



StarScape

A plugin for Cinema 4D

Introduction

If you've tried to create a space scene in Cinema 4D, you will have surely tried to use the 'Starfield' shader provided. And been sorely disappointed with the result. The shader only produces an extremely simple star field; what is really needed is one where you can adjust star numbers, colour, size, and so on. This shader tries to give a better star field; it is entirely procedural, highly configurable, and doesn't require that you search for a suitable bitmap instead (and end up using the same one as everyone else). Now you can create star fields that are unique to your scene.

Please note that this shader is intended for use as a backdrop - it isn't a 3D volume that you can fly through.

Update to v1.1, February 2025

The plugin has been updated to fix a major bug, improve some areas, and add new functionality. The major changes over the initial version 1.0 are:

- A significant bug has been fixed which prevented the correct settings being entered into the shader when a scene was reloaded.
- This in turn required a major change to the user interface when more than one layer was needed.
- The previous limit of 10 layers has been removed, you can now add as many layers as required.
- Fixed a bug which caused sunspots on all single stars to be the same regardless of the seed value in the layer.
- The star glow has been improved and now looks better than the previous version.
- Additional settings have been added to control the appearance of star flares if enabled.
- A new setting for hue shift has been added to each layer.

Please note that existing scenes using the previous version of StarScape will not load settings into the shader correctly now. The scene itself loads with no problems but the shader settings will have to be recreated from the start.

How to use the shader

The interface is shown on the next page. There are a lot of settings! Rather than go into details of all the various options, it might be easier to start with how to use it. There are a number of things needed to achieve the best result. These are:

1. For a backdrop using the C4D standard render engine you can add a material with this shader to the C4D Background object, or to the Sky object. The alternative is to add the material to some other object (such as a

