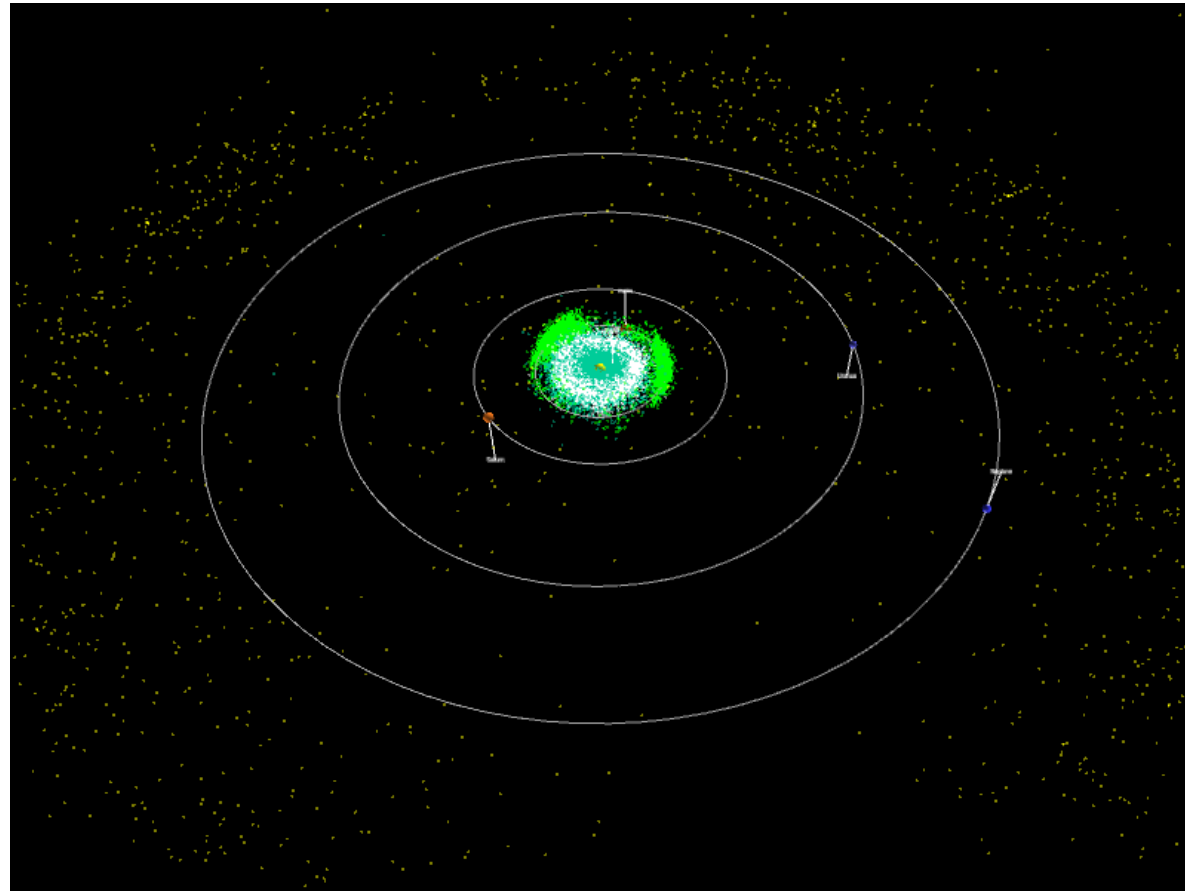


The Minor Planets



Swinburne Astronomy Online 3D PDF

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1 Description

1.1 Minor planets

Our view of the Solar System has changed dramatically over the past 15 years with the discovery of new classes of small bodies. Minor planets are another name for asteroids, or celestial bodies that orbit the Sun that are not otherwise classed as planets or comets. Generally, minor planets are relatively small rocky bodies, while comets are icy bodies that become active when their orbits carry them close to the Sun. (An “active” comet exhibits a large coma and a long tail.)

The minor planets can be classified by their orbital characteristics. In this 3D PDF, we have included 5 classes of minor planets: (1) the Near Earth Asteroids (NEAs), (2) the main belt asteroids, (3) the Trojan asteroids of Jupiter, (4) the Centaurs, and (5) the Trans-Neptunian Objects (TNOs). The dataset used comes from the Minor Planets Centre. As of 19 November 2012, there were 9,346 NEAs (comprising 732 Atens, 4686 Apollos and 3928 Amors); 581,613 main belt asteroids; 5,407 jovian Trojans; 330 Centaurs; and 1,150 TNOs. (Note that in this 3D PDF, we have only included 11,678 main belt asteroids.)

