Particle simulation

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1   Introduction

The aim of this assignment is to visualize a particle emitter. All the data about the emitter, particles and forces that affect the particles are read from given JSON files. The whole implementation is available in the Github repository.

2   Simulation

2.1   Emitters and Poisson process

Two types of emitters are implements: point emitters (Figure 1) and disk emitters (Figure 2). Point emitter emits particles in a random direction, while the disk emitter emits particles in the direction of its normal.

Particles are emitted on principle of Poissons distribution. Each emitter has an attribute emit rate - a value of particles it emits in s^-1.

2.2   Forces

The simulator can simulate four forces: constant force, force with an acceleration vectore, linear drag force and radial force. The effect of forces on the trajecotry of particles are shown on Figures 3, 4 and 5. Effect of radial force is best shown in Figure 10.

3   Visualization

User is able to rotate the scene using the arrow keys on the keyboard. The size of the particles is dependant on the distance from the camera - particles closer to the camera are bigger (Figure 6). Color of particles varies based on their age (Figure **??**). The color begins as red and ends as yellow before the particle disappears due to age.
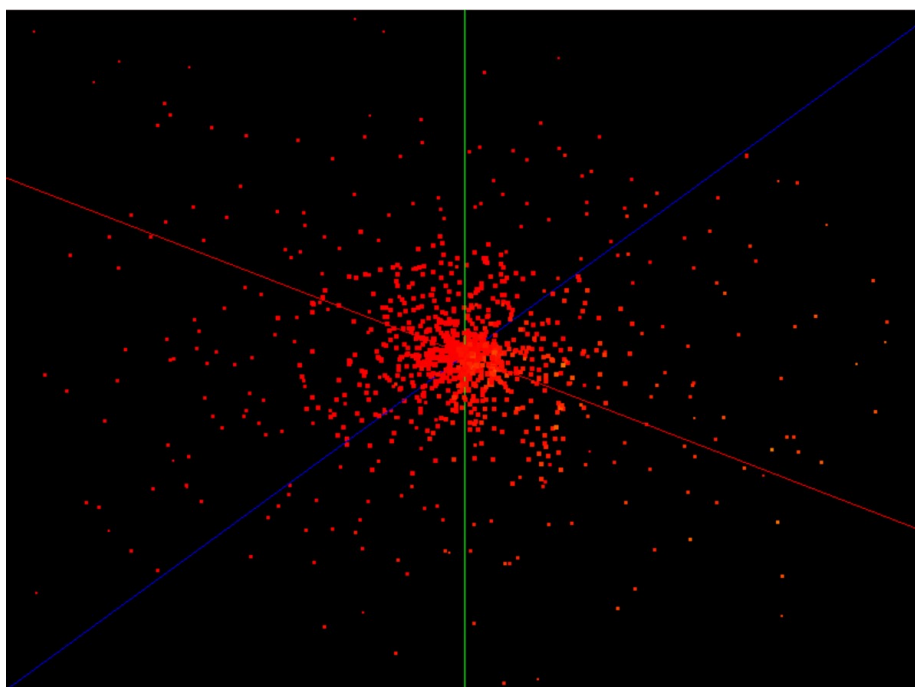
Figure 1: Point emitter
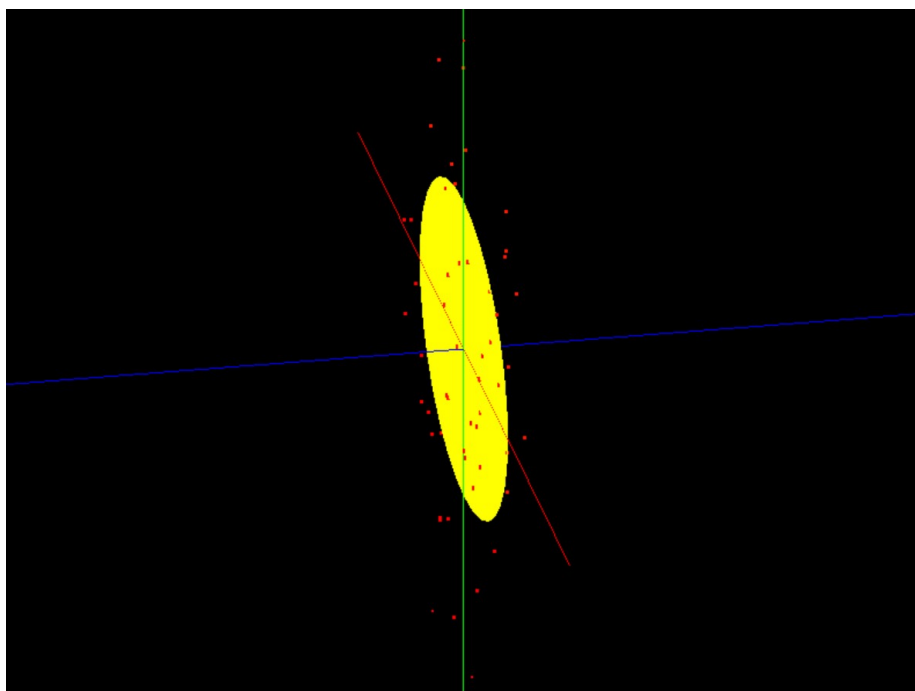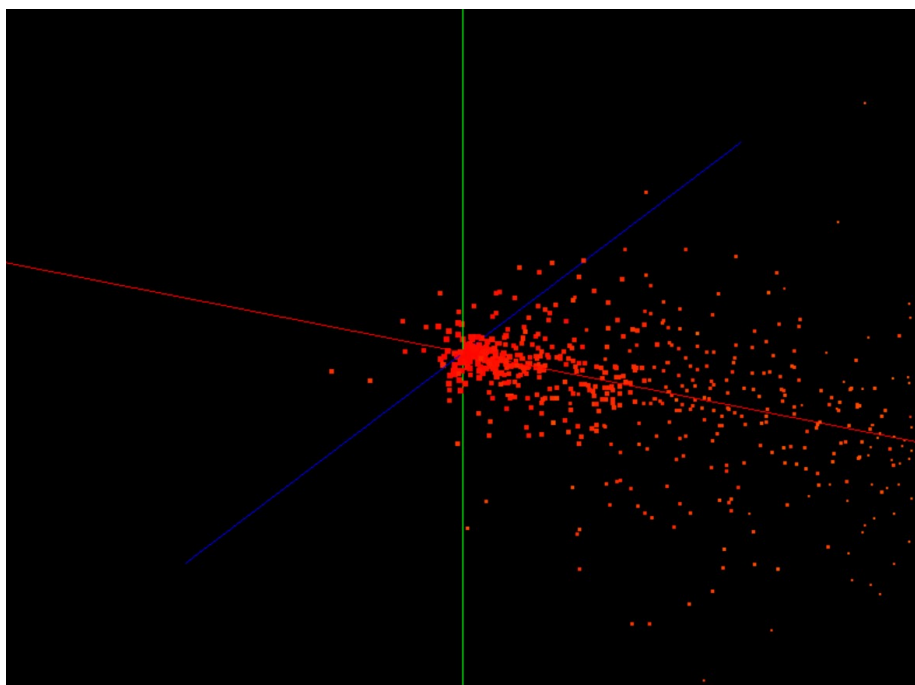
Figure 2: Disk emitter
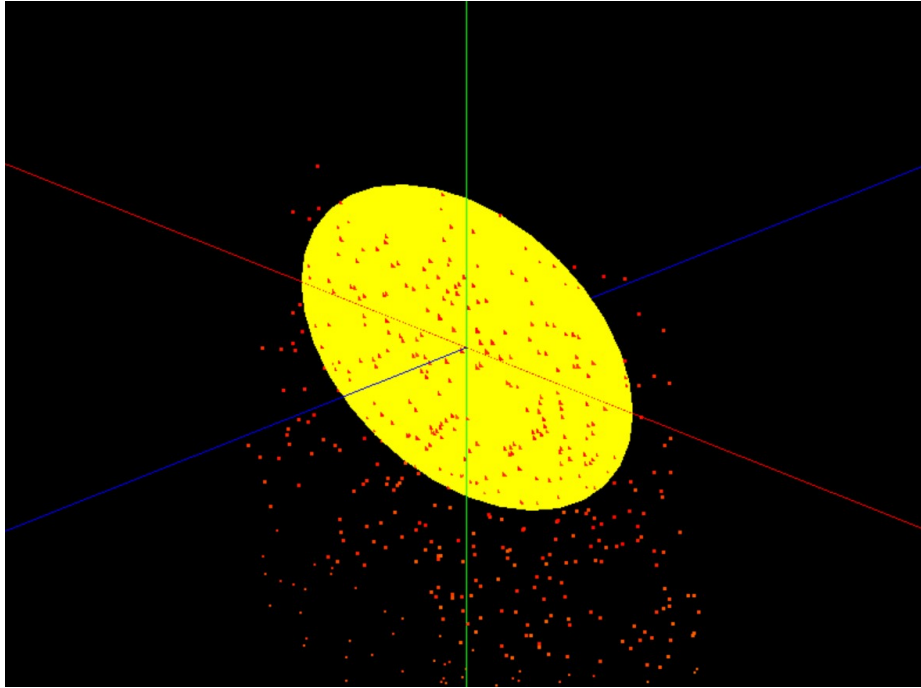
Figure 3: Effect of constant force ([10, 0, 0])

