Graphics project: Particle track viewer

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Project link	https://github.com/mxxo/eV

1 Synopsis

The goal of this project is a small, simple viewer for physics simulations. The viewer takes simulation data and renders it using the `three.js` JavaScript library. It was ostensibly built for the National Research Council's Electron Gamma Shower (EGSnrc) system [1] and handles common simulation items like particle sources, physical objects and particle tracks. For now, the JSON layout is based on standard EGSnrc input files [2] Because the input is generic JSON data, the viewer could be extended for other particle modelling programs like the Acts project at CERN [3].

2 External resources

- The skeleton code for rendering multiple scenes was taken from the `three.js` Lighting Strike example,

- The two sets of JSON data in the `examples` directory were adapted from the first simulation input examples in the NRC's Getting Started with EGSnrc tutorial.

3 Goals and achievements

3.1 Goals

- Read in general simulation input files,

- Display simulation shapes, particle sources, and particle tracks,

3.2 Achievements

1. File loading interface can handle general slab and cylinder shapes, isotropic and parallel beam point sources, and track vertex data sets

2. Extensible shape, source and particle track rendering

3. Simple particle track paths

4. Vacuum shapes and particle source directions (not present in the default EGSnrc viewer to my knowledge)

4 Usage

4.1 View controls

1. Change the current model using the `Model` dropdown menu

2. Rotate the model by clicking and dragging

3. Pan the view by right-clicking and dragging

4. Zoom in and out by dragging the middle-mouse

4.2 Making a new model scene

The current input file names are hardcoded in separate scene constructors (e.g. `createPlateScene`). The eventual goal is to point the viewer to a folder location and it will create a scene based on the data it finds there. For now, new scenes can be added by:

1. Putting your JSON data in a new folder under the `examples` directory,

2. Adding a new `sceneCreator` function based off the existing ones and,

3. Adding the `sceneCreator` function to the scene options by changing the `sceneCreators` array and `createGUI` function.

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References

[1] National Research Council Canada. *EGSnrc: software tool to model radiation transport.* URL: https://nrc.canada.ca/en/research-development/products-services/software-applications/egsnrc-software-tool-model-radiation-transport.

[2] *Getting started with EGSnrc.* URL: https://nrc-cnrc.github.io/EGSnrc/doc/getting-started.pdf.

[3] *A Common Tracking Software (Acts) Project.* URL: https://gitlab.cern.ch/acts/acts-core.