

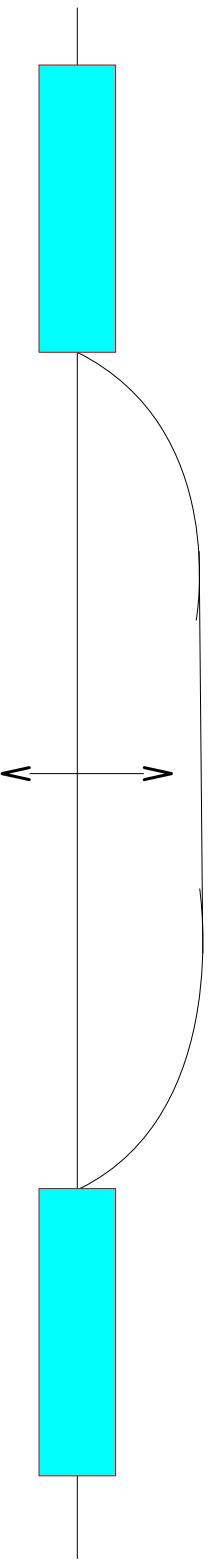
OSC simulation update

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1. Integrate the undulator radiation in tracking

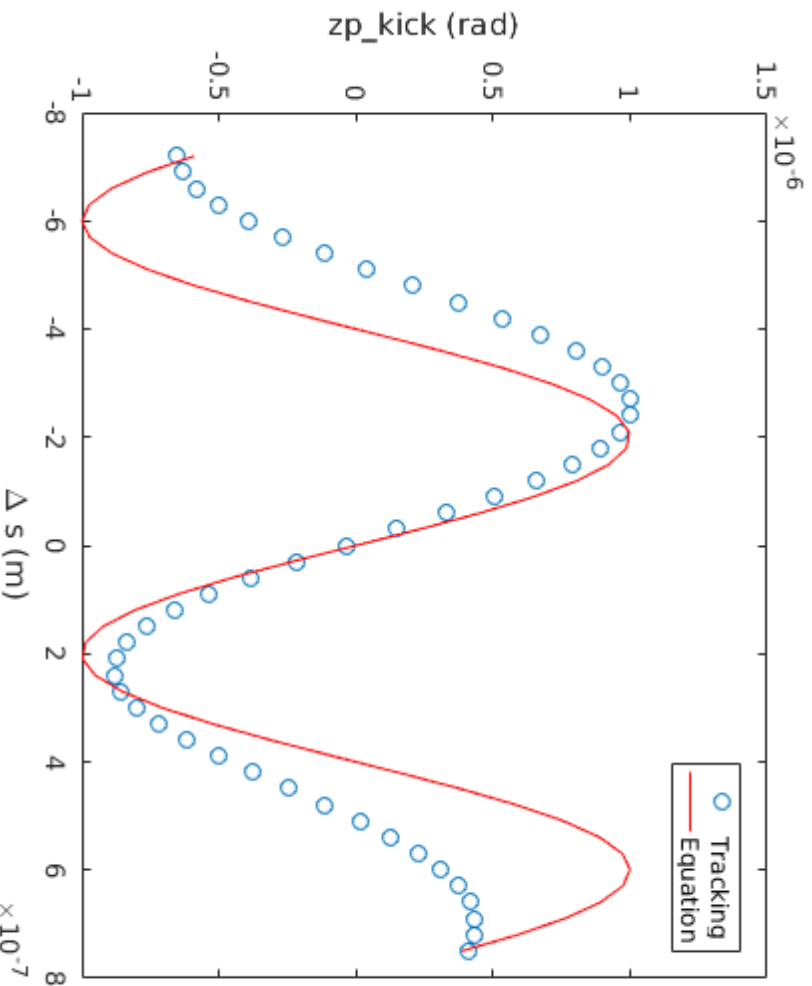
9/18/2018

Energy transfer kick by the undulator:



1. Track an electron through both undulators using fixed step Runge-Kutta method
2. Use Liendard-Wiechert formula to calculate the E field at the lens
3. Calculate the energy transfer which the electron receives at the kicker
4. The energy transfer depends on the time at which it arrives at the kicker undulator

Create a FORTRAN routine based on Vardan's code.



Equation: $\delta z_p = -G \sin(K\Delta s)$

Tracking: $\delta z_p = \delta E/E$

Normalized to $G=1E-6$

Planar undulator:

