

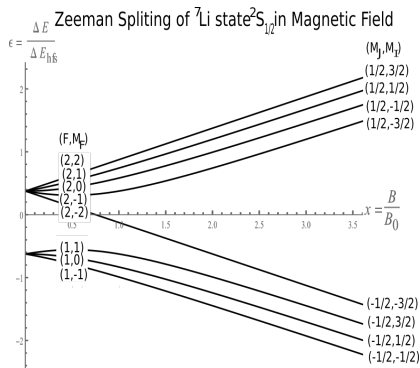
Magnetic Field Oscillation in Adiabatic Slower System for Cold Atom Physics

Yu Lu, Graduate student, Dept. of Physics
Nitish Mittal, Graduate student, College of Pharmacy
Xingyao Wang, Graduate student, CSEM

University of Texas at Austin

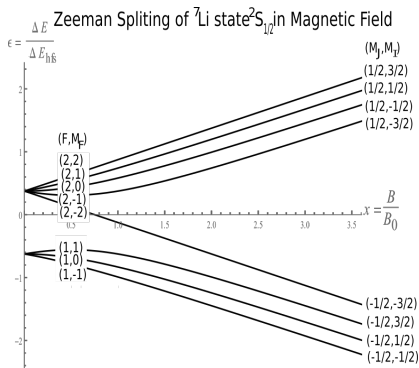
December 1st, 2016

Adiabatic slower and Field Oscillation

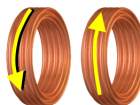


<http://demonstrations.wolfram.com/BreitRabiDiagram/>

Adiabatic slower and Field Oscillation



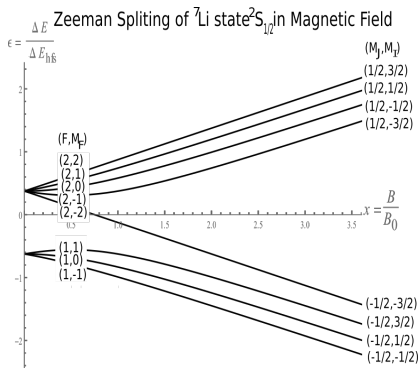
Anti-Helmholtz Coil



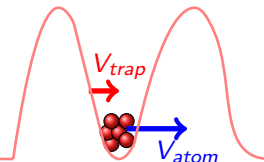
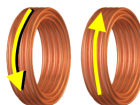
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E. Narevicius and M. G. Raizen. Chem. Rev. 112, 4879 (2012)

Adiabatic slower and Field Oscillation



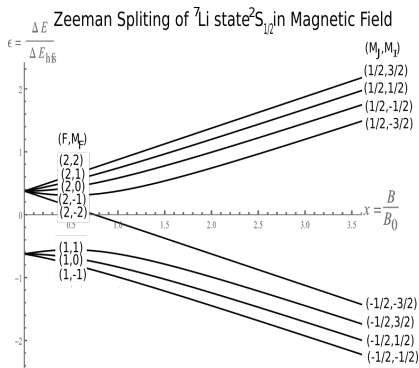
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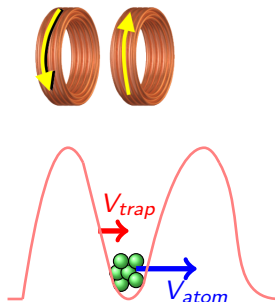
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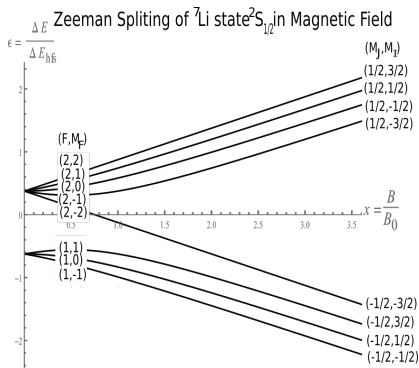
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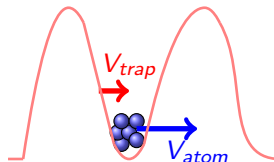
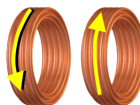
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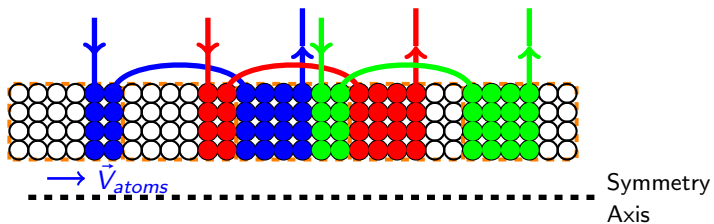
Anti-Helmholtz Coil