- The Near Earth Asteroids have perihelion distances of less than 1.3 AU, and include the following sub-classes:
 - Atens have aphelion distances greater than 0.983 AU, and semi-major axes less than 1 AU
 - Apollos have perihelion distances less than 1.017 AU, and semi-major axes greater than 1 AU
 - Amors have perihelion distances between 1.017 and 1.3 AU and semi-major axes greater than 1 AU
- The main belt asteroids reside between the orbits of Mars and Jupiter, with most of the asteroids orbiting between about 2.1 AU and 3.3 AU.
- The jovian Trojan asteroids share their orbits with Jupiter. Trojan asteroids are found in the planet’s two stable Lagrange points, the L4 group leading the planet by 60 degrees and the L5 group trailing the planet by 60 degrees. A very small number of Trojan asteroids have also been found in the orbit of Mars, Neptune and even the Earth.
- The Centaurs are icy minor planets with perihelion distances beyond Jupiter and semi-major axes less than that of Neptune. Since their orbits cross one or more of the giant planets, the Centaurs are inherently unstable.
- The Trans-Neptunian Objects (TNOs) have semi-major axes greater than Neptune. The most famous TNO is the dwarf planet Pluto.

1.2 How to use this 3D PDF

The interactive 3D content appears on the next page of this document. You can interact with the 3D content in a variety of ways. Most of these can be found in the 3D toolbar (see below) that appears when you move the mouse cursor over the 3D figure.



To start, click and hold the left mouse button anywhere within the 3D figure. Then move the mouse around and see how the orientation changes. You can use the right mouse button in the same way to zoom in and out. Other interaction modes are also available. You can explore these by clicking on the drop-down menu of the left-most icon on the 3D toolbar.

Every 3D figure has a default view, which can be returned to by selecting View 1 from the toolbar Views menu. Some figures may also have other interesting views available for you to try.

There are some additional keyboard shortcuts for you to use. (Note that you must first left mouse click on the 3D figure to utilise these shortcuts.)

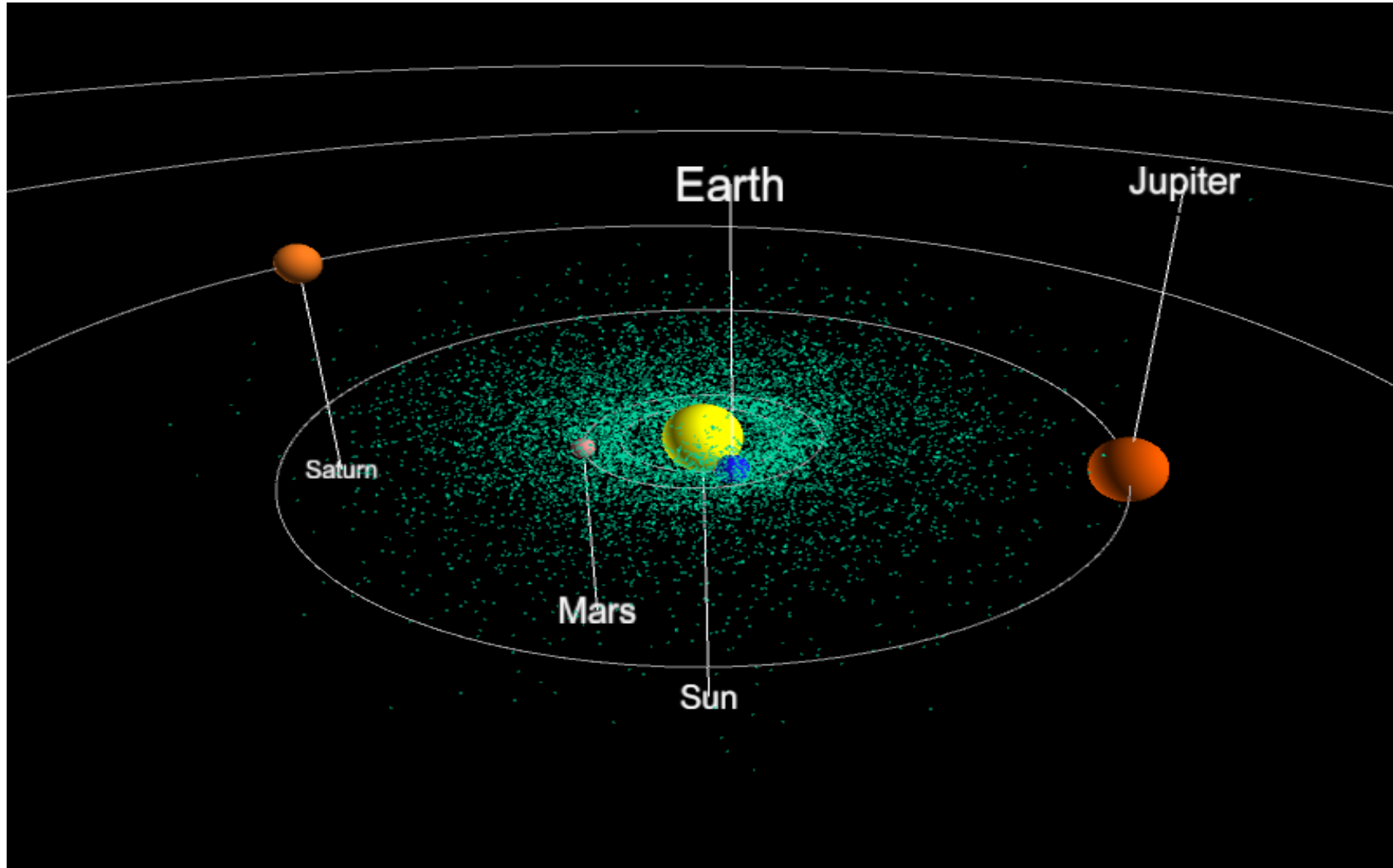
arrow keys (up, down, left, right)	rotate the object
+ , -	zoom in or out
a	autospin
* , /	increase, decrease the autospin speed
[,]	roll the object clockwise, anti-clockwise
h	return to the default view