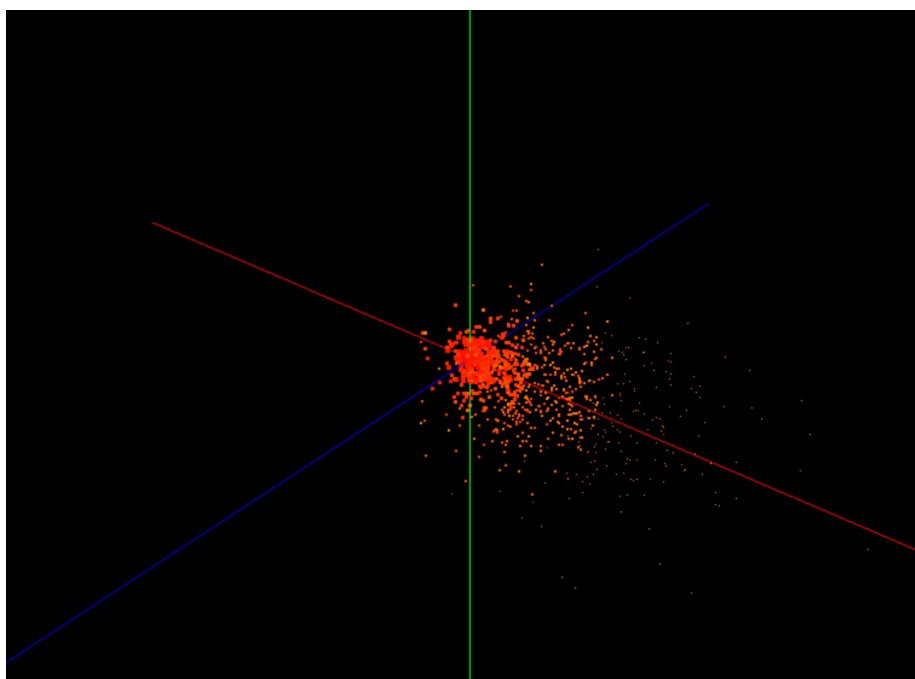Figure 4: Effect of acceleration force ([0, -9.81, 0]) on disk emmiter