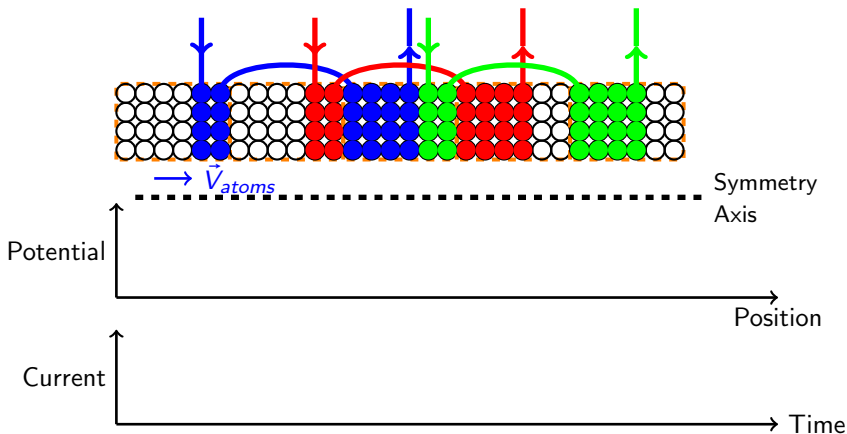
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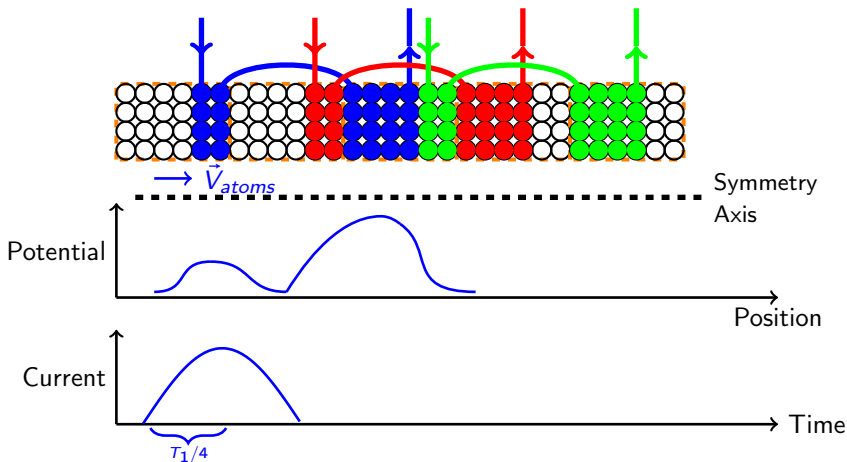
Field switching