Some 3D figures may also allow you to show or hide certain types of objects from view. If available, this option will appear as a text link below the 3D figure, e.g. [Click here to...](#)

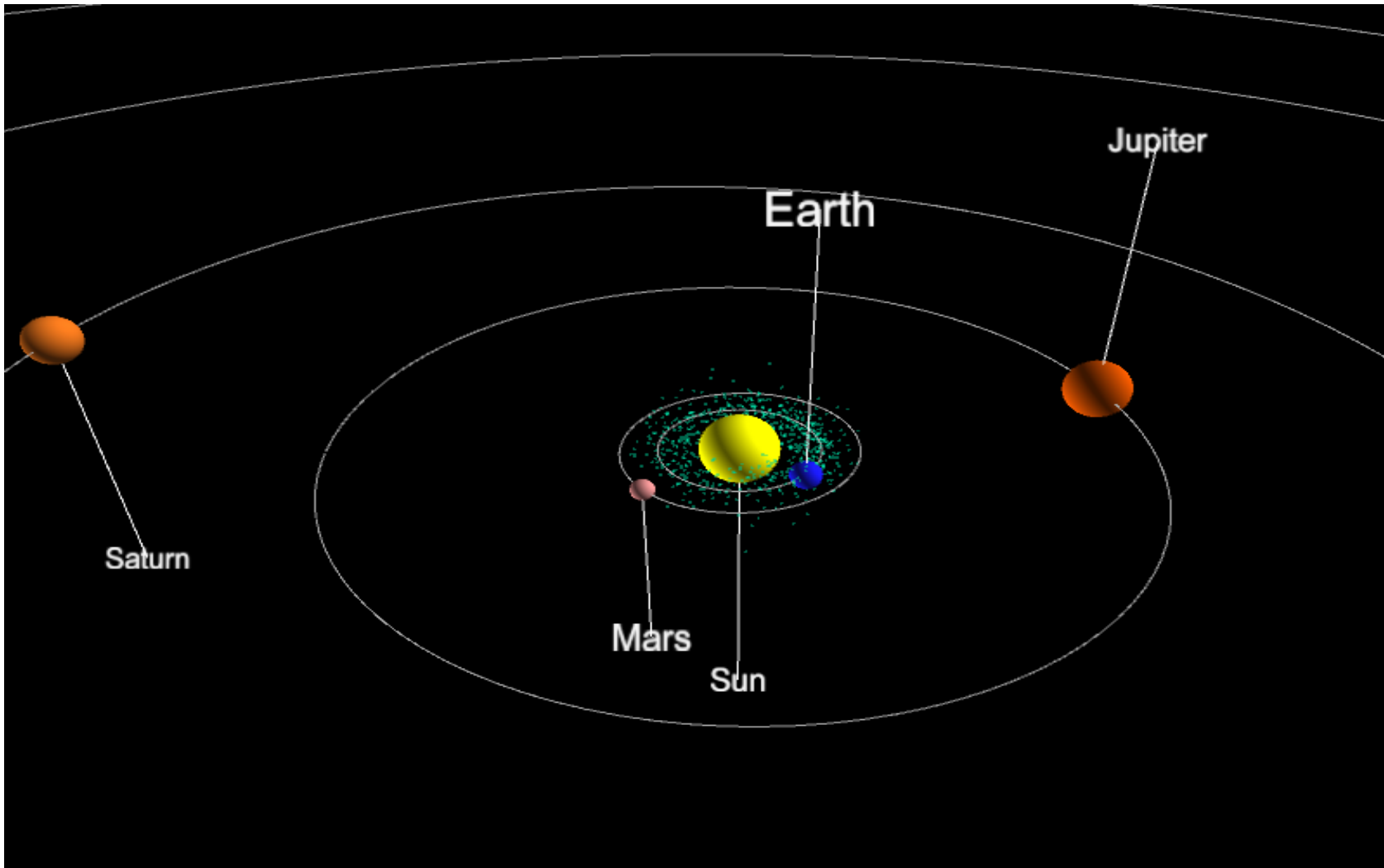
Note: The free Adobe Reader (Version 8 or higher) is required for these 3D PDFs.