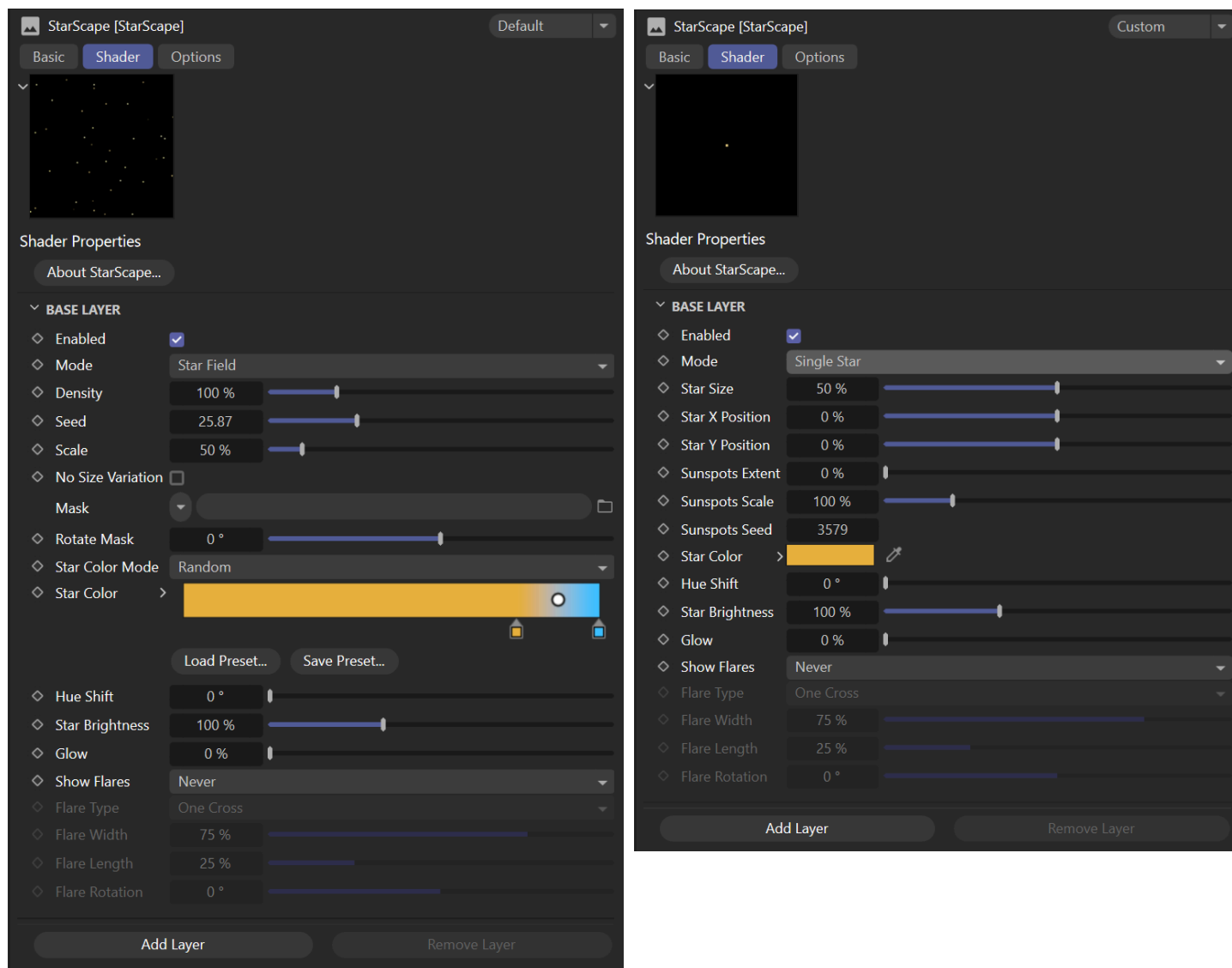


Figure 1. The StarScape interface ('Star Field' mode on the left, 'Single Star' mode on the right)

Plane) and then position and resize the Plane as required. Note that, unless the object is square, you will need to adjust the aspect ratio of the shader (see the section on this below) or your stars will look weirdly stretched.

If you're using Redshift, the Background and Sky objects are not supported, and the backplate settings in Redshift only use a bitmap image, not a shader. To use this shader in Redshift therefore, you will have to use a suitably positioned Plane object to reproduce the functionality of the standard Background object. There is more information about using Redshift at the end of this manual, and I would also recommend this tutorial: <https://www.youtube.com/watch?v=2CVvcH2Fluc> on using shader trees for a background object in Redshift.

2. Back in the standard renderer, add the shader to the luminance channel of the material and turn off the color channel. There's a reason for this. If your scene has lights in it, the object to which the material is added will be lit, which looks completely unrealistic. To avoid that, you can add the object to the exclusion list of the light(s). Unfortunately, the object then won't be lit at all, so will be completely black. The way round this is to add the shader to the luminance channel and to exclude the object from any lights in the scene.

3. Turn off the material's reflectance channel. You don't want your sky showing a specular highlight! This is so important that the shader will do this automatically for you unless you turn the relevant option off (standard renderer only, not Redshift).

For more complex results the shader has a layer system so that the star field can be built up in layers. It is

almost impossible to get the exact star field you want by using one layer. Using multiple layers in the shader will let you mix a background of tiny stars with a few medium-sized stars and maybe one or two large, 'hero' stars. You can have as many layers as you like, but in most cases two or three is sufficient.

You can also add the shader to a Layer shader then add more Starscape shaders if you need them. You might want to do this so you can apply some effect to only some of the layers. Just be aware that if you do this, the sky background colour should be set only once - in the lowest layer - and all subsequent instances of the shader should have a pure black background and be set to 'Add' rather than 'Normal' in the Layer shader. This will add the stars from different shaders into the scene without affecting the background.

The settings

There are many controls available in the shader, which are explained here. The majority of the controls apply to the individual layers, so as you change from one layer to another you will see the settings change. The settings in the 'Other Options' and 'Color Correction' groups apply to the shader overall and are not changed between the different layers. For example, you can only have one background gradient setting or aspect ratio, not one for each layer.

Layers

The shader has two tabs, labelled 'Shader' and 'Options'. On the 'Shader' tab, shown in Figure 1, you will initially see the settings for the base layer. This layer gives the initial render results for the shader, and cannot be deleted, though it can be disabled by turning off its 'Enabled' switch if required. For more layers, click the 'Add Layer' button below the base layer to add a new layer. You can add as many as you like, but each additional layer will increase the render time.

To remove a layer, click the 'Remove Layer' button. The last one added (the lowest on the list in the interface) will be removed. You can remove all of them except the base layer which can never be deleted, only disabled.

What happens if you've added (for example) five layers but decide you don't want the second one you added? Do you have to delete the last three layers, delete the second layer, then add the three deleted layers again? Well, no. That would be silly. The way to handle that is to go to the layer you don't want and simply disable it by turning off its 'Enabled' switch. The layer will not be used in the render and the fact that it still exists won't impact render time.

In fact, this is a good way to try out different settings. If you want to try something new, add a new layer, disable the other layers you don't need and render. When you find the settings you want, just disable the unwanted layers and use the one you do want.

You can change settings in all the layers that have been added. To use a layer in the render, make sure the 'Enabled' switch is turned on in each layer you want to use. The stars in a layer won't appear in the render or viewport unless that switch is on. Also, note that each layer has a 'Seed' value which controls the random distribution of the stars. These seeds are set to arbitrary different default values for each layer, which you can change if you don't like the pattern produced. Be aware though that if two layers have the same seed and all other parameters such as Scale, Density and so on are the same, the stars for the two layers will be directly superimposed on one another. Finally, although you can use as many layers as you like the more layers that are active, the slower the render will be.

