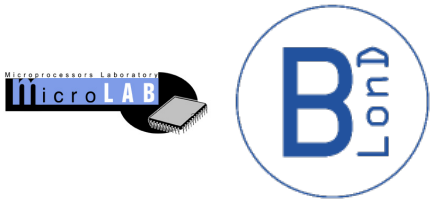
PhD Meeting

Konstantinos Iliakis



October 27, 2017

Table of Contents

PyHEADTAIL [1]

Facts

- The project started in early 2014, by Kevin B. Li (CERN).
- A port from HEADTAIL(2002), written in C/ Fortran, to Python.
- Numerical n-body simulation code for simulating beam dynamics with collective effects.
- Used actively in and outside of CERN. Still under development, seems to be reaching a mature state.

Features

- GPU Accelerated [2] using a "context manager" that manages the memory allocation and function implementation.
- Not fully utilizing the GPU potential. Relies on PyCUDA which is not as efficient as CUDA/ Thrust/ OpenACC.

[1] https://github.com/PyCOMPLETE/PyHEADTAIL

[2] http://cds.cern.ch/record/2239398?ln=en

Elegant [1]

Facts

- Electron Generation and tracking, started in 2000 by Michael Borland and Tim Berenc.
- Simulation of synchrotrons, linear accelerators and beam transport systems, full 6D particle tracking, written in C.
- Used for the needs of the Advanced Photon Source, Argonne National Laboratory, IL, US.

Features

- Since 2006 it has a parallelized (with MPI) version called Pelegant [2].
- Since 2015 there is also a GPU-accelerated version. [3]

[1] http://www.ipd.anl.gov/anlpubs/2000/08/36940.pdf

[2] http://www.aps.anl.gov/Accelerator_Systems_Division/Accelerator_Operations_Physics/publish/Pelegant_manual/Pelegant.pdf

[3] http://inspirehep.net/record/1337000/files/mopwo067.pdf

Other similar simulators

- PyORBIT [1]
- MuSiC [2]
- PATRIC [3]
- PyECLOUD [4]

[1] http://www.sciencedirect.com/science/article/pii/S1877050915011205
[2] https://cds.cern.ch/record/1986452
[3] https://dl.gi.de/bitstream/handle/20.500.12116/1929/paper06.pdf?sequence=1
[4] https://github.com/PyCOMPLETE/PyECLOUD

Thank you for your attention