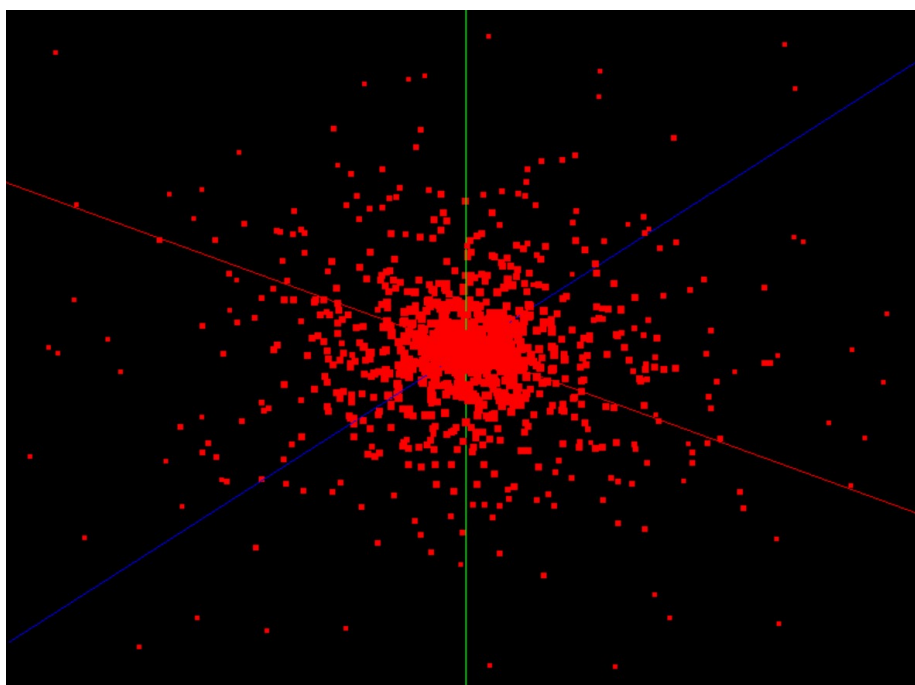Figure 5: Effect of linear drag force

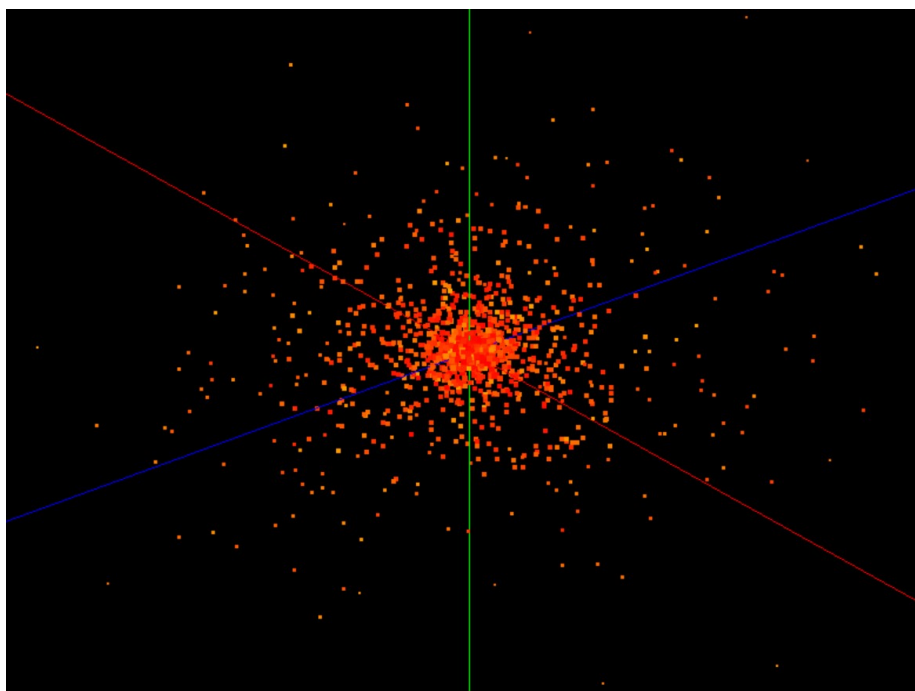Figure 6: Size of the particles depends on distance from camera