1. Enabled

If this switch is not checked, the layer will not be used in the render. If you want to use more than one layer, you must turn this switch on for each layer you want to use. By default, only Layer 1 is enabled when you first add the shader to the scene.

2. Mode

The default setting is to produce a star field, but occasionally you want to add a single, precisely positioned, large star. You can do this by changing the mode to 'Single Star'. This is discussed in the relevant section below.

The next six settings are only available in 'Star Field' mode:

3. Density

By default this gives a star field density of 100% and can be increased to whatever you like. It is recommended not to exceed 500% for any one layer though. You can activate additional layers if required. The higher the value, the greater the number of stars will be seen and the longer the render will take.

4. Seed

A random seed value used to distribute the stars. If you don't like the pattern, you can change the seed. You don't have to change it much: even a small change in value will change the pattern completely. As mentioned above, if two layers have the same seed and all other parameters such as Scale, Density and so on are the same, the stars for the two layers will be superimposed on top of one another. Each new layer will have a different initial seed value.

5. Scale

This scales up the star field but it does so by effectively zooming in on an area of the field, with the result that you get larger stars but fewer of them. If you need more stars, you will then need to use the 'Density' setting or add another layer. As you might expect, if you reduce the scale you get more but smaller stars; then you might need to reduce the number with the 'Density' setting.

6. No Size Variation

By default, the generated star field will contain a mix of smaller and larger stars. If you want all the stars to be the same size, turn on this switch. Note that, if your star field has multiple active layers you will need to turn on this switch in all those layers for all stars to be the same size (and of course, the scale will need to be the same in each layer).

7. Mask

This is a link field for a shader or bitmap to mask out parts of the shaded result. Using a mask will let you render (for example) a cloud or streak of stars which you can then overlay on a different background layer of stars. For more details, see 'Masking out part of the star field' in the tips on using the shader below.

It is strongly recommended that, if using a Noise shader as the mask, that the 'Space' setting of the noise is set to 'UV (2D)'. This gives better results than the default 'Texture' space and in any case is essential if you want to rotate the mask (see the next section).

Note that a mask only applies to the layer it is in. That is, if you have a mask in one layer, that mask will not affect stars in any other layer. If you need multiple layers to use the same mask, simply copy the mask shader or bitmap to each of the other layers.

8. Rotate Mask

If you use a bitmap as a mask, you can draw one to give exactly the effect required. But if you use shader (typically a noise shader) for the mask, you may like the noise pattern but want to rotate it. For example, consider this mask made using a noise shader (Figure 2):

