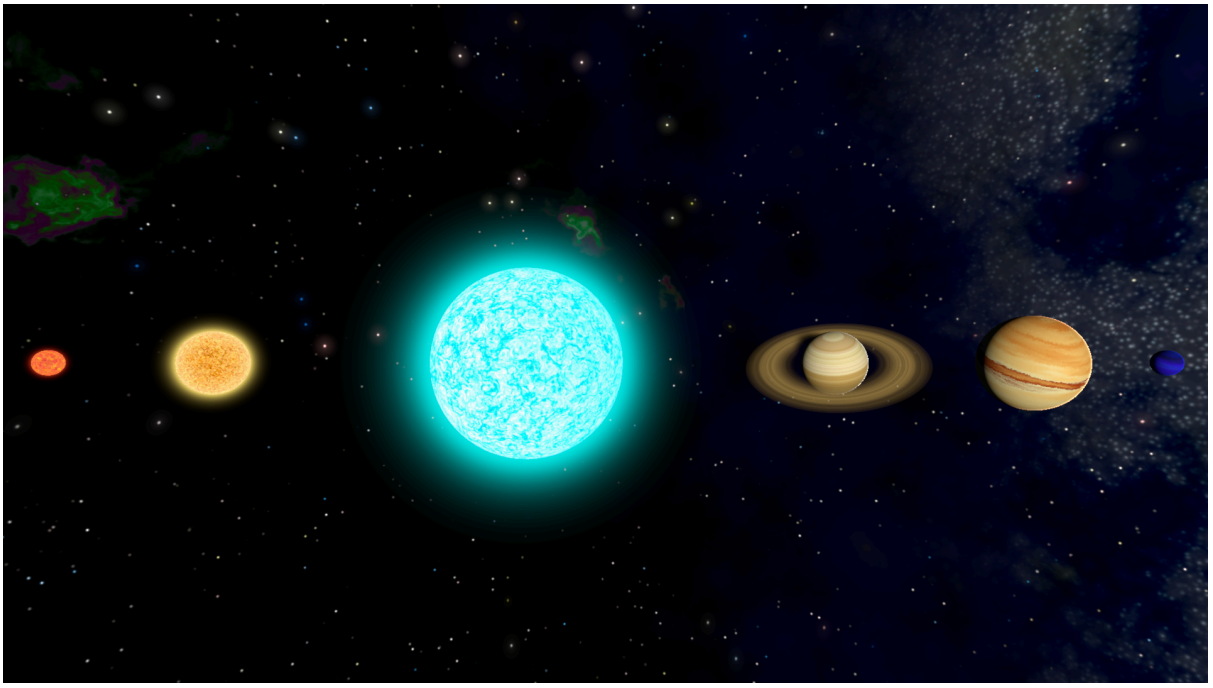
Procedural Celestial Body Materials

Version 1.0.0 - December 2024

A Parallel Cascades Asset



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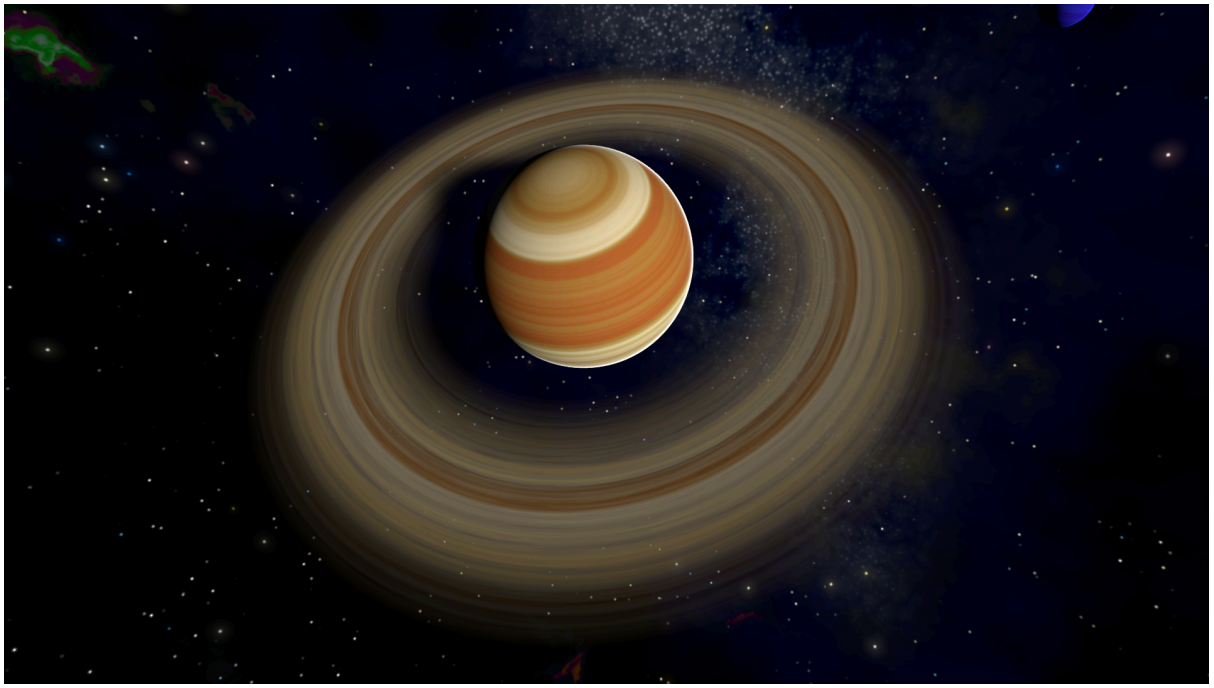
Introduction

Contribute to the infinite cosmos with these procedural shaders and effects for Unity. Generate stunning gas giants with dynamic, swirling patterns, multi-layered asteroid rings, and vibrant suns with immersive 3D corona glow effects. Leveraging procedural domain-warped noise, this package enables the creation of unique, customizable materials for your celestial environments.



Asset Contents

Shader Graph procedural shaders:

- Procedural Asteroid Ring
- Procedural Gas Giant
- Procedural Star
- Procedural Star Corona

MonoBehaviour control scripts that expose shader properties in a more user-friendly way:

- Procedural Star
- Procedural Gas Giant
- Procedural Asteroid Ring
- Star Corona

Modular Shader Components

- Various HLSL and Shader Graph Sub Graph modules enable you to build and extend even more procedural shaders tailored to your creative needs.

Additional utility scripts:

- Editor Menu Items to create procedural celestial bodies with all materials, textures, and components assigned and ready to edit.

Two meshes that can be found in the **Resources > Meshes** folder of the package:

- icosphere_high - high-poly sphere for rendering smooth stars and gas giants.

- double_sided_plane - for rendering Asteroid Rings.

