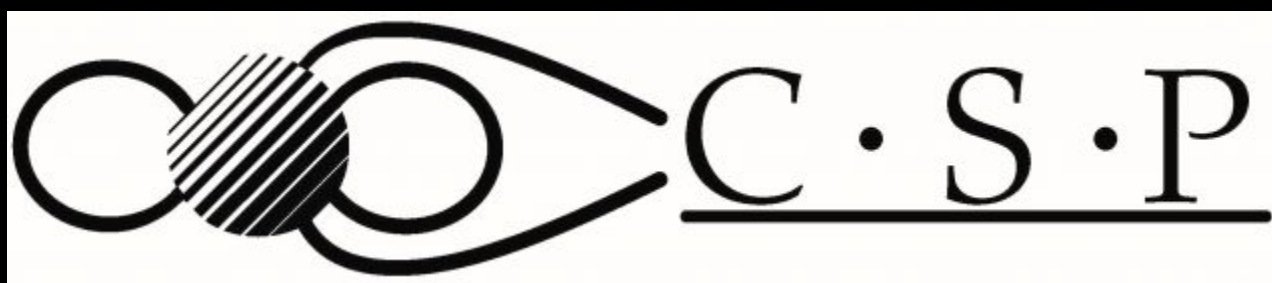


Rattanakorn (Save) Koontaweeponya and Meers Oppenheim

Boston University, Astronomy Department



Motivation

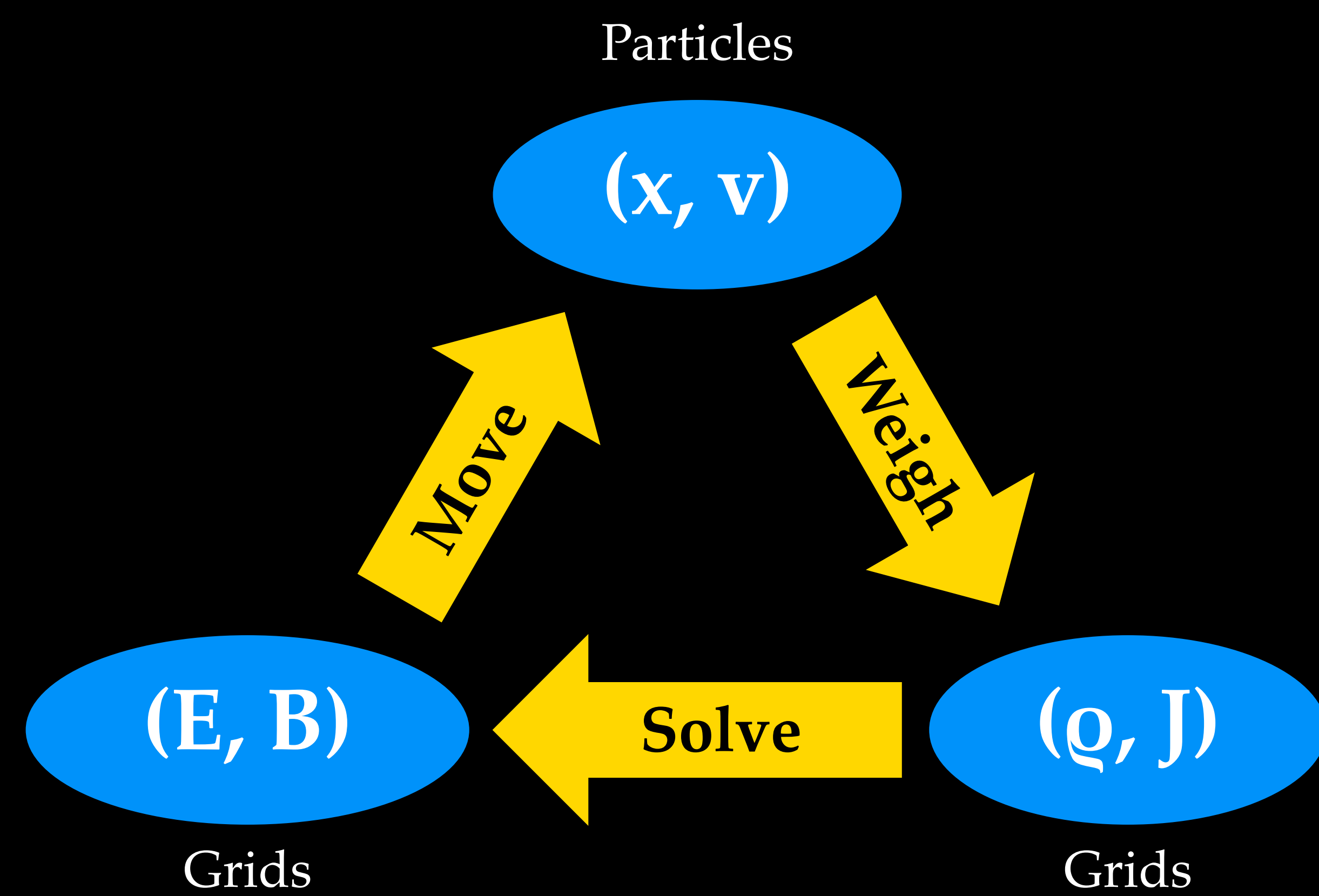
We needed an easy-to-use particle-in-cell (PIC) plasma physics simulation code for use in an introductory plasma physics course.