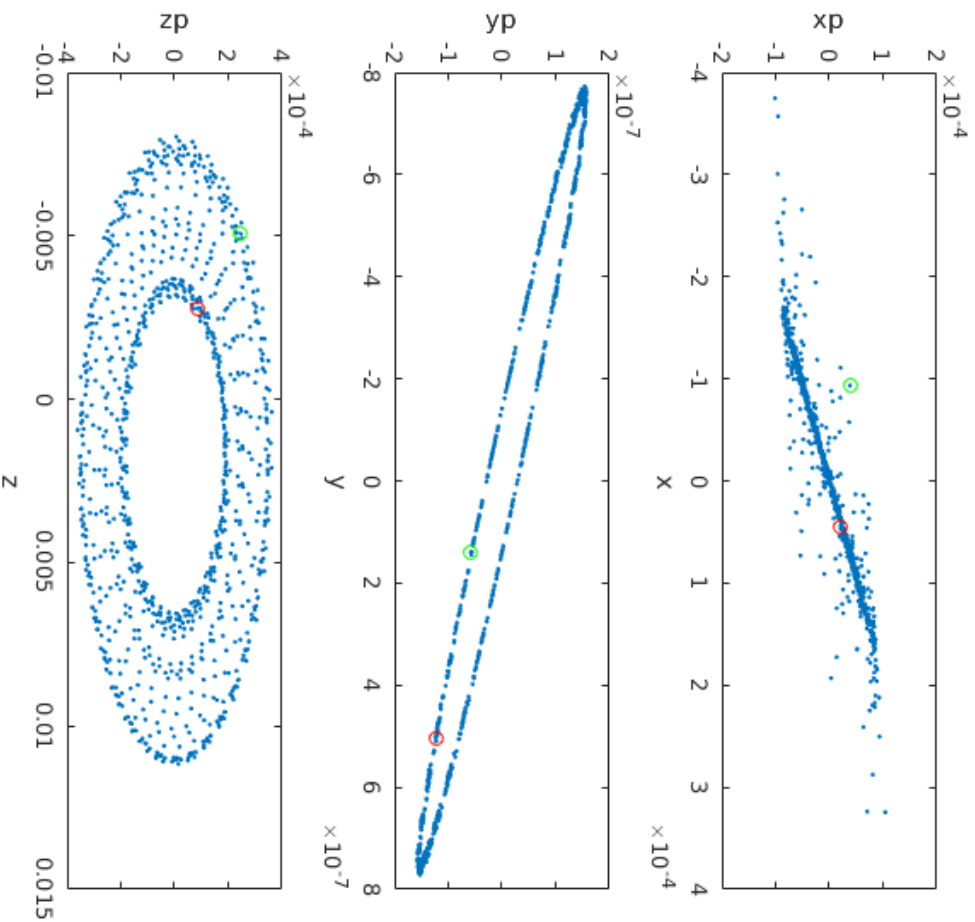
$L=2.6$ m, $K=4.0$, $B_0=0.0675$ T

$N_u=4$, $\lambda=800$ nm

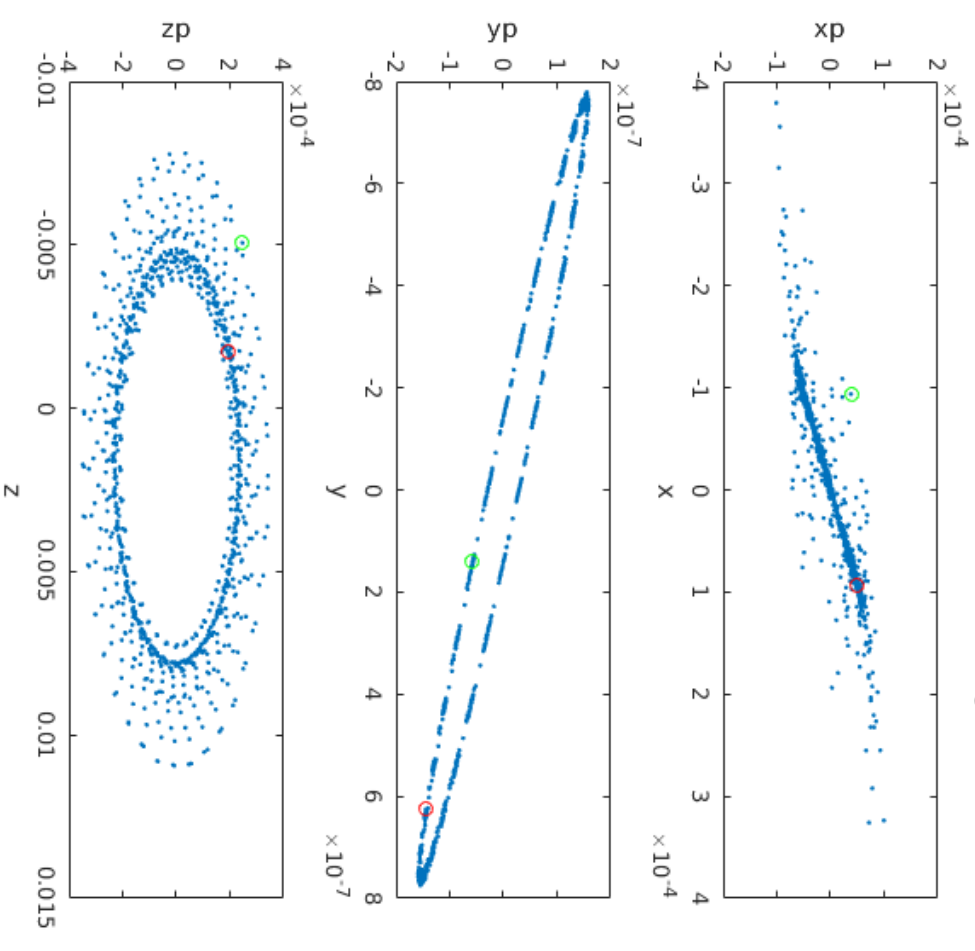
$E_{\max}=73$ meV

Track single particle for 1000 turns, with the same initial coordinates, $G=1E-6$

Equation



Undulator Tracking



Green: turn 1, Red: turn 1000

Both horizontal and longitudinal cooling are seen.

1000 turns for 12 hours

Further work

- Use real orbit for the energy transfer calculation