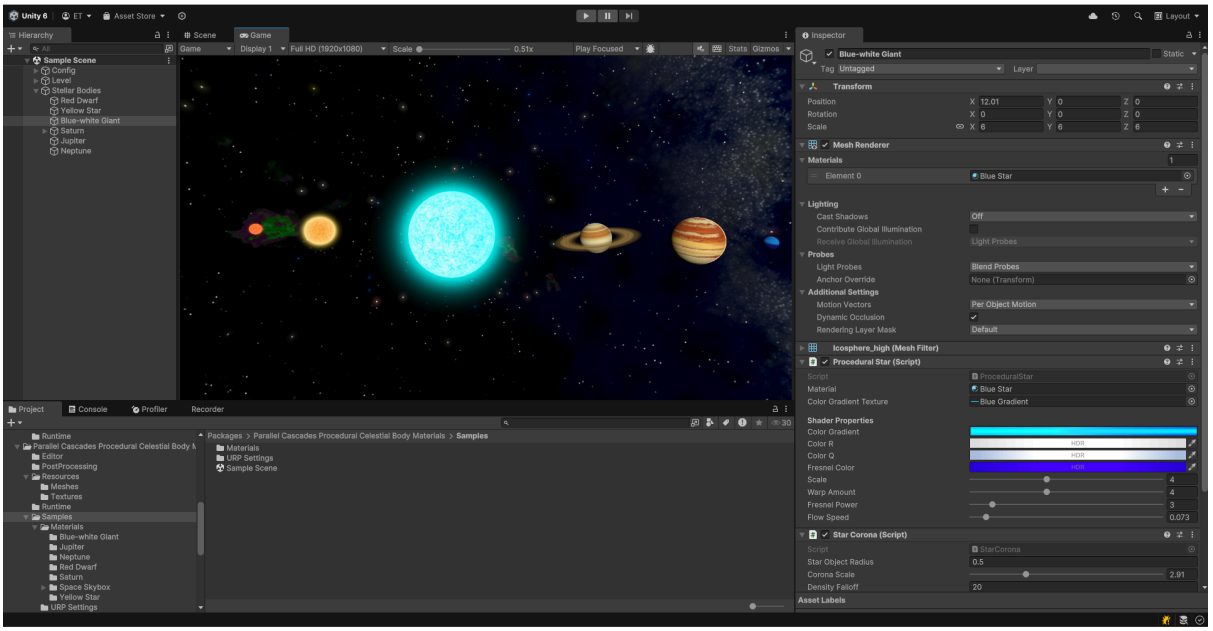
How to Use

Installation

This asset uses the Unity Package Manager format, meaning it is stored in the Packages/ folder of your project. It installs its dependencies when it is imported into your project. If you are updating this package, make sure to delete the old version first.

Samples

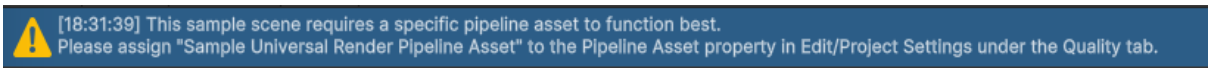
The quickest way to get started using this asset is to open the sample scene and materials that you can find under the **Samples/** folder:



You can explore each celestial body, customize its properties, and experiment with the shader's parameters to help you understand how to create unique and stunning celestial designs.

URP Settings

When opening the Sample Scene for the first time, you will get the Warning:

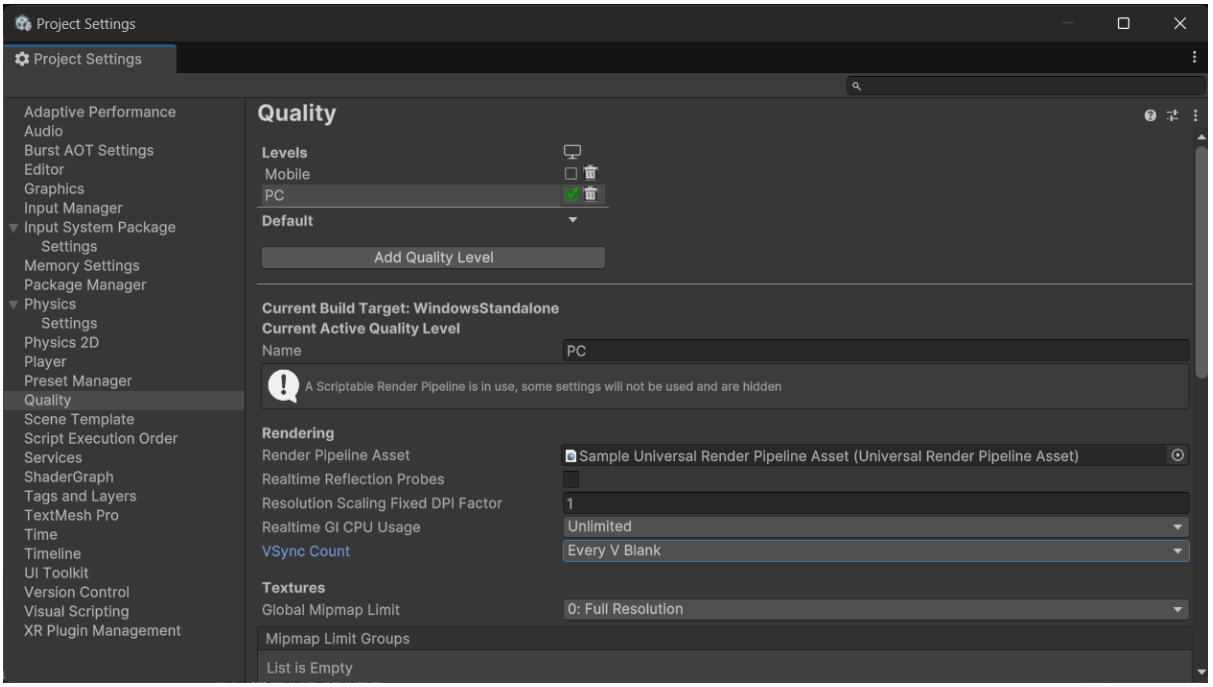


This sample URP Asset has the shadows and anti-aliasing settings used to get the look of the asset presented in the store page. You can find it under **Procedural Celestial Bodies Sample Scene > URP Settings.**