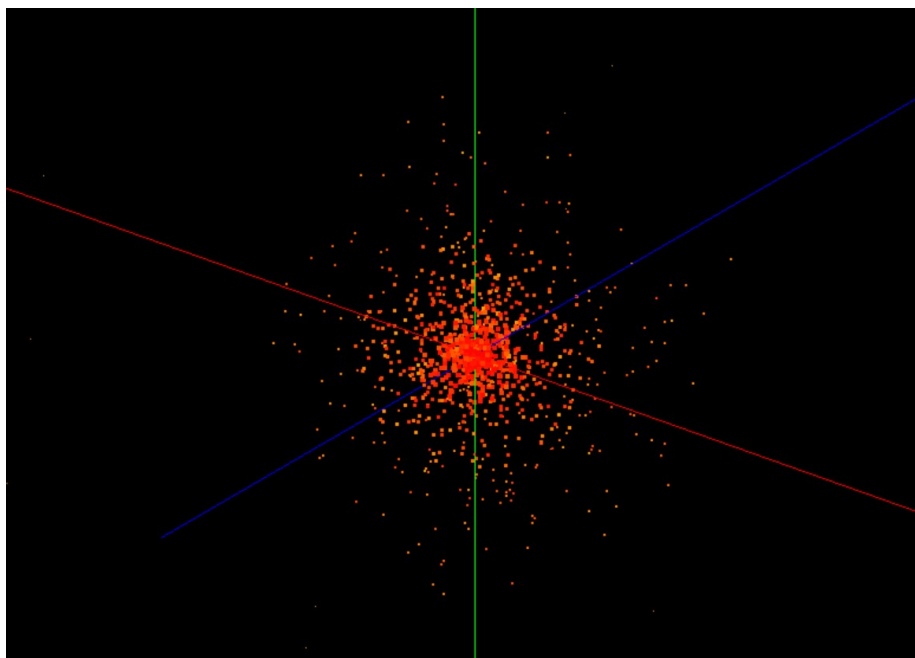Figure 7: Color of the particles depends on its age