2 Minor planet classes

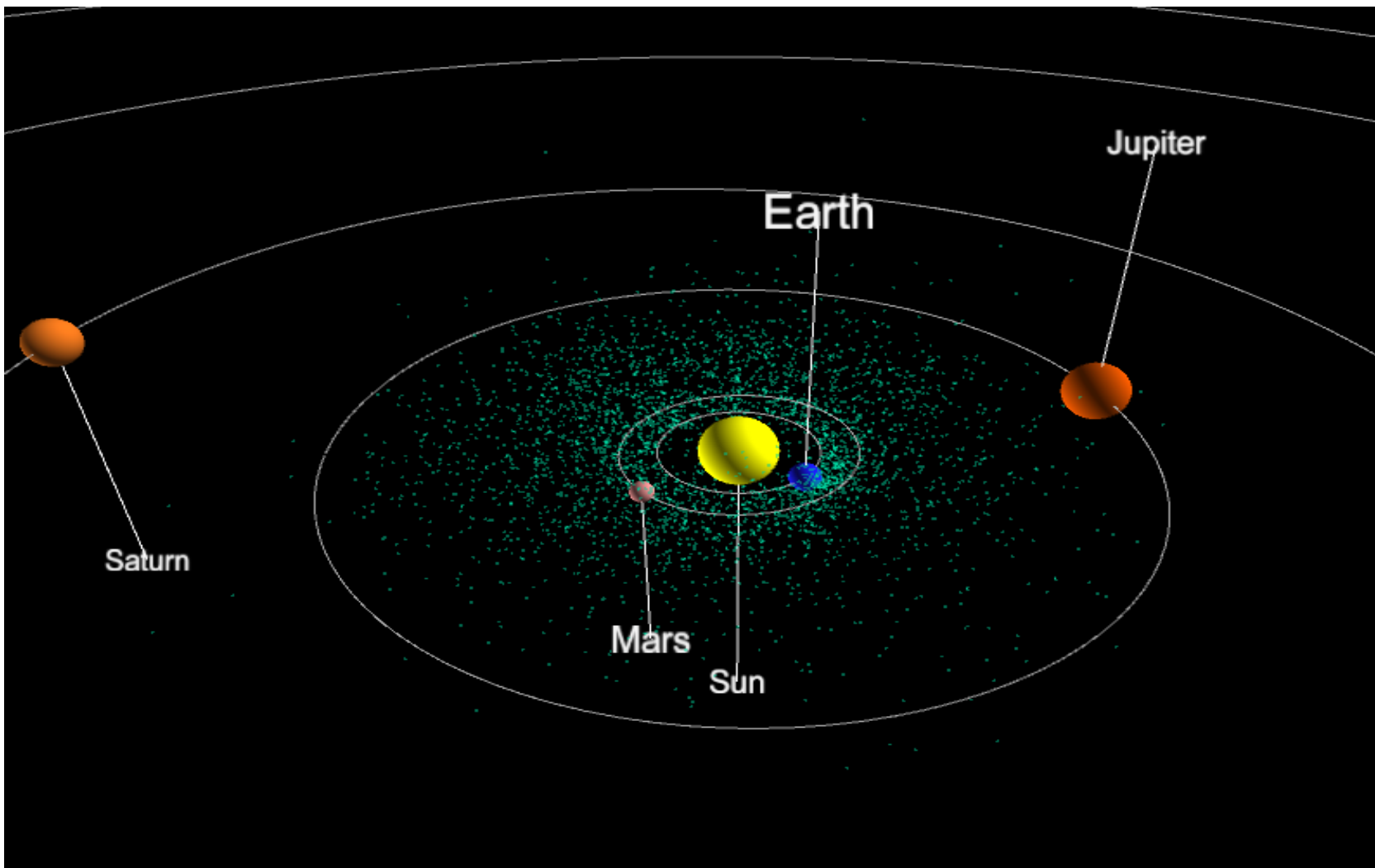
2.1 Near Earth Asteroids



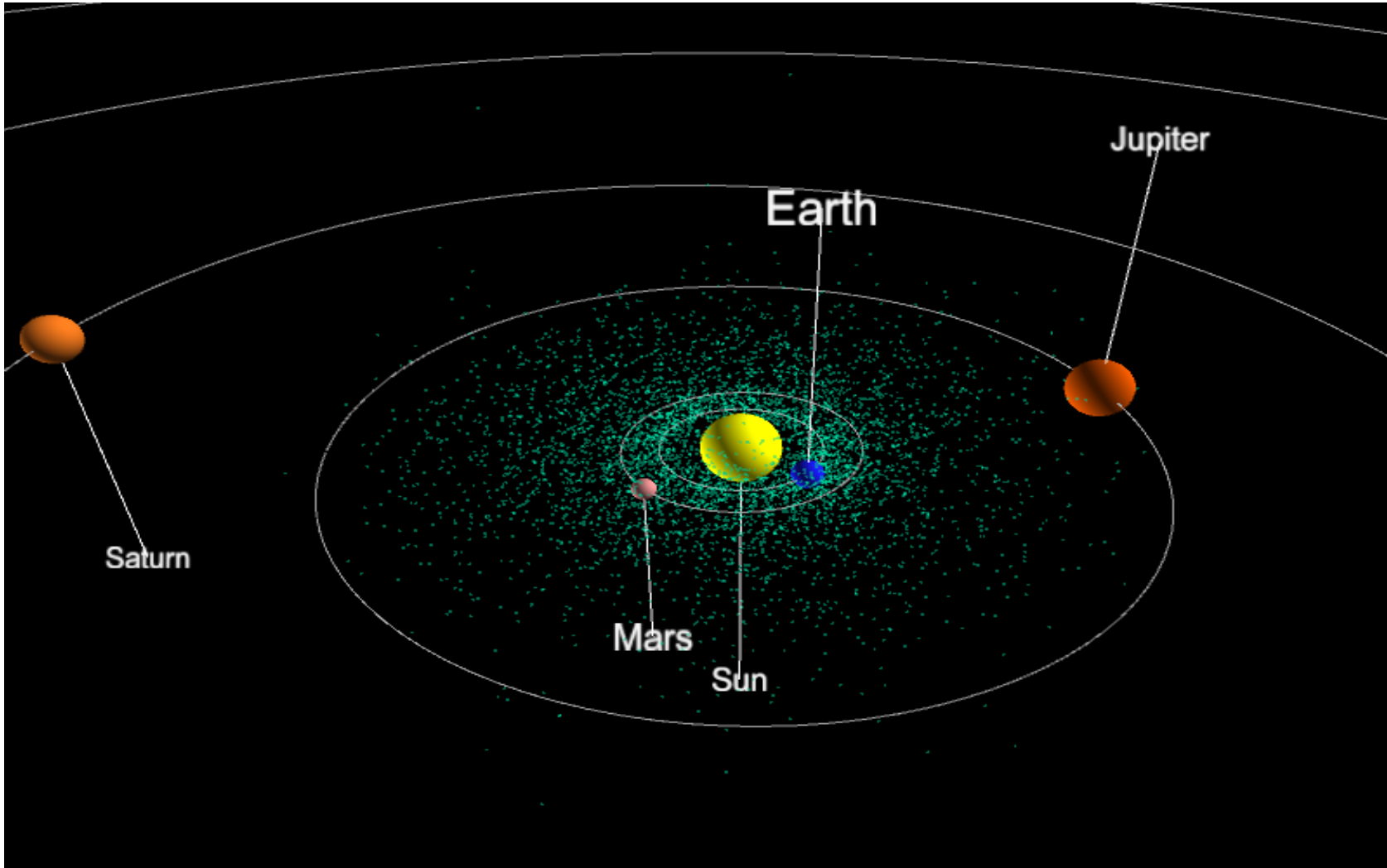
2.1.1 Atens