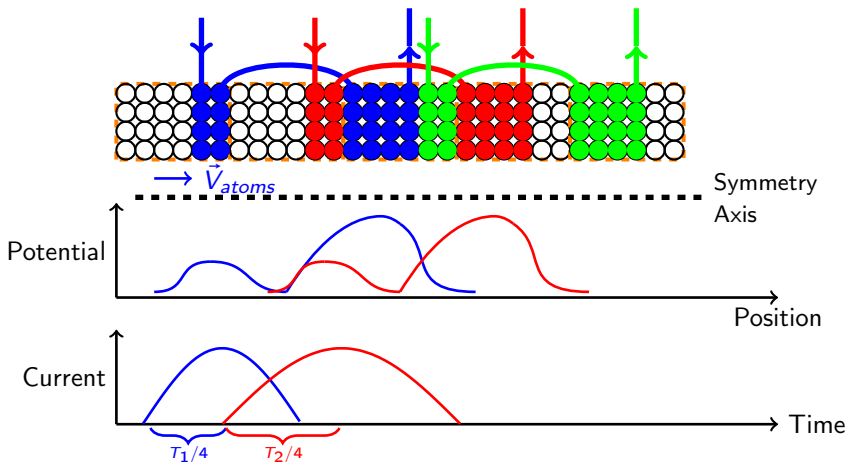
Field switching



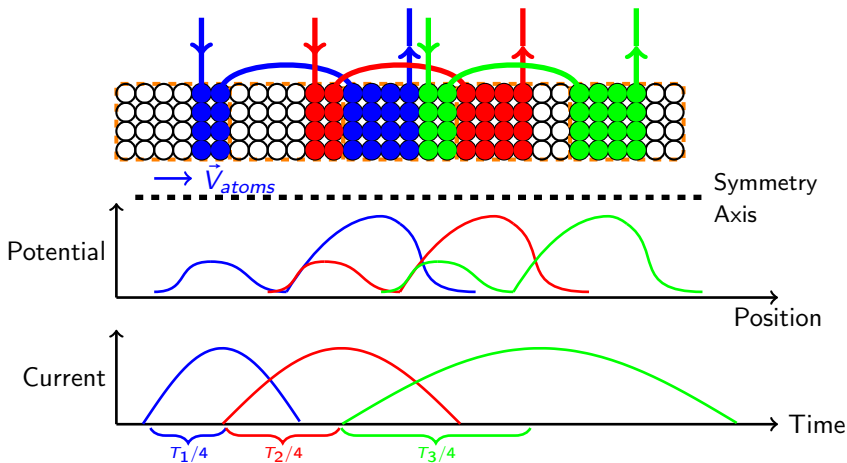
Field switching



Field switching



Field switching



Objective

Study the oscillation of magnetic field minimum during the transition

Method

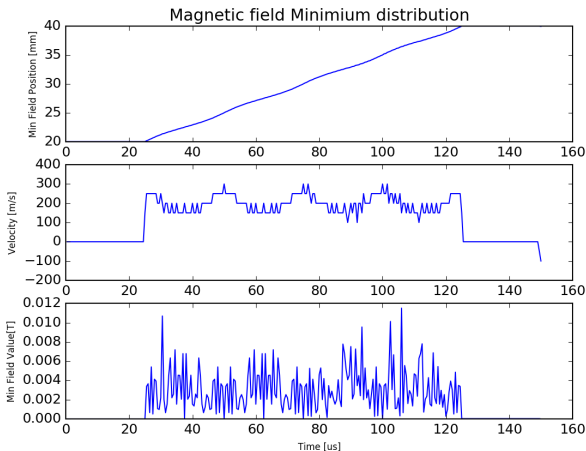
Programming languages: C++, Python, Shell

- ▶ Construct coil geometry and location
- ▶ Generate time dependent current in coils
- ▶ Loop Through time for certain periods.
- ▶ At each time point, loop through traps and position, calculate field distribution.
- ▶ Search for field minimum point and return position and value
- ▶ Save data file into csv file
- ▶ Call Python3 through Makefile to generate and save plots.
- ▶ Call Shell through Makefile to combine plots into gif.

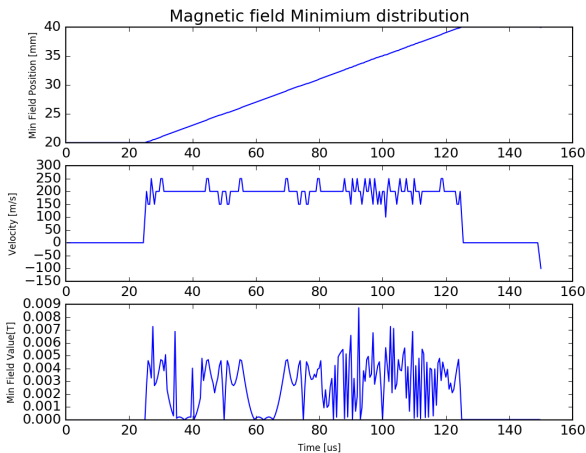
Codes: 3 head files, 13 .cc file, 2 python files, 1 shell script, 1 Makefile