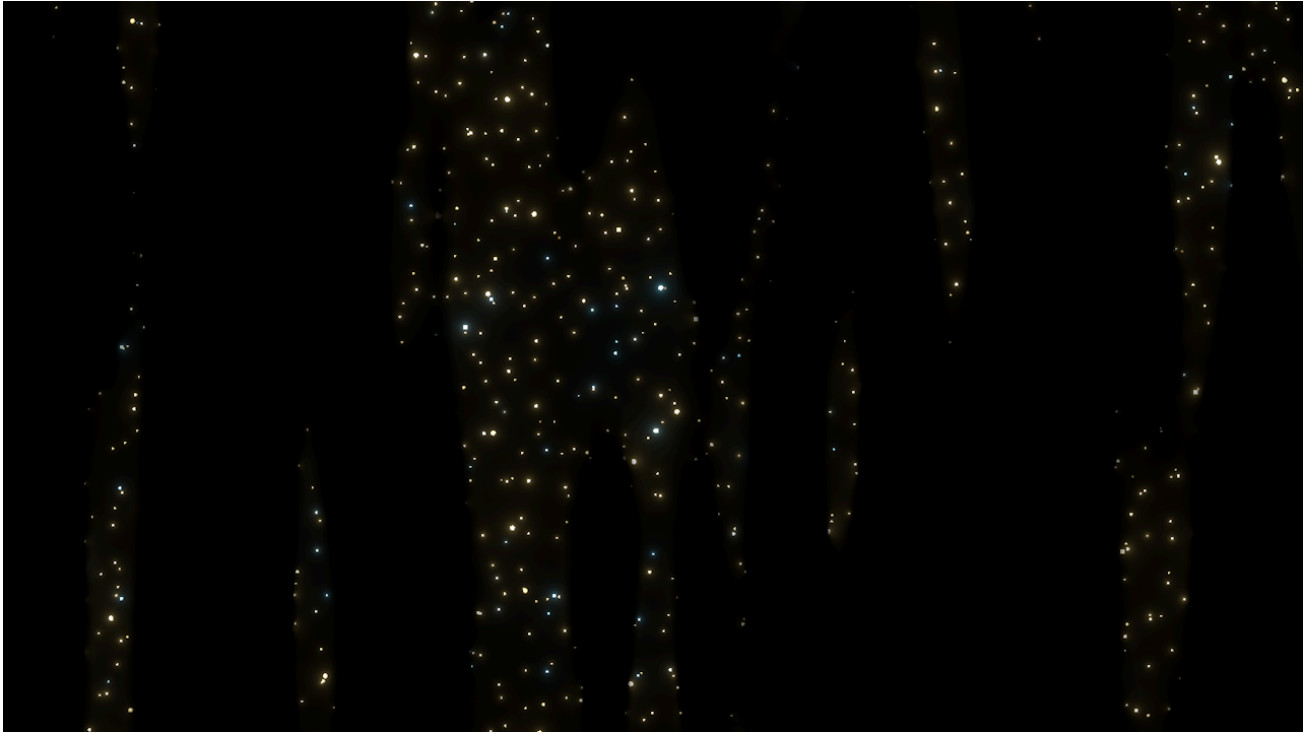


Figure 2. Star field partially masked out using a Noise shader

What I'd like is to rotate the mask so that the star bands are almost horizontal. This is where this setting comes in. By rotating the same mask to 65 degrees, this is the result (Figure 3):

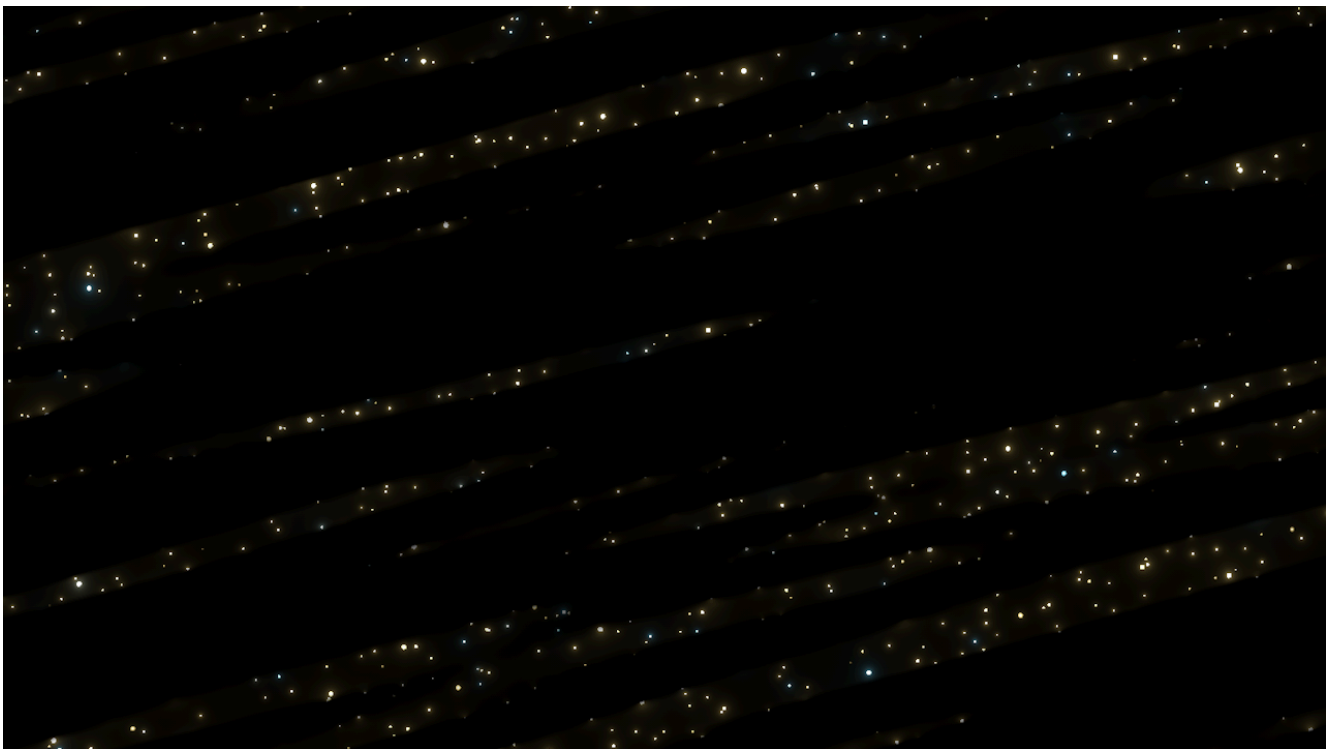


Figure 3. Same mask from Figure 2 but rotated 65 degrees

A couple of important points to note here:

You can use 'Rotate Mask' with a bitmap or shader as the mask, but results from rotating a bitmap tend to be unpredictable, because the masking bitmap, when rotated, may partly disappear off one edge and reappear on the other.

If you use a Noise shader as the mask (which is very likely) you really MUST set 'Space' in the noise settings to

‘UV (2D)’ because the rotation works by rotating the UV coordinates. The default ‘Texture’ space will not show any rotation when rendered.