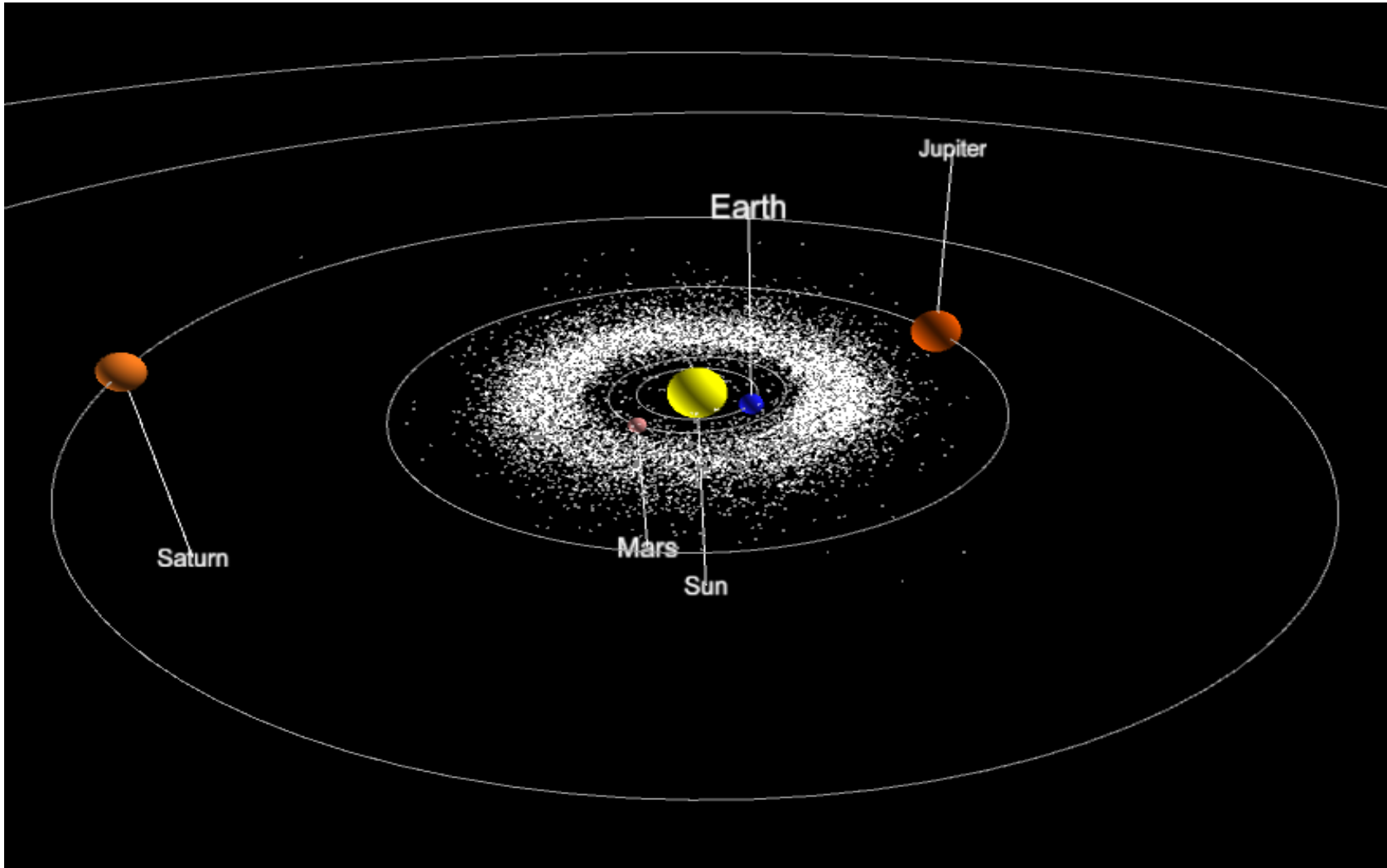
2.1.2 Amors



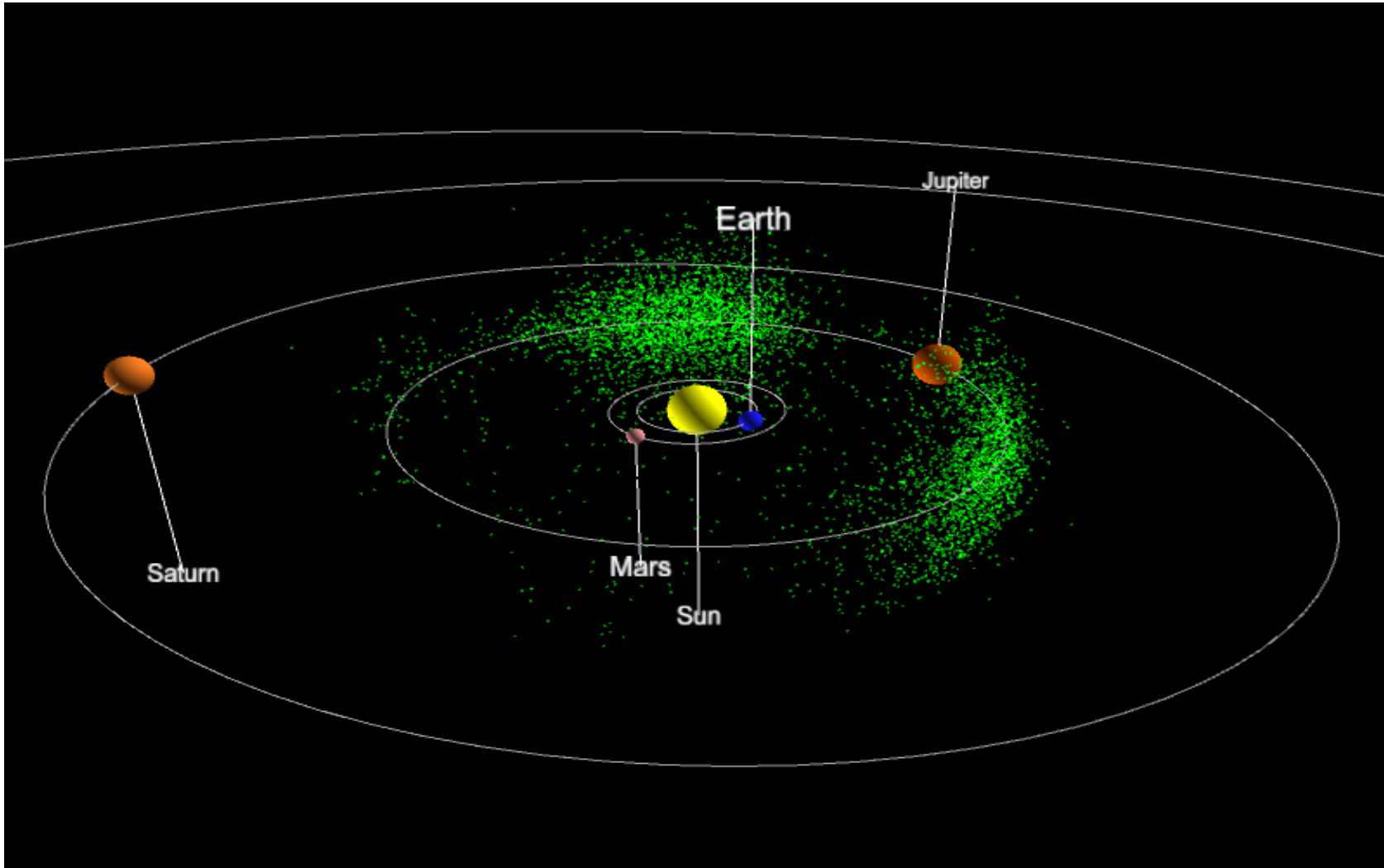
2.1.3 Apollos



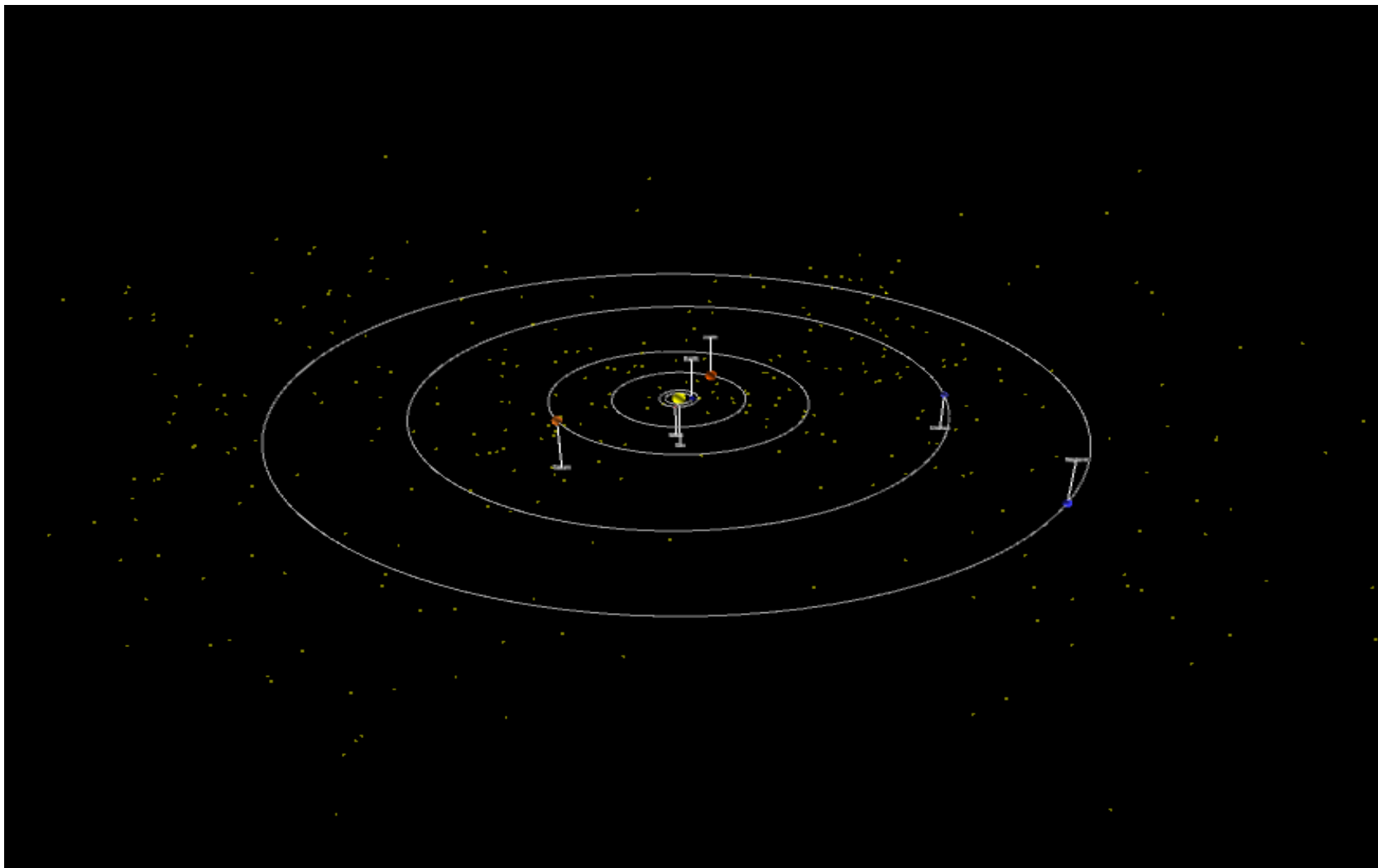