Method

We developed the 1DEMPyPIC Plasma Physics Simulator, a one-dimensional electromagnetic particle-in-cell plasma simulation code written entirely in Python.

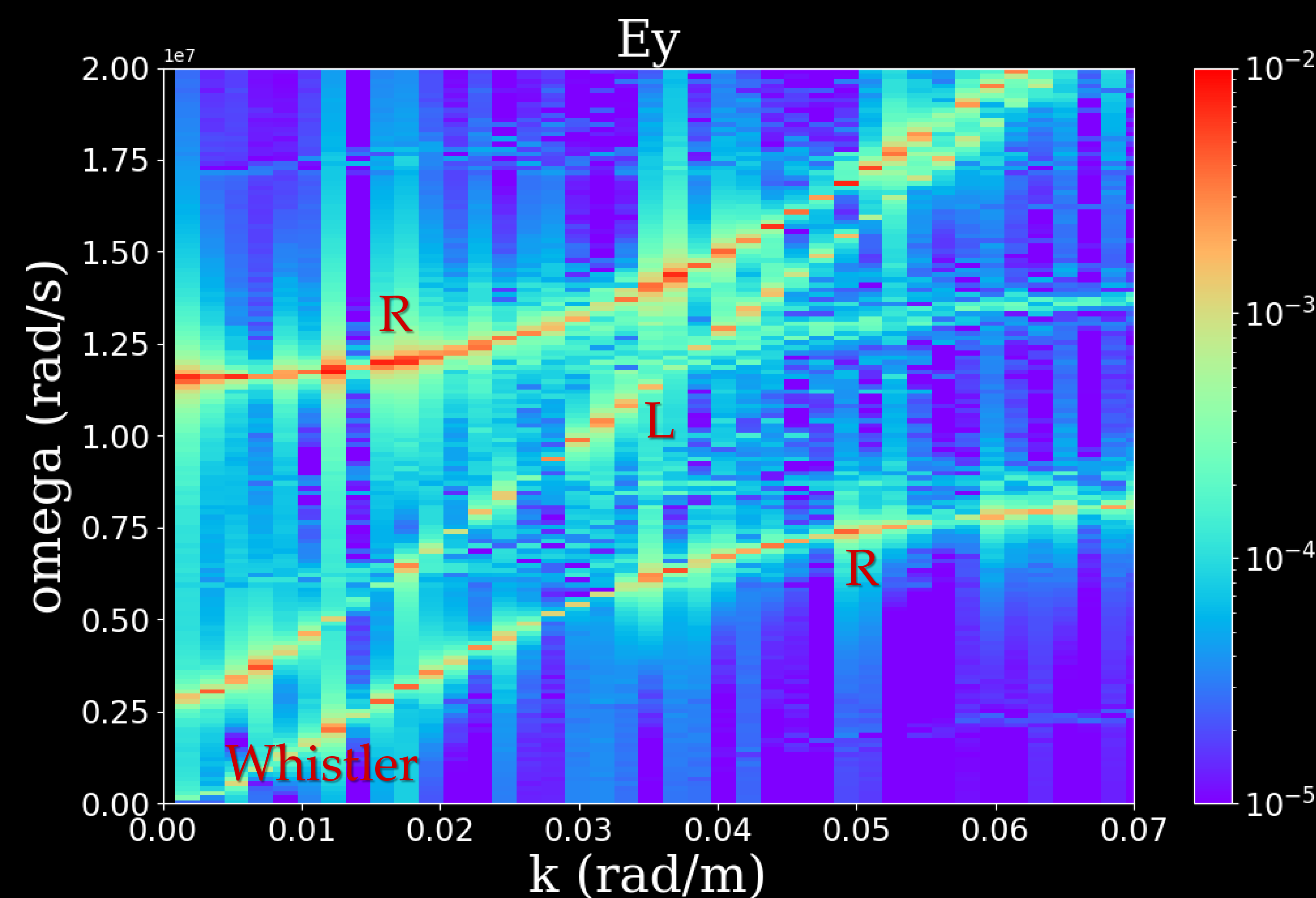
How does 1DEMPyPIC work?

1DEMPyPIC simulates plasma behavior using the plasma-in-cell (PIC) method.