9. *Star Color Mode and Star Color*

In ‘Star Field’ mode, star colours are selected from the ‘Star Color’ gradient. There are two options in the mode menu:

- Size-Dependent: as the stars become larger, the colour is selected more to the right hand end of the gradient. Small stars have colours from the left hand end.
- Random: the colour is selected randomly from the gradient.

Of course, if you want all stars the same colour, just have a single colour in the gradient. Be aware that, if you turn on ‘No Size Variation’ and select ‘Size-Dependent’ as the gradient mode, all stars will be the same colour.

In ‘Single Star’ mode the gradient is not available. In that mode, the colour is selected from the single color control with the same name.

10. *Hue Shift*

Changing this value will tint the entire layer to some other colour. The range is 0 to 360 degrees. This setting is used when you are selecting colours from a gradient and want to change the hue without altering the gradient itself. It’s not used in ‘Single Star’ mode since you can just change the star colour setting.

11. *Star Brightness*

Reducing this value will lower the star brightness. As the value is reduced further, small stars will disappear altogether. A value of zero will remove all the stars.

12. *Glow*

Each star has a central point and a surrounding glow. This can sometimes be overpowering if you have a lot of stars, so you can turn the glow down with this setting. With very small stars reducing the glow width may make them almost invisible, so this setting may appear to reduce the number of stars (you can increase them with the ‘Density’ setting).

Increasing this value can be useful if you want to produce the effect of a dense ‘cloud’ of stars that you sometimes see in images of the Milky Way, for example.

13. *Show Flares*

The generated stars can have flares as seen here (Figure 4):

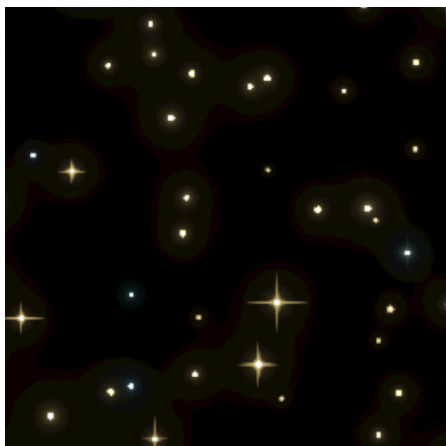


Figure 4. Flares on stars (‘Size-Dependent’ mode)

There are three options in this menu:

- Size-Dependent: in this case only largest stars will have flares
- Always: all stars will have flares, regardless of size
- Never: no flares are generated (the default setting)

14. Flare Type

The three flare types are shown in these images (Figure5):

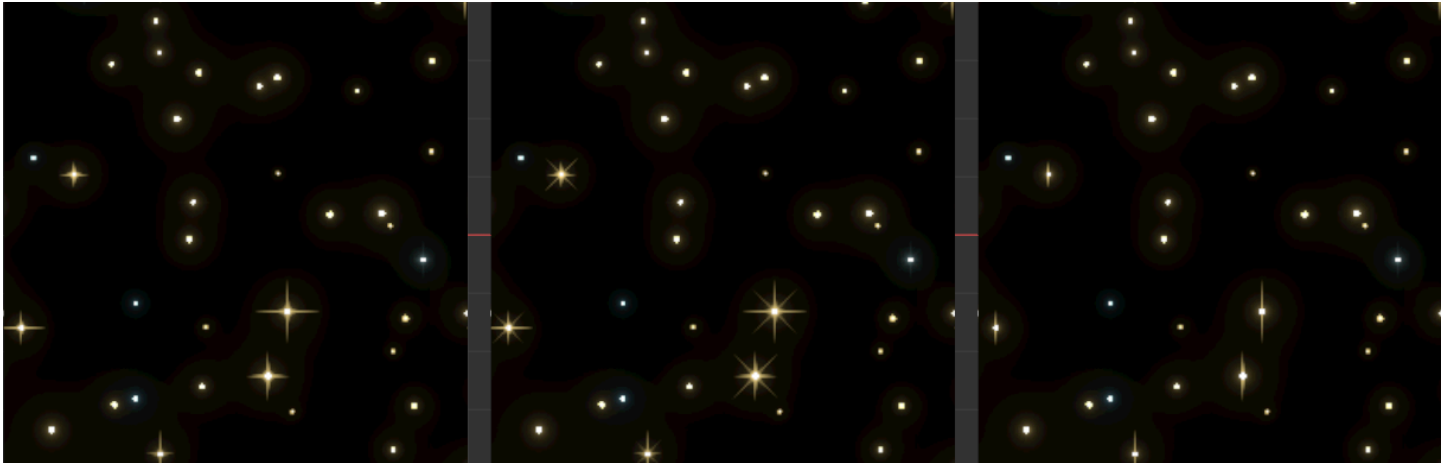


Figure 5. The three flare types - one cross, two crosses, and single

When choosing the 'Two Crosses' option, the second cross is always shown at 45 degrees rotation to the first.

