

# Updates to the MAX IV 3 GeV Storage Ring Lattice

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## Abstract

The lattice for the MAX IV 3 GeV storage ring has been modified to include results from detailed vacuum engineering design. A new lattice m4-20111213-420 [1] has been branched off from the previous m4-20110117-420 version. As the optics have not been modified, beam dynamics studies performed with the previous m4-20110117-420 branch will remain valid. The previous lattices will be retained, however a new bare lattice file m4-20111213-420-bare is being made available in order to reflect updated positions and lengths of the elements contained in the lattice files. This document describes the changes that resulted in the new m4-20111213-420 branch. A list of current lattice files and their purpose is appended.

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<sup>1</sup>This document can be found at [http://www.maxlab.lu.se/maxlab/max4/max\\_iv\\_reports\\_public/](http://www.maxlab.lu.se/maxlab/max4/max_iv_reports_public/)

# 1 Modifications in the New Lattice

Detailed vacuum engineering design for the MAX IV 3 GeV storage ring has recently been completed. As a result, minor changes to the lattice have been made. This involves mainly the order in which horizontal and vertical orbit correctors are positioned as well as the position of the BPMs in the long straights (LS). These BPMs have been moved a bit farther into the LS in order to open up space for stainless steel chamber sections for fast correctors. The latter are however not included in the lattice files. The lattice files only contain orbit correctors intended for use in the slow orbit feedback (SOFB).

The following is a summary of modifications applied to branch m4-20110117-420 resulting in the new lattice branch m4-20111213-420.

- A dedicated septum element (1025 mm magnetic length) has been added to include the limiting horizontal aperture of 10.0 mm.
- The horizontal pinger magnet has been removed from the lattice. The dipole injection kicker will server as a horizontal pinger.
- The magnetic length of the vertical pinger magnet has been reduced to 150 mm.
- The dipole injection kicker has been moved upstream by 150 mm and its magnetic length has been reduced to 300 mm.
- The BPMs flanking the LS have been moved into the LS by 43 mm. This means the space available for IDs has been reduced from 4728 mm to 4642 mm.
- The corrector assemblies flanking the LS have been shifted toward the adjacent BPM by 3 mm.
- The order of the correctors in the corrector assemblies flanking the LS has been switched. The horizontal corrector is now closest to the BPM.

# 2 Current Lattice Files

Table 1 lists all current official lattice files [1] and what type of elements are included. The lattice files are human-readable and in Tracy-3 format. All lattice files contain BPMs and correctors (SOFB). Girder markers are also included.

Table 1: List of all current lattice files.

File name	Lattice contains
m4-20111213-420-bare.lat	Bare lattice, injection elements included, positions/lengths updated w.r.t. m4-20110117-420-bare.lat
m4-20110117-420-01pmuL.lat	1 pmuL installed in otherwise bare ring
m4-20110117-420-10pmuL.lat	10 pmuL installed in otherwise bare ring
m4-20110117-420-19pmuL.lat	19 pmuL installed, “fully loaded ring”
m4-20110117-420-2W.lat	$2 \times 4$ m PMDW installed in otherwise bare ring
m4-20110117-420-10U.lat	$10 \times 3$ m IVU installed in otherwise bare ring

## References

- [1] The updated lattice files can be found at [http://www.maxlab.lu.se/maxlab/max4/max\\_iv\\_reports\\_public](http://www.maxlab.lu.se/maxlab/max4/max_iv_reports_public)