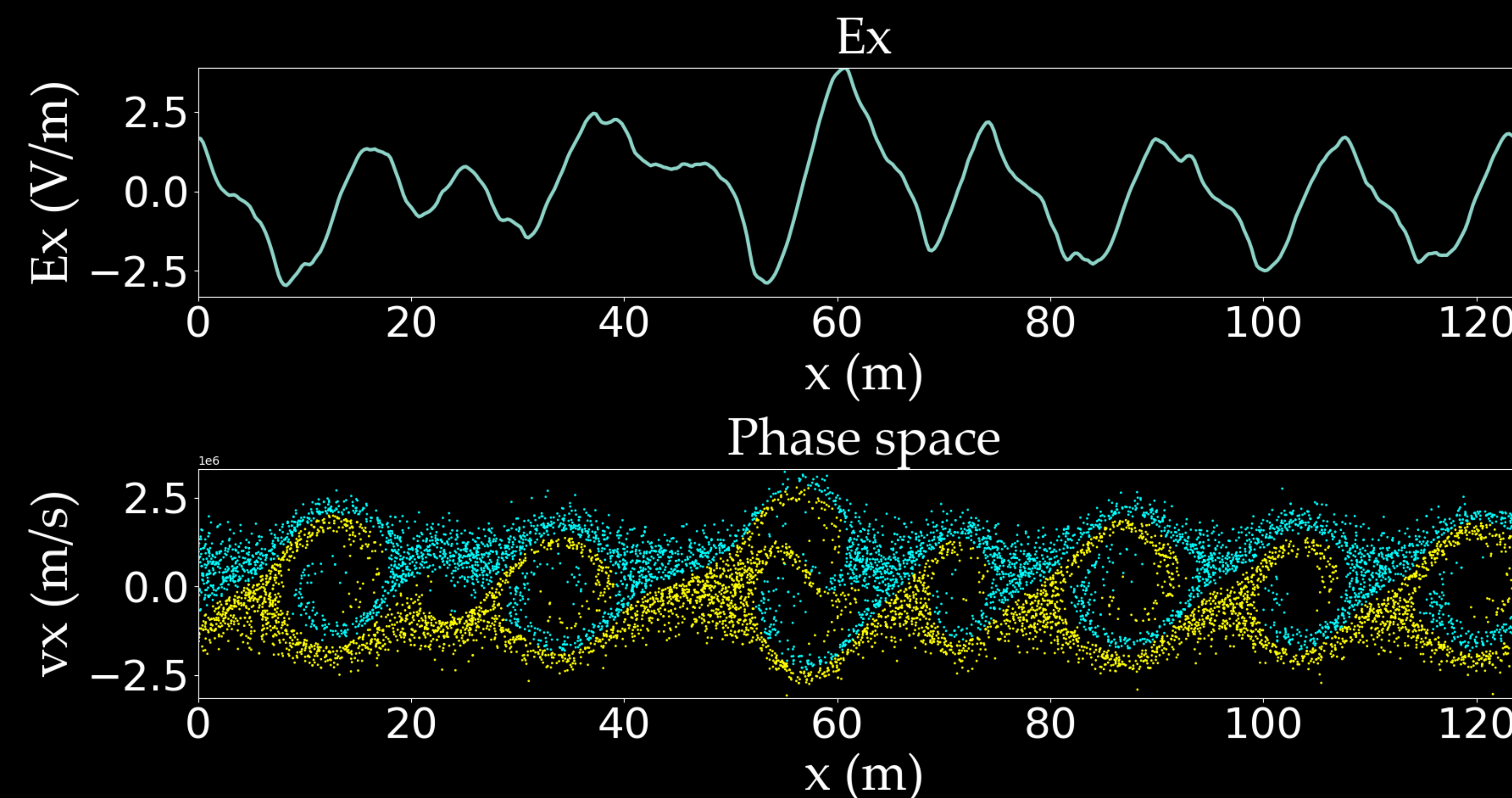


Example Outputs

Fourier spectrum plot: R and L waves



Animation snapshot: Two-Stream Instability



Why 1DEMPyPIC?

- **Python:** 1DEMPyPIC is written in Python, a programming language familiar to many.
- **Electromagnetic:** 1DEMPyPIC can simulate a wider range of plasma behavior than a purely electrostatic PIC code.
- **Flexible units:** 1DEMPyPIC works in both physical units and natural units.
- **Parallelized:** 1DEMPyPIC runs fast on multiple processors.
- **Built-in, customizable plot generator:** No more Jupyter Notebook! Our 1DEMPyPIC package includes a complimentary plot generator which outputs customizable plots and animations.

Where do I get 1DEMPyPIC?



1DEMPyPIC is publicly available on GitHub. The code is under constant development and remains experimental.

<https://github.com/Save2541/1DEMPyPIC>

References

Birdsall, C. K., & Langdon, A. B. (1991). *Plasma Physics via Computer Simulation*.

Acknowledgements

The 1DEMPyPIC Plasma Physics Simulator would not be as clean and efficient as it is today without the help of Samuel Evans and Alexander Green who have helped with modularizing the code, testing, and implementing parallelization among other things.