

HOM Characterization for Beam Diagnostics at the European XFEL Injector

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Higher Order Modes (HOM) excited by bunched electron beams in accelerating cavities carry information about the beam position and phase. This principle is used at the FLASH facility, at DESY, for beam position monitoring in 1.3 and 3.9 GHz cavities. Dipole modes, which depend on the beam offset, from the lowest order bands are used. Similar monitors are now under design for the European XFEL. In addition to beam position, the beam phase wrt accelerating RF will be also monitored using monopole modes from the first higher order monopole band. The HOM signals are available from two HOM couplers installed on each cavity. Their monitoring will allow the on-line tracking of the phase stability over time, and we anticipate that it will improve the stability of the facility. As part of the monitor designing, the HOM spectra in the 8 cavities of the 1.3 GHz cryo-module installed in the European XFEL injector have been measured. This paper will present their dependence on the beam position and charge. The variation in the modal distribution from cavity to cavity will be discussed. Based on the results, initial phase measurements based on a fast Tektronix oscilloscope are planned.

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