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Further aspects of the deterministic lattice design approach for BESSY III

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In the lattice design of the BESSY II successor, the diffraction-limited, Multi-Bend-Achromat (MBA) storage ring BESSY III, HZB follows the approach of deterministic lattice design. MBA lattices are composed of rather simple sub-structures: the repetitive unit cell, two dispersion suppression cells at the end of the achromatic section, and the focusing doublet or triplet with the straight section. As demonstrated in earlier papers, these sub-structures can be strategically optimized, once the optimization criteria are clearly defined. This paper deals with the optimal distribution of the bending angle between the (identical) unit cells and the two dispersion suppression cells, aiming at the lowest emittance. Further, options for utilizing different numbers of chromatic sextupole families are investigated with respect to their impact on the tune shift with momentum. Finally, the need for and benefit of harmonic sextupoles are treated.

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