

Updates to the MAX IV 3 GeV Storage Ring Lattice

Simon C. Leemann

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Abstract

The official lattice for the MAV IV 3 GeV storage ring has been updated. The new 20101101 branch [1] will replace the previous 20090901/20091125 branches. The positions of magnets and hence the optics have not changed. The BPM/corrector layout, the long straight length, and certain nomenclature have however been modified. This document summarizes the differences between the previous lattice and the new lattice.

1 Summary of Changes in the new Lattice

The following is a summary of the changes applied to branches 20090901/20091125 resulting in the new lattice branch 20101101.

- 2×18 mm drift space have been added around the first and last corrector pair in every achromat in order to satisfy engineering constraints. Consequently the length of the long straight (BPM center to BPM center) is now 4778 mm compared to the previous 4850 mm.
- The BPM and correctors next to SDend have been shifted 20 mm away from SDend (bringing them 20 mm closer to OYY) in order to satisfy engineering constraints.
- The 2nd vertical corrector in MC1 has been removed. There are now 10 BPMs, 10 horizontal correctors, and 9 vertical correctors per achromat. Accordingly, the lattice file now contains separate definitions for MC1 and MC2.

¹This document can be found at <http://www.maxlab.lu.se/node/999>

- The model for the correctors is more realistic. The horizontal and vertical correctors are now separated by a short drift space.
- The apertures of all elements in the OPA lattice files have been set to the default value of $a_{x,y} = 11$ mm.
- The OPA lattice files contain dipole slice bending angles using the same precision as their original specification in DDR Chapter 2.5 [2].
- The Tracy-3 lattice files now display dipole slice gradients in the same way as the OPA lattice files.
- The nomenclature and structure in the lattice files has been slightly updated for consistency with the DDR (LS, SS) [2].
- The Tracy-3 lattice files now contain the updated maximum cavity voltage of 1.8 MV. Obviously the cavity in the lattice is only a model for long. dynamics studies and has nothing to do with the placement of the six actual cavities in the real machine.
- The Tracy-3 lattice files now contain the proper octupole strengths per the DDR specifications [2].

2 Current Lattice Versions

Table 1 lists all current lattice versions, which code they have been written for, and what type of lattice they contain.

Table 1: List of all current lattice files.

File name	Code	Lattice contains	Superperiodicity
m4-20101101-410-bare.lat	Tracy-3	Bare lattice only	20
m4-20101101-411-4W.lat	Tracy-3	4 PMDWs	4
m4-20101101-412-4W10U.lat	Tracy-3	4 PMDWs and 10 IVUs	—
20101101-410-bare.opa	OPA	Bare lattice only	20
20101101-411-4W.opa	OPA	4 PMDWs	4
20101101-412-4W10U.opa	OPA	4 PMDWs and 10 IVUs	—

References

- [1] The updated lattice files can be found at <http://www.maxlab.lu.se/node/999>

[2] The MAX IV Detailed Design Report, available at <http://www.maxlab.lu.se/node/1136>