

Elucidations of Simulations

You can try the simulation on your browser now by going to: <https://aimanonphysics.github.io/>

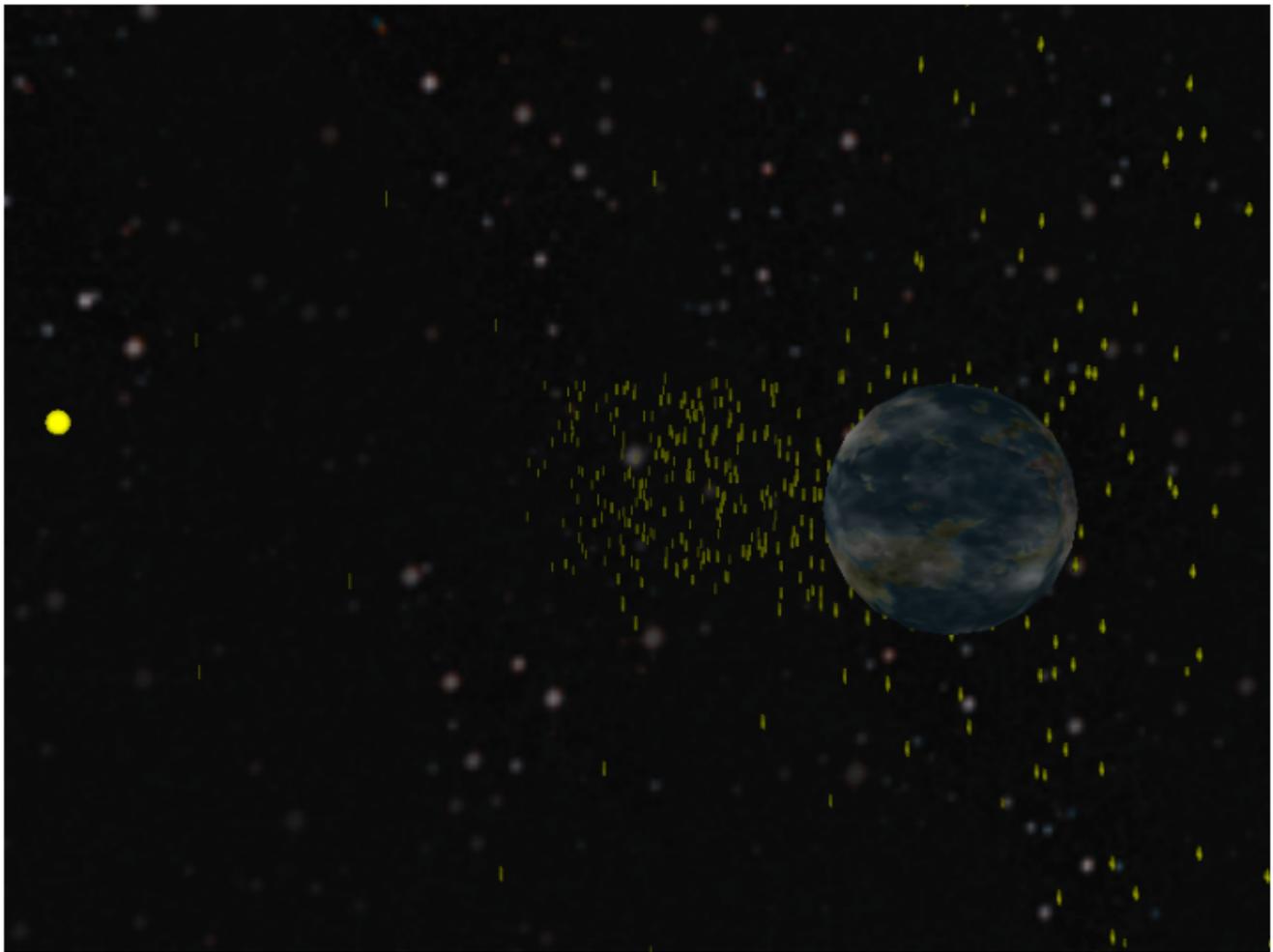
You can move the camera angle around by dragging on the screen. On the left, you can see the yellow spot that's the sun. It's one AU away (you can move the camera until you're there, but it's going to take a lot of time :P).

You can find the full source for the simulation at: <https://github.com/AimanOnPhysics/AimanOnPhysics.github.io>

The main file is "simulationscript.js" written in Javascript. The files in the "libraries" folder are just libraries we import. "index.html" is just for the interface (written in HTML), setting the initial values of the simulations, as well as some imports.

Date and place of presentation: 7:15 PM 02/11/18, Seminar Room RIII

Screenshot:



Refresh

Particle count: 670
Wind particle mass: 5
Earth magnetic moment: 9
Wind particle delta angle [degrees]: 0
Wind particle charge: 2.4
Mass flowrate: 100
Wind particle speed: 7.7
Wind flux side length: 50

The goal of this presentation was to work through an interactive simulation of the earth's geomagnetic field interaction with the solar wind. In the interior of the earth circulates molten iron created currents that can be modeled approximately by current going through a loop. This produces a magnetic field around the earth that protects it from harmful ionizing radiation (solar wind). In the simulation, the solar wind was approximated by a stream of charged particles, and the magnetic field of the earth was approximated by that of a magnetic dipole tilted at 12 degrees angle from the sun. The Lorentz force deflects the charges into a pole of the dipole, where it shows some spiraling that would normally lead to [Aurora](#).

The simulation included some adjustments sliders where some parameters can be adjusted. Other parameters like distances were put so that they are to scale (e.g: size of the Earth and the Sun is accurate, as well as the distance between them being 1 AU (you can see the yellow dot in the screenshot; that's the sun).

The simulation uses HTML5 for its convenient portability, and since it's easier to show, experiment with, and distribute between the attendees.