VSync

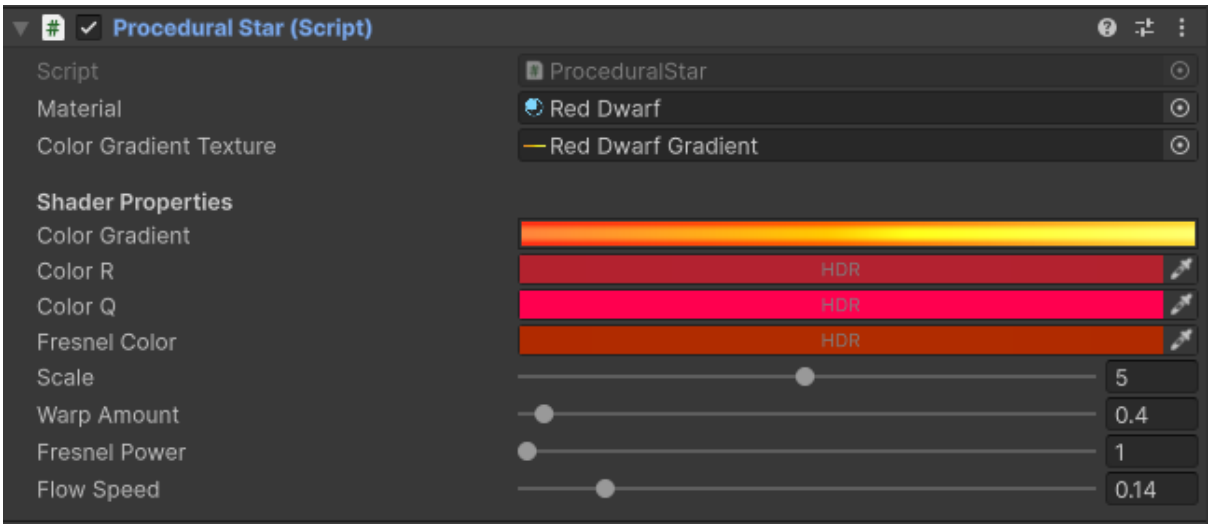
To avoid screen tearing with the glowing corona post-processing effect, make sure to enable VSync:

And for Builds, in the Project Settings, find Quality > VSync Count and enable:



Customising Procedural Celestial Bodies

Procedural Stars

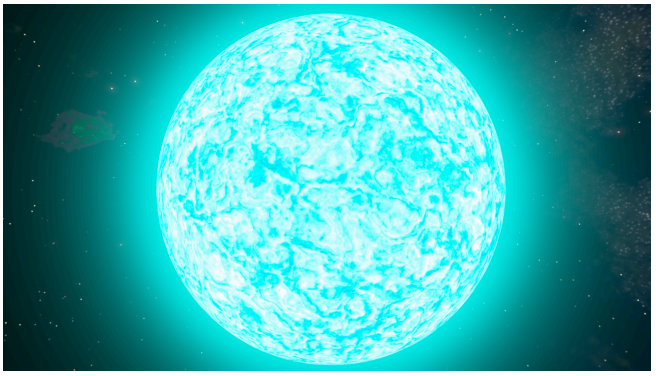


Procedural stars are built using domain-warped fractal brownian motion noise patterns. Inigo Quilez has described [these techniques] in detail.

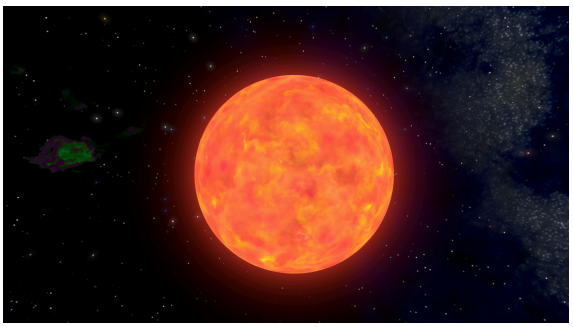
For users of this asset, it is enough to explore the myriad effects and patterns that can be achieved by adjusting the Color Gradient, R and Q colors.

