Graduate Course on Planet Formation
Assignment 3

Professor Hanno Rein

Due: 11am, Friday, December 11th

N-body simulations with REBOUND

This assignment is about N-body simulations, but also about open source tools such as git/github. First, create a github account (if you don't have one already). Then fork the REBOUND repository `github.com/hannorein/rebound`. You can then clone *your* REBOUND repository to your computer and test the code by running one of the examples. Your task is to contribute a new example or tutorial to REBOUND. Look through the existing examples at `rebound.readthedocs.org` or on your own computer. Note that there are three different places where you can find examples: in the `examples/` directory for C examples, and in the directories `python_examples/` and `ipython_examples/` for python and Jupyter notebooks, respectively. Try to come up with a new example problem that is different from the ones that already exist, possibly related to what you are currently working on, or have been in the past. Be creative. Here are a few examples of what you could do:

- Kozai oscillations, possibly with tidal damping, leading to high eccentricity migration.

- Simulate the long term behaviour of irregular satellites.

- Import data for various spacecraft such as New Horizons, calculate their orbits into the future, estimate when they leave the Solar System.

- Choose a known Kepler multi-planet system and add one additional planet, scan the parameter space to search for stable orbits.

Instead of submittng a written report, you have to submit a pull request for this assignment. You can work in groups, sending me one pull request as a group. However, every person in the group has to be the author on at least one commit. Finally, a few stylistic guidelines:

- The examples should be relatively short and easy to understand. Try to write source code that is as clean as possible.

- Add comments. Make it interesting to read.

- Try to avoid having to run the simulations for a long time. Ideally the examples shouldn't take more than a few minutes to execute.

- Use as few external libraries as possible with the exception of numpy and matplotlib.