Stellar System Creator

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Selewirre Iskvary

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ONE

INTRODUCTION

The Solar System Creator is a python package that aims to ease the creation of realistic stellar systems in sci-fi settings. With minimal input, the user is able to create stars, planets, moons, asteroid regions and other celestial bodies, with accurate physical characteristics, declare their habitability, extract physical characteristics and visualize them.

CHAPTER

TWO

QUANTITIES

Here, we will explore the various physical quantities found in this package.

2.1 Material

2.1.1 Mass

Mass is the quantity of mater in a physical body. In the context of this package, mass determines most of other physical characteristics.

Suggested (approximate) masses:

1. For rocky planets: up to around 5 earth masses (Me)
2. For ice-giants: between 5 and 100 earth masses
3. For gas-giants: between 100 earth masses and 10 jupiter masses (Mj)
4. For long-lived, red stars: 0.081 and 0.5 solar masses (Ms)
5. For habitable stars: 0.6 to 1.4 solar masses
6. For short-live, big blue stars: 1.4 to 50 solar masses.

2.1.2 Density

2.1.3 Composition Type

2.1.4 Chemical Composition

2.2 Geometric

2.2.1 Radius

Radius is the variable that defines the size of celestial objects. The suggested radius is determined by the mass of the object via various radius models.

Models used:

1. For planetary models, see https://arxiv.org/pdf/0707.2895.pdf.
2. For hot gas-giant models, see https://arxiv.org/pdf/1804.03075.pdf.

3. For stellar models, see https://academic.oup.com/mnras/article/479/4/5491/5056185.

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