Updates to the MAX IV 3 GeV Storage Ring Lattice

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Abstract

The MAV IV DDR [1] chapters on linear and nonlinear optics (Sections 2.2 and 2.3) of the 3 GeV storage ring have been based on the 20090601 lattice. There have been two recent updates to this lattice branch: lattice version 20090901 (changes documented in [2]) and the latest version 20091125 which is now being made available [3]. The changes made in version 20091125 are minor are involve girder marker definitions to properly model errors with Tracy-3. Therefore, the OPA lattice files remain unchanged at version 20090901. This note details the changes made between versions 20090901 and 20091125. Since these changes involve markers only, all of the information previously given in the DDR and the conclusions drawn from it remain valid. A table with all current lattice versions is included at the end of this note.

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[1]This document can be found at `http://www.maxlab.lu.se/node/999`

1 Summary of Changes in the new Lattice

In order to properly model errors with Tracy-3 the lattice file needs to include markers that define where a girder starts and ends. In the case of the MAX IV 3 GeV storage ring the solid iron magnet blocks define the "girders". Because there are two separate girder markers that define the start and end of a girder, inversion of lattice segments (as was previously often done to better display the underlying lattice symmetry) is no longer possible as it could lead to girder end markers appearing in the lattice before girder start markers and hence crash the code. Therefore, the Tracy-3 lattice files have been changed to include girders and without use of segment inversion. This is the new 20091125 lattice branch.

It is important to note that these changes have no influence on the position or strength of any magnet in the lattice. The changes also do not modify the underlying symmetry of the lattice even though this symmetry is harder to recognize in the new 20091125 lattice file. Since the girder markers are only required for Tracy-3, the OPA lattice files have been left unchanged at version 20090901. Note therefore, that from a magnet and optics point of view lattices 20090901 and 20091125 are identical and no 20091125 lattice version has been made for OPA. The OPA lattice 20090901 corresponds *exactly* to the Tracy lattice 20091125.

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. Note that although the version number indicates a difference between OPA and Tracy lattice files, the magnet and optics properties are identical and correspond to the same original 20090901 branch.

Table 1: List of all current lattice files. Note that from a magnetic and optics point of view all belong to the same 20090901 branch.

File name	Code	Lattice contains	Superperiodicity
20090901-410-bare.opa	OPA	Bare lattice only	20
20090901-411-4PMDW.opa	OPA	4 PMDWs	4
20090901-412-4PMDW10IVU.opa	OPA	4 PMDWs and 10 IVUs	—
m4-20091125-410-bare.lat	Tracy-3	Bare lattice only	20
m4-20091125-411-4PMDW.lat	Tracy-3	4 PMDWs	4
m4-20091125-412-4PMDW10IVU.lat	Tracy-3	4 PMDWs and 10 IVUs	—

References

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

[2] S.C. Leemann, Updates to the MAX IV 3 GeV Storage Ring Lattice, MAX-lab internal note 20090902, available at `http://www.maxlab.lu.se/node/999`

[3] The updated lattice files can be found at `http://www.maxlab.lu.se/node/999`