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## Orbit Jitter Analysis at SwissFEL

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With the beam synchronous readout of the beam position measurement at the hard X-ray FEL beamline Aramis at SwissFEL we analyze the intrinsic orbit jitter, using a classification algorithm and Principal Component Analysis (PCA). The method sorts the jitter in a set of eigenvectors and  $\lambda$ -values. With the magnitude of the eigenvalues the impact of the different jitter sources can be estimated. From the purely stochastic results we derive also a physical interpretation by matching the linear transport functions to the eigenvectors, reconstructing the orbit jitter in terms of the center of mass jitter of the electron bunch in the transverse positions, momenta, and the mean energy. Any deviation from the theoretical prediction indicates possible wrong set values of the transport magnets or errors in the BPM calibration (sign flip or faulty amplitude calibration). We present the results and give an outlook on extending the analysis to additional channels such as charge, compression and arrival time monitors as well as the FEL output signal.

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