Result and discussion

Current shape - sine

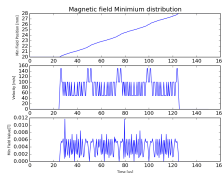
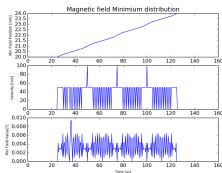
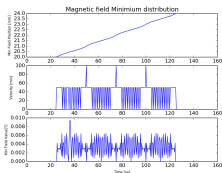
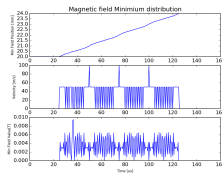
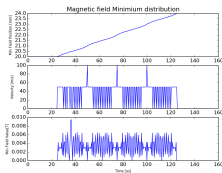
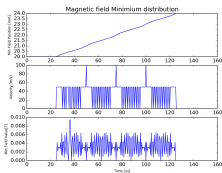


Current shape - triangle



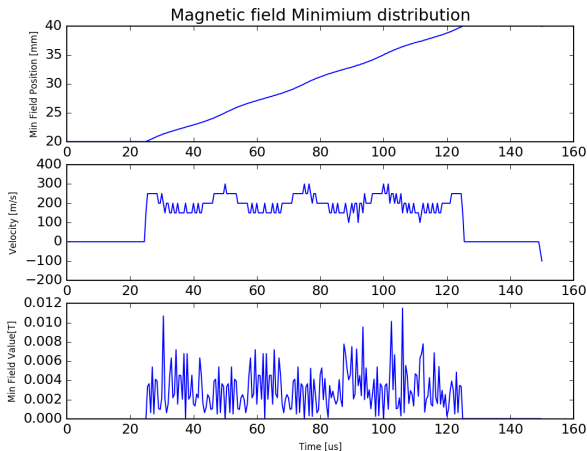
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Geometry overlap



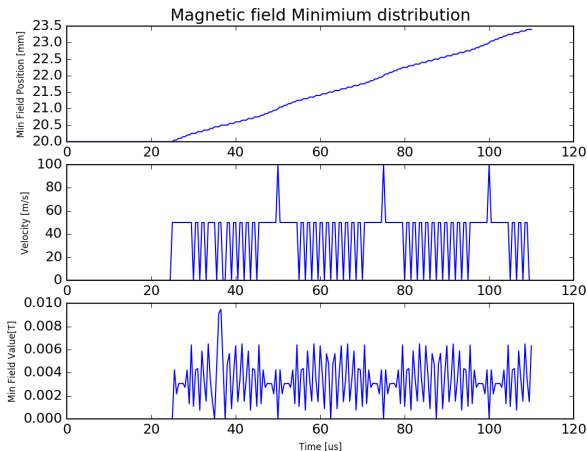
Time overlap

overlapratio: 0.5



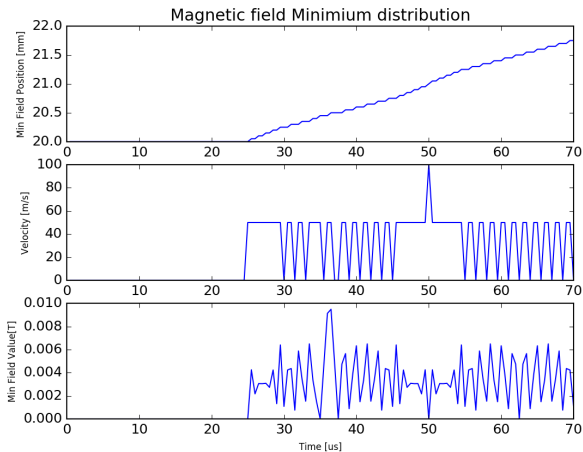
Time overlap

overlapratio: 0.7



Time overlap

overlapratio: 0.9



Thank you

Github:

<https://github.com/SuperYuLu/STC-2016>