The Fresnel Color is an additional emissive effect at the edges of star spheres.

The Warp Amount and Scale properties produce the roiling, twisting pattern of the star's liquid surface.

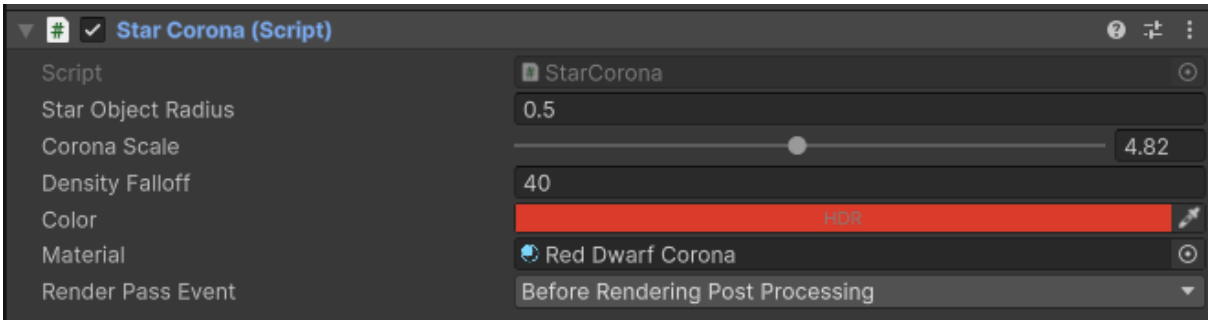


Warp Amount=4 and Scale=4 make for a very high-detail, swirling, liquid blue giant.



The red dwarf with Scale=5 but Warp Amount = 0.4 has much lower frequency detail.

Star Coronas

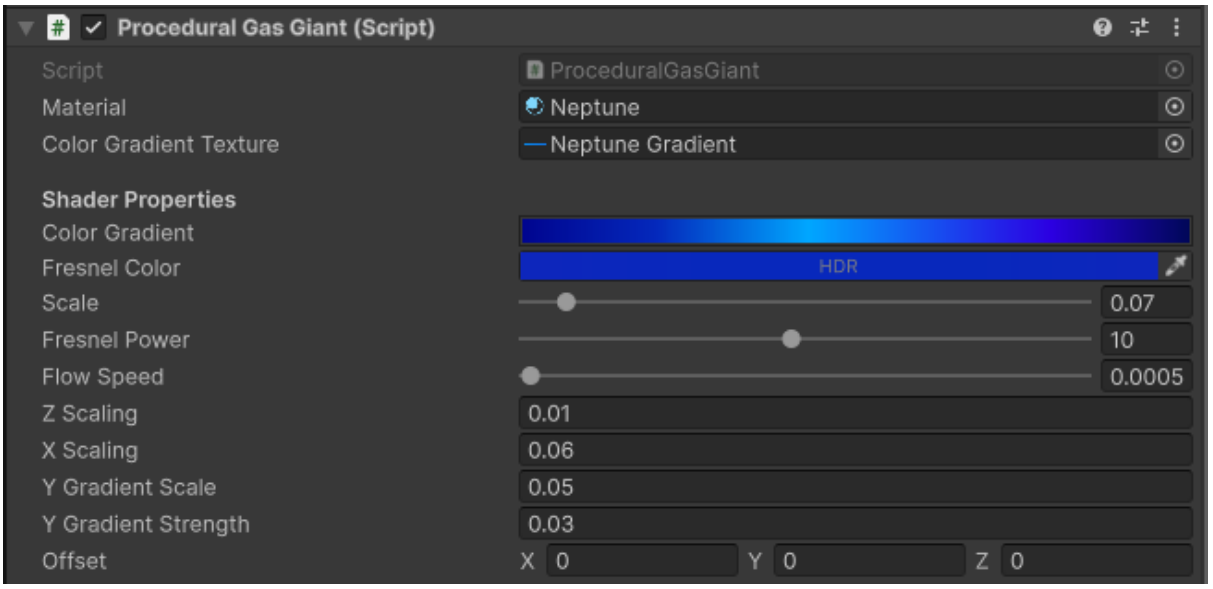


Each star corona is a full-screen 3D post-processing effect applied through a custom **ScriptableRenderPass** using Unity's RenderGraph API. You should not have to adjust the Render Pass Event from the default 'Before Rendering Post Processing' unless you're running other effects that might interfere with these, like stacking cameras or screen overlays.