15. Flare Width and Flare Length

These two settings give you additional control over the thickness and length of the flares. As a general rule, a value of 50% or less gives the most pleasing results. If either value is zero, no flares are produced. It is suggested that if flares are used on large single stars, a glow is also added with the 'Glow' setting; 25% to 50% glow gives a good result.

16. Flare Rotation

You can rotate the flares using this setting. A value of zero means that the flare will point vertically (and horizontally with the 'One Cross' setting).

The following settings are only available in 'Single Star' mode (Figure 6):

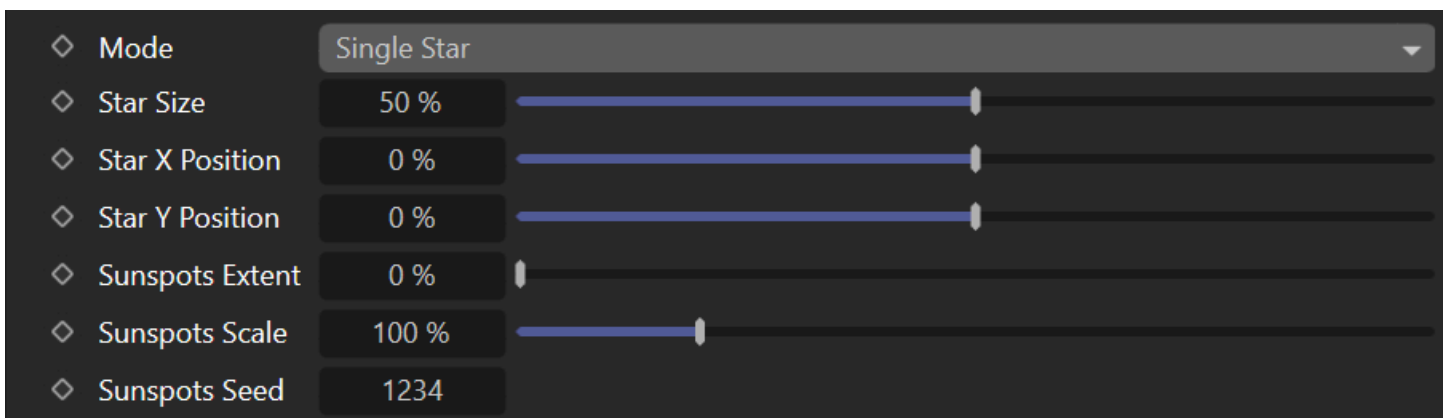


Figure 6. Settings in 'Single Star' mode

17. Star Size

The size of the star you want to produce.

18. Star X Position and Star Y position

By default the star is generated at the centre of the shaded area, but of course you might well want to move it elsewhere. Use these controls to move the star to the left or right (X position) and up or down (Y position).

19. Sunspots Extent, Scale and Seed

These three controls enable the appearance of sunspots on the sun disk in 'Single Star' mode. These appear as black patches on the disk. In reality, sunspots are in fact intensely bright and hot, but because they are cooler than the rest of the sun's surface, they appear black when seen against the surface of the sun.

The extent setting determines how much of the disk is covered in sunspots. For greatest realism, keep this low: 5% is good. But you can go as high as you like. The default setting is zero (no sunspots); at 100% the entire surface is black, which would never happen in reality.

You can increase the size of the sunspots with the scale setting, but remember that in reality the spots are very small. As the scale is increased you will see larger sunspots but fewer of them.

If you don't like the pattern of sunspots you see, you can change it with the seed setting. Figure 7 shows the sort of effect that results:

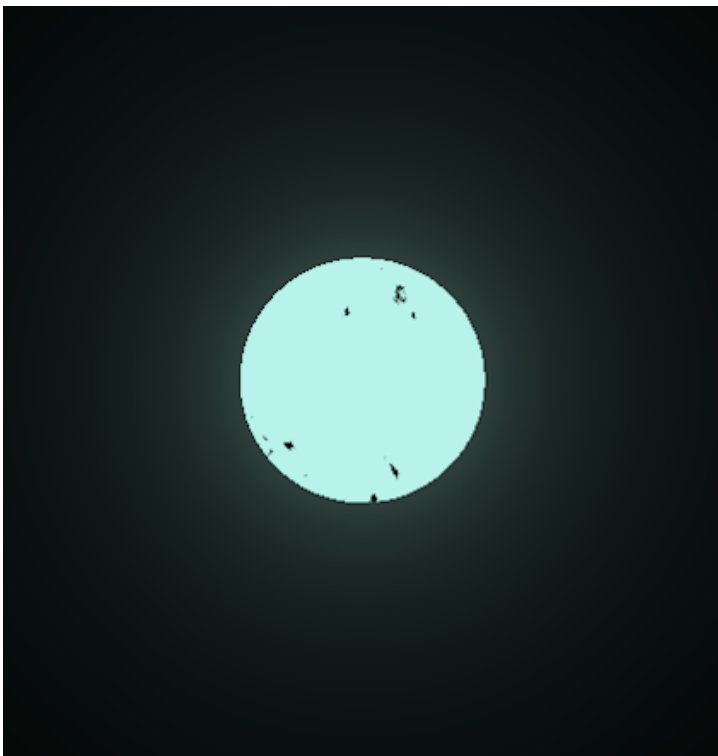


Figure 7. Sunspots example

Other Options

These settings are all found in the 'Options' tab (Figure 8).

