator (IVU) with varying gap width is being developed for the new X-Ray source, PETRA IV at DESY. Its electromagnetic properties need to be investigated. These include, especially, the losses in the flexible taper transitions between the beam pipes and in the magnet array, as well as the impact of the IVU's impedance on beam stability. To assess the impedance of the structure, we employ numerical simulations. The challenges lie in the large size of the IVU, the wide frequency range due to the short bunch length, the highly resonant response of the system, and in the complex geometry of the structure. In a first step, wakefield simulations are carried out using CST Studio Suite. Subsequently, the shunt impedances are calculated by eigenmode simulations with the CST Studio Suite and a specialized in-house frequency domain impedance solver.

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Footnotes

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Yes

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