Figure 8: 01-point.json

4 Test JSONS

On Figures 8 - 13 it is shown how the implementation works on given test JSON files. The position of the camera is adjusted between files for better visualisation.
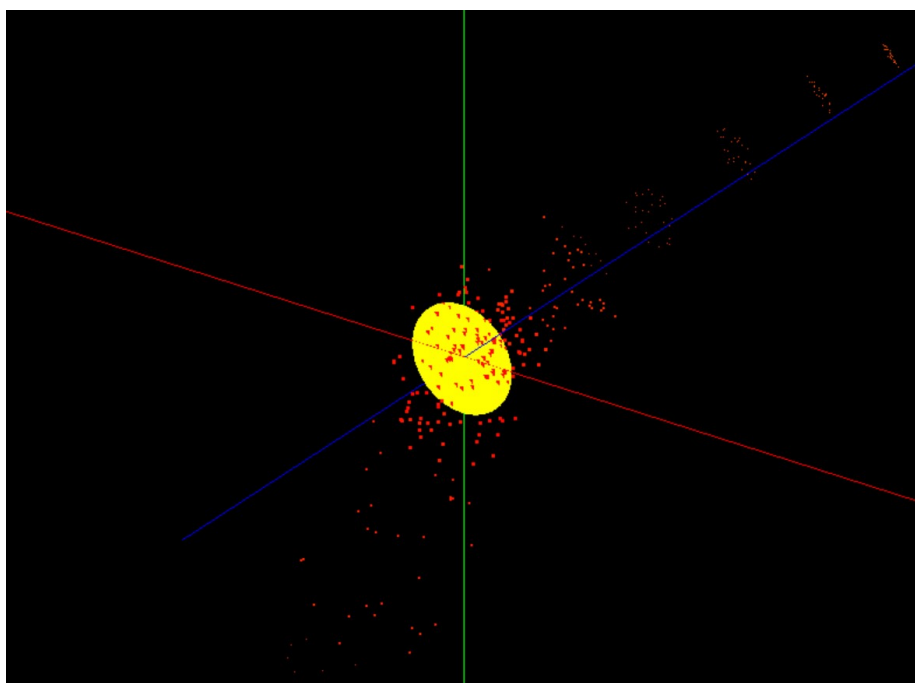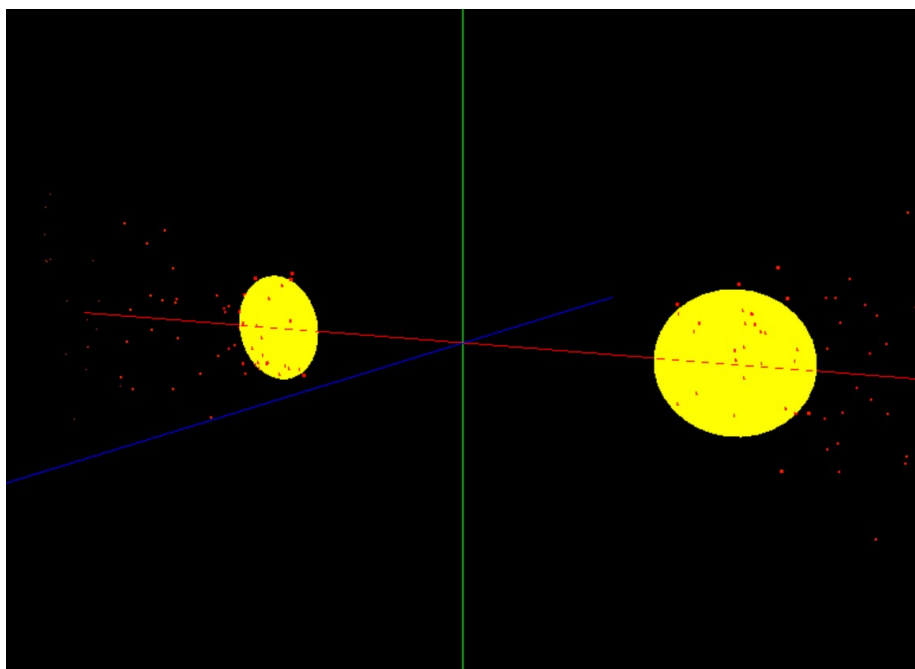