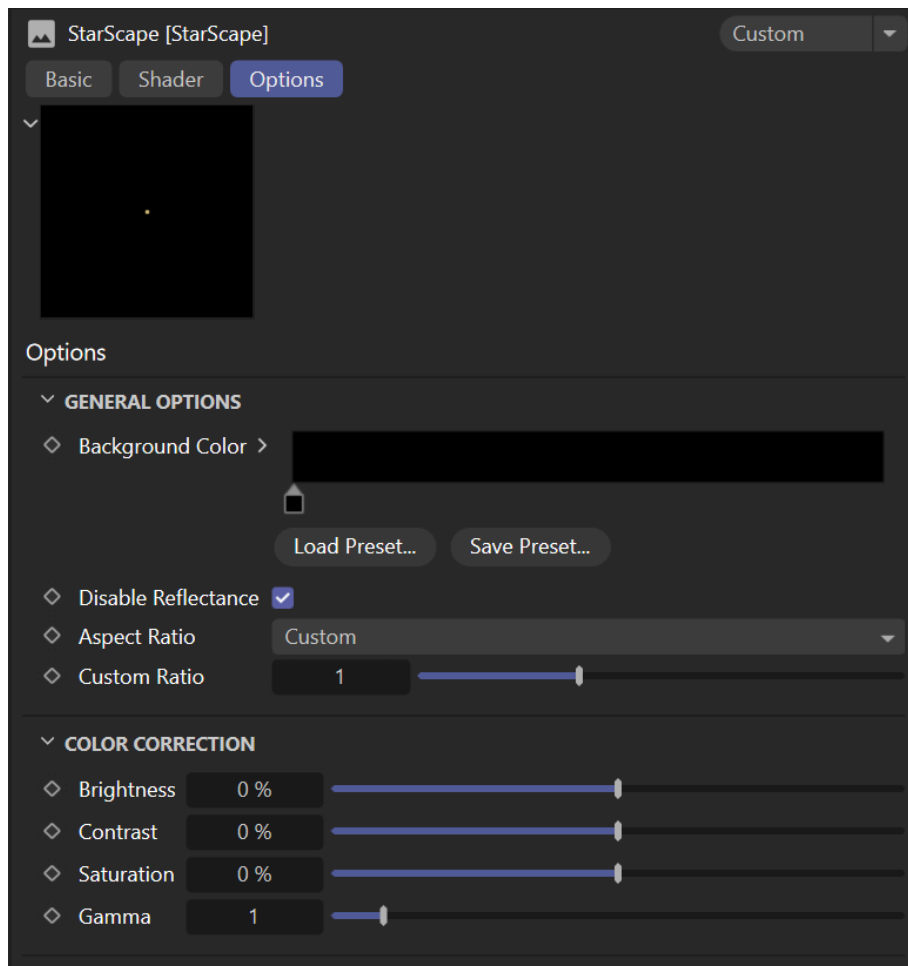


Figure 8. Options tab

1. Background Color

This is the colour of the sky background. The default setting is black, but you can set it to any required colour. You can also use a gradient, for example to get a horizon effect. If you do use a gradient, note that it is set up to use a Background or Sky object, and that if you use a Plane object you may need to invert the gradient to get the correct orientation of colours.

2. Disable Reflectance

As mentioned earlier, it is recommended that the material with the StarScape shader should have the reflectance channel disabled. If this switch is on, which it is by default, reflectance is disabled automatically so you don't have to remember to do it. If you really want it back on, turn this switch off.

Important: this switch ONLY applies to the standard renderer, and not to Redshift. You will need to turn reflection off manually if using Redshift.

3. Aspect Ratio/Custom Ratio

If the object the shader is placed on is not square, the stars will look stretched, either horizontally or vertically, depending on the object's width and height. If that happens, you can adjust the aspect ratio used in the shader by choosing 'Custom' from the 'Aspect Ratio' menu and entering the correct value into the 'Custom Ratio' field. Or, you can just drag the slider left or right until the aspect looks about right (when rendered in the viewport or picture viewer, not in the material preview as this is always square).