The Star Object Radius property relates to the radius of the mesh used for the star object. The default value of 0.5 applies to Unity's Sphere mesh and the custom high-resolution ico-sphere mesh provided with this asset. You do not have to modify this property if you're changing the star GameObject's transform scale, the scale is calculated automatically and passed to the shader through the **Star Corona** MonoBehaviour.

Having this script on every star is mandatory to display and update coronas' transform positions and scales.

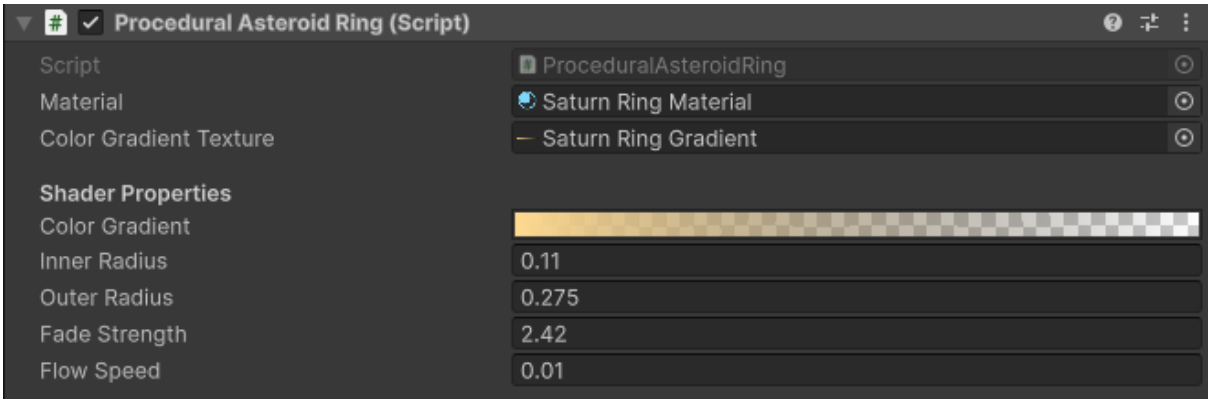
Procedural Gas Giants



Similar to Procedural Stars, Gas Giants are built with domain warped FBM noise, but the pattern is kept constant around the Y axis, to produce distinct vertical layers.

You can control the variation along each axis using the X and Z Scaling and Y Gradient Scale and Strength Properties. Observe the difference between the Saturn and Jupiter samples in the Sample Scene.