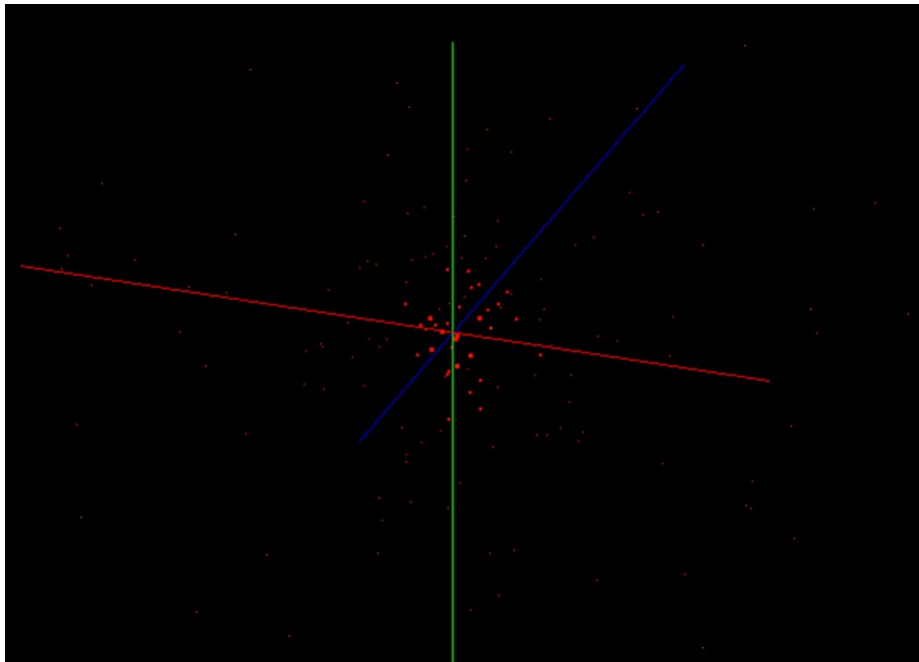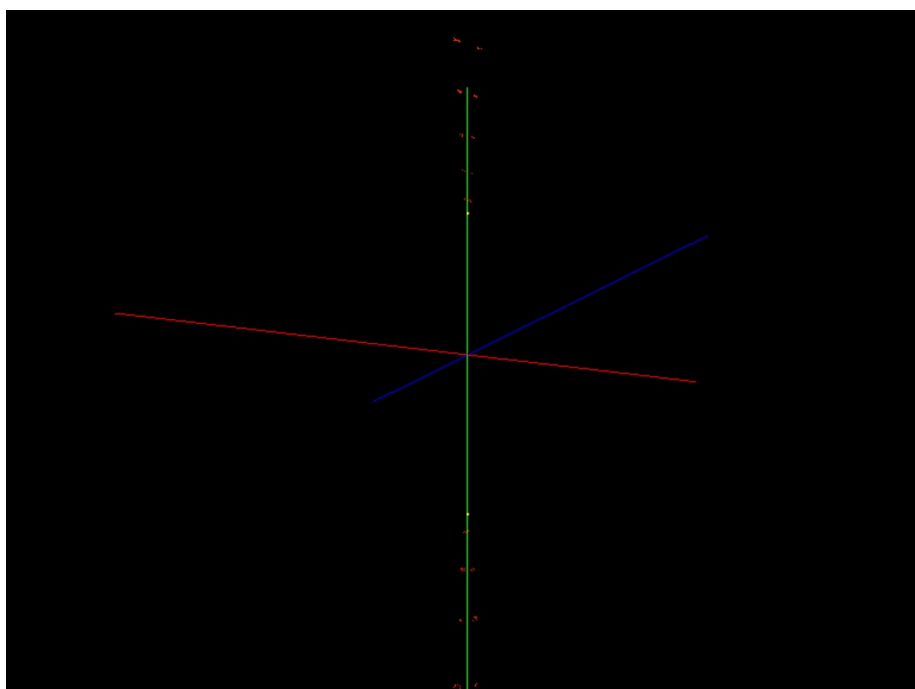
Figure 9: 02-disk.json
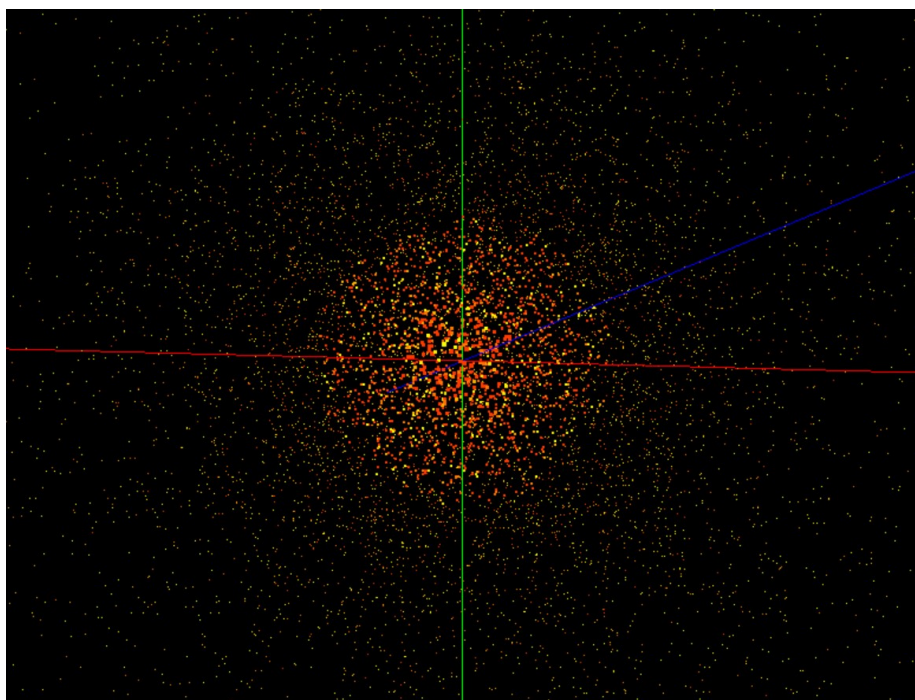
Figure 10: 03-radial.json

Figure 11: 04-constant.json

Figure 12: 05-masses.json

Figure 13: 06-stress.json