MAD-X

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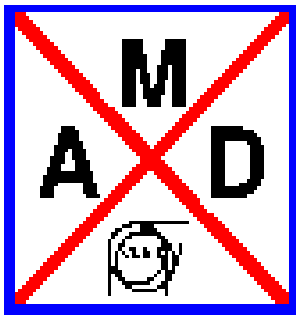


Overview

- What is MAD-X
- Running MAD-X
- Example Simulation
- Limitations of MAD-X
- PTC

What is MAD-X

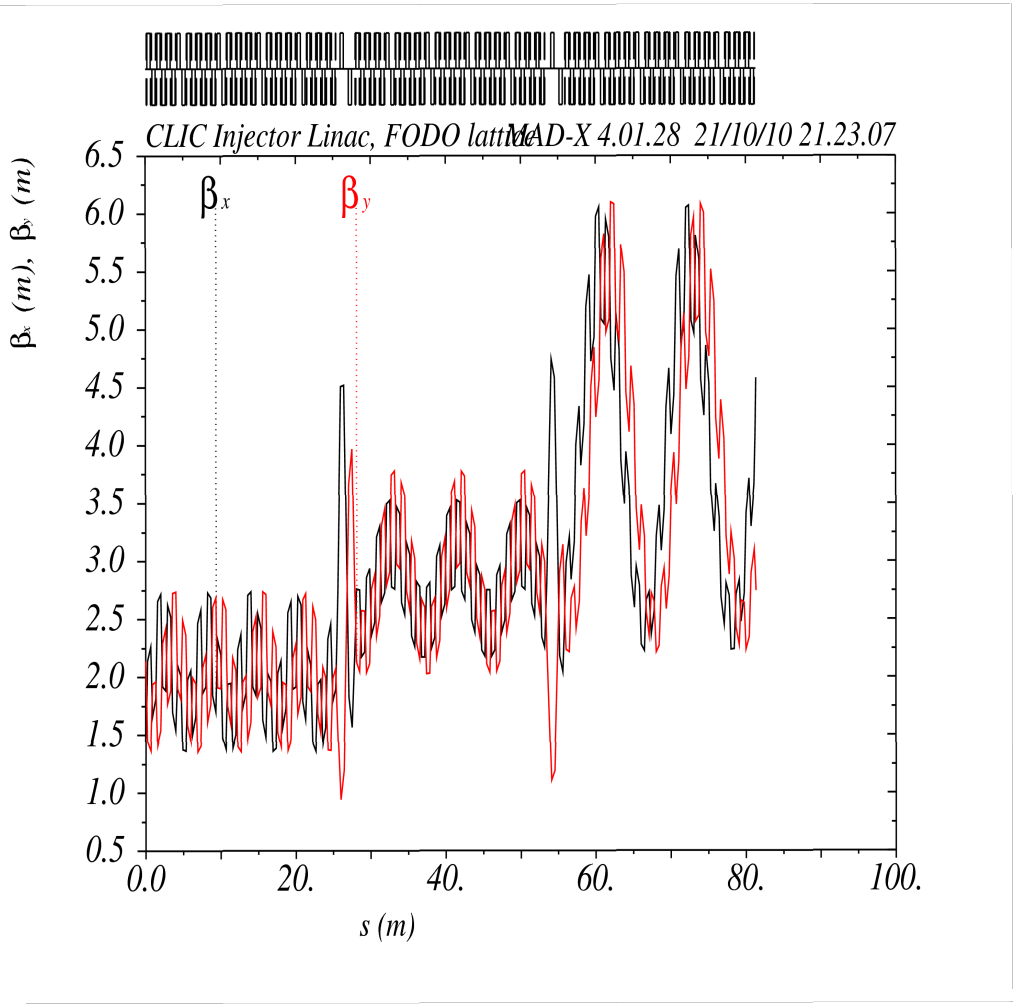
- MAD-X is a beam optics code
- Successor to MAD8 and MAD9
- Written in C, Fortran 77 and Fortran 90
- Available from SVN repository
- Runs on Linux, OSX and Windows
- Users Guide and other documentation available from MAD-X homepage http://mad.web.cern.ch/mad

Running MAD-X

- Can either run interactively or from a file
- Define a lattice
- Derive beta functions, tune, dispersion, chromaticity, momentum compaction in numerical form
- Generate tables and plots
- Run by typing: ./madx <filename>

Example Simulation

```
efinal = 2424;
nex = 9.2e-3;
ney = 9.2e-3;
// ****** Accelerating sections
// acceleration phase (rad/2pi)
phac = 0;
// acc. frequency
f0 = 2000;
// cavities
volt = 60, lag = 0, freq = 2000: rfcavity, volt = 60, lag = 0, freq = 2000;
// length of acc. section
lacc = 4.00;
// voltage on accelerating sections
voltc = (efinal-en0)/37;
// energy gain INCLUDING cavity PHASE
dener = voltc*cos(phac*twopi);
// gradients for acc. sections (used for LCAV definitions)
gvcav = voltc/lacc;
// gradients INCLUDING PHASE (used for energy gain calculation)
gecav = dener/lacc;
// ****** Define the quads
// length of quads
lqs1 = 0.42;
// length of quads
// ****** Define the drifts
// length before and after quad
ldmid = (lacc-6*lqs1)/6;
// length before and after quad
// ****** the first two sections of the linac are fodo
// first, search for the quadrupole gradients in one cell
// second, search for the input beta-functions
kqslf = 3.6;
// QS quadrupole
qfl: quadrupole, k1 = kqslf, l = lqs1/2;
```



Limitations of MAD-X

- Only calculates Twiss in 4D
- Does not track spins
- Designed for rings so not very easy to use for linacs
- Does not accelerate beams

PTC

- PTC stands for Polyorphic Tracking Code
- Written by E Forest
- Can be called from MAD-X
- Used to calculate Twiss Parameters in 6D
- Can do spin tracking
- Not very well documented

Thank you for listening