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Beam-based characterization of a non-linear injection kicker at BESSY II

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Top-up operation at BESSY II is performed with average injection efficiencies of 98 %. However, the four-kicker bump and the septum, that form the present injection system, both contribute to a distortion of the stored beam with an amplitude of about two millimeters for several thousand turns after injection. A non-linear injection kicker (NLK) could be used to reduce the distortion due to the kicker bump by a factor of approximately 30 - a necessary condition for transparent injection. Studies with an NLK and optimized sextupole settings have shown that it is also possible to achieve injection efficiencies of up to 97 %. The NLK was characterized beam-based with regards to the application of the NLK for BESSY II user operation, a possible injection method for BESSY III and to get a better understanding of the limiting effects of the injection efficiency. Additionally, measurements and simulations were compared.

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