Procedural Asteroid Rings



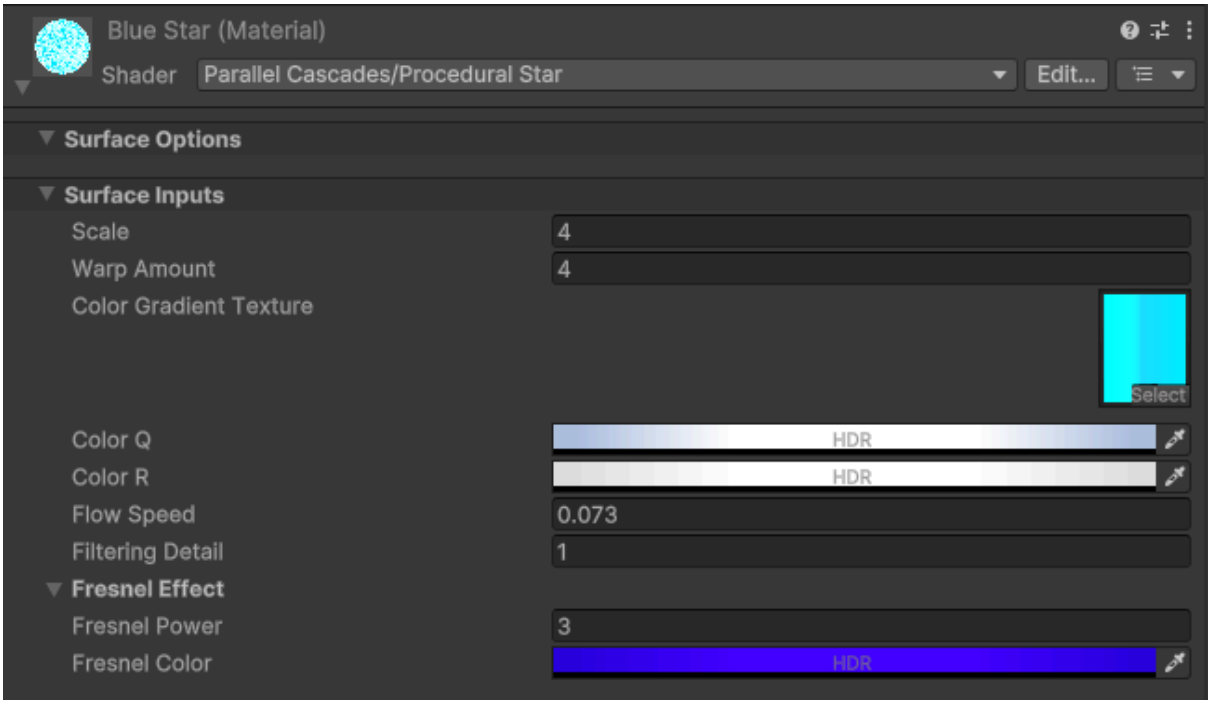
Inner and Outer Radius control the shape of the asteroid ring.

The patterns in asteroid rings are built by sampling a **detailNoise** texture assigned by default to each Procedural Asteroid Shader. As an advanced user, you can plug your own textures here to get different patterns.

Filtering Detail Levels (Advanced Option)

Viewing stars and gas giants from a distance can cause aliasing, where high-detail (large-scale) patterns appear as flickering dots on the surface.
To avoid this problem, a supersampling algorithm is integrated into the shader, based on a filtering technique proposed by Inigo Quilez.

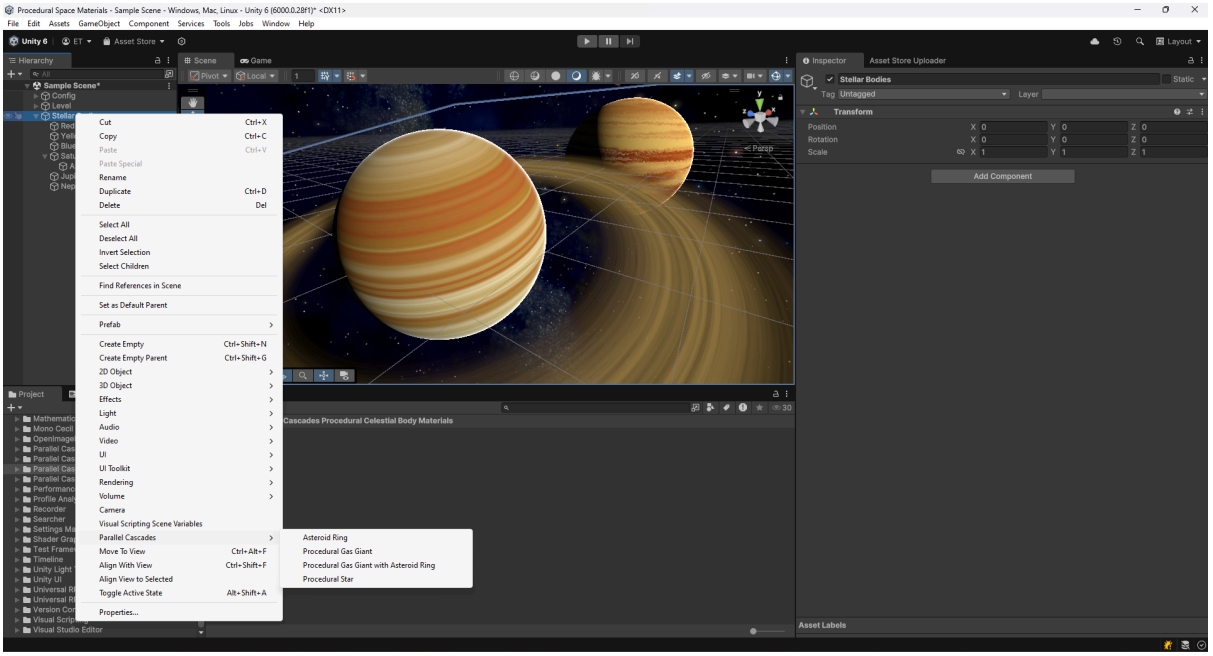
You don’t need to understand this technique to use the filtering, you simply need to increase the value of the **Filtering Detail** property in the material. The higher the value, the more smoothed the material will be when viewed at a distance, but this comes with a performance cost, so it should not be overused, nor used when the material takes up a large portion of the screen.