2.2 The Main Belt



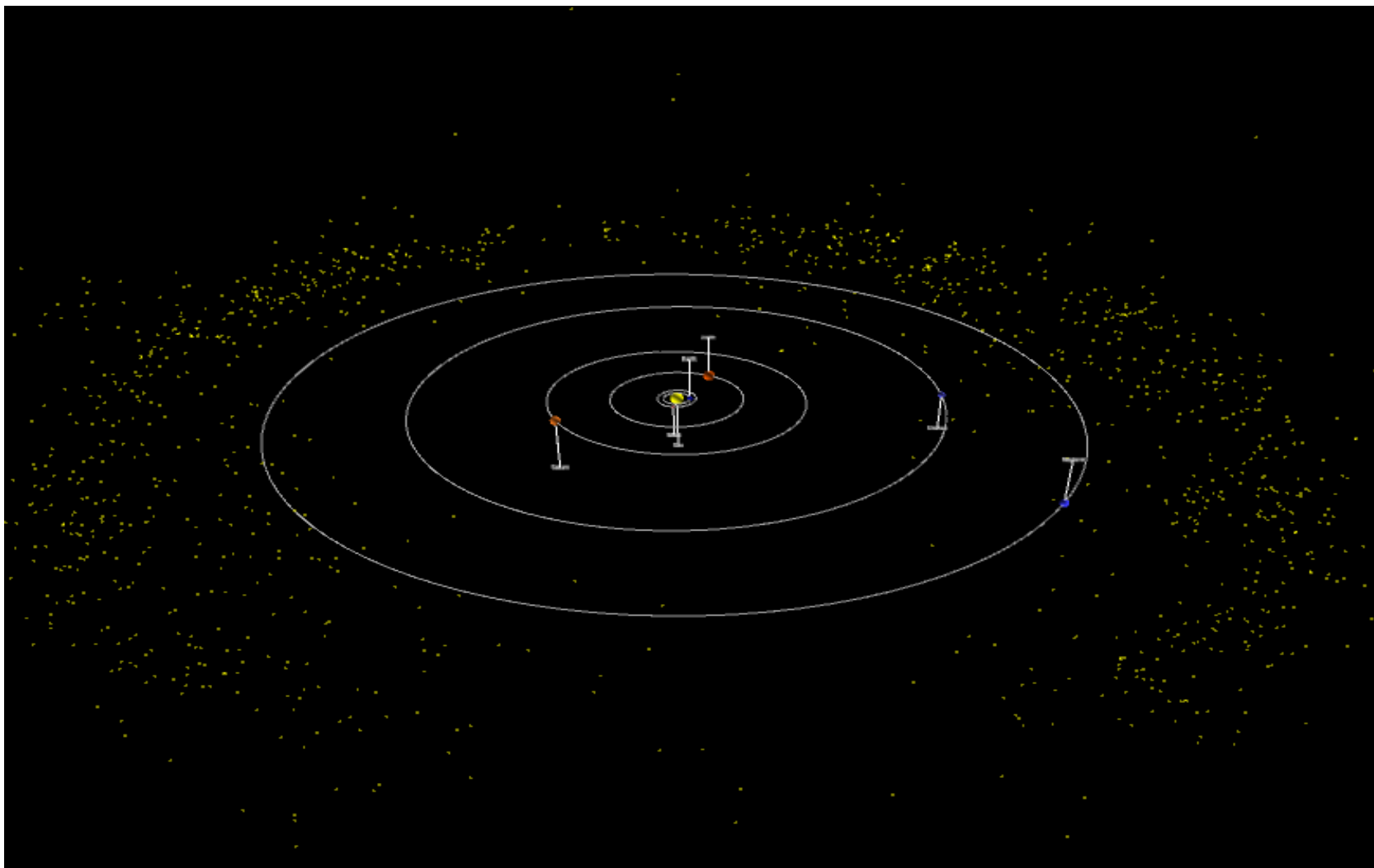
2.3 The Jupiter Trojans



2.4 Centaurs



2.5 Trans-Neptunian Objects



3 Credits

The data used for this PDF was sourced from the Minor Planet Center.

The 3D content in this PDF document was prepared with S2PLOT (Barnes et al., 2006, PASA, 23, 82; Barnes & Fluke, 2008, New Astronomy, 13, 599).

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