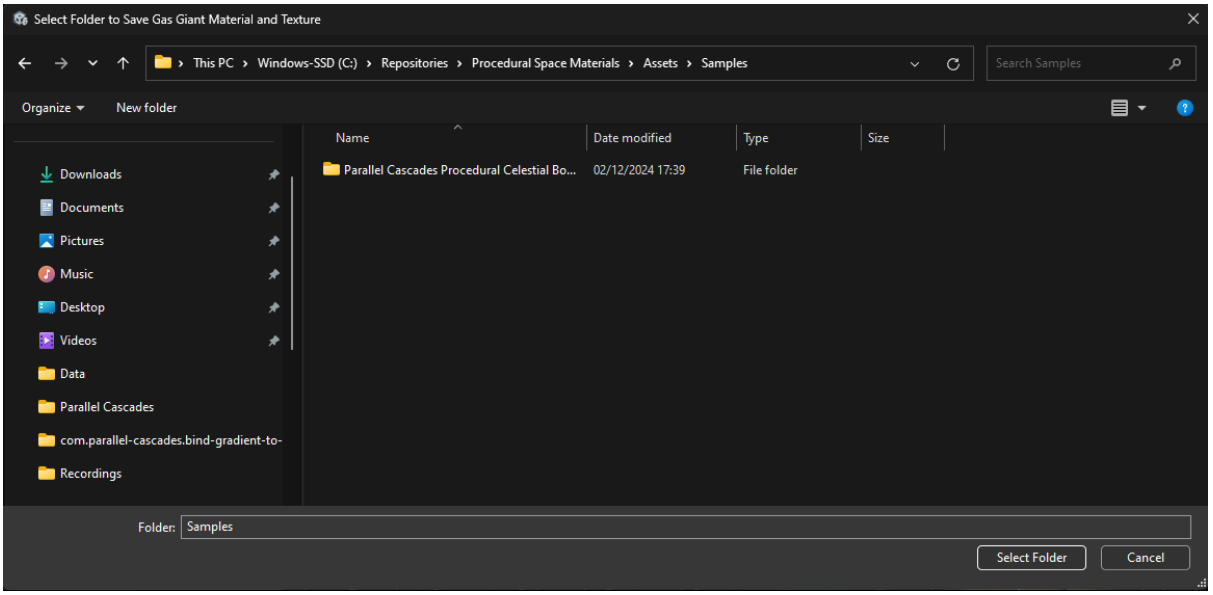
Creating new Procedural Celestial Bodies in your scene

Each procedural celestial body requires its own material and gradient texture. Instead of creating these manually, you can use custom menu commands added to Unity’s context menu.

Right-click in your hierarchy view, or use the **GameObject > Parallel Cascades > *** menu:



These will create a body with a mesh and renderer in your scene, coupled with the relevant procedural MonoBehaviours, and create and bind the necessary textures and materials for the procedural shader.
Once you click on an option, a save folder window will open:



This will be the folder where your body's material and textures will be saved. It is recommended to create a new one for each new celestial body, to better keep track of them.

Technical Support

If you have any issues or questions about the asset, don’t hesitate to contact the developer at:
emil.a.tonev@gmail.com

Leave a Review

If you are happy with this asset, please consider leaving a review on the Asset Store as it helps out with visibility! If you are unhappy with your purchase, please contact me so I can remedy any problems.