What value should you enter into the custom ratio field? The easiest thing is just to use the width of the object divided by its height. So if the object is, for example, 1200 by 800 scene units in size, enter '1200/800' into the field. Cinema will calculate that entry to give as aspect ratio of 1.5.

If you are using a Background or Sky object, they don't have a size so you can't do this. In each case the object fills the render area, so all you need to do is change the menu to 'Screen' which will automatically use the correct ratio.

Color Correction group

The next four controls are colour correction settings which are the same as used in any other software. Very briefly they are:

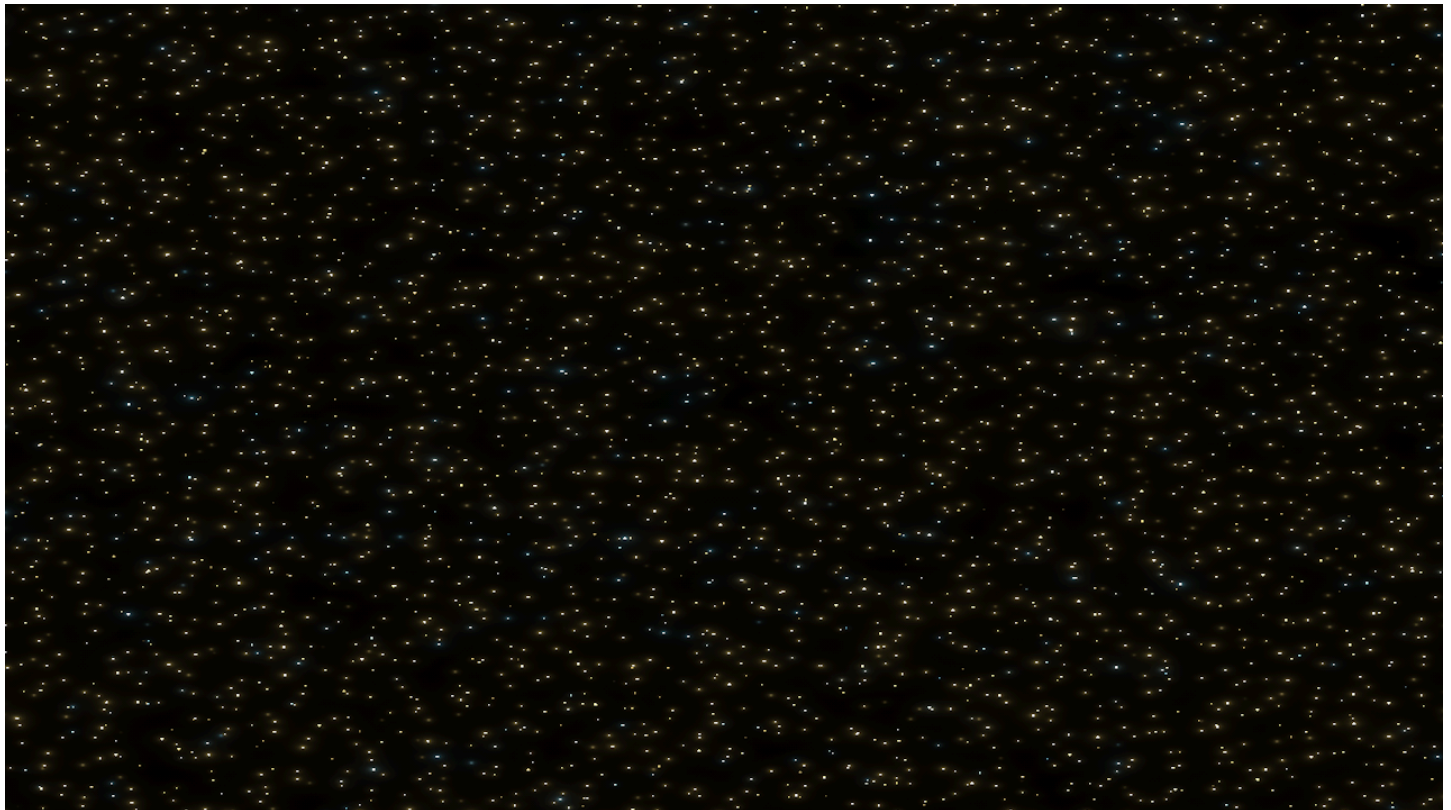
- Brightness: alters the brightness of the rendered result; note this is a colour correction for the entire image and does not affect star brightness specifically (use the 'Star Brightness' setting for that)
- Contrast: alters the contrast between different colours
- Saturation: alters the colour intensity; the brightness is unchanged but the colour looks more or less vibrant depending on the setting
- Gamma: alters the gamma value applied to the output colour

These settings give exactly the same result as if you added this shader to a Layer shader then applied an effect such as Brightness/Contrast/Gamma. They are included here for convenience.

Examples from using the shader

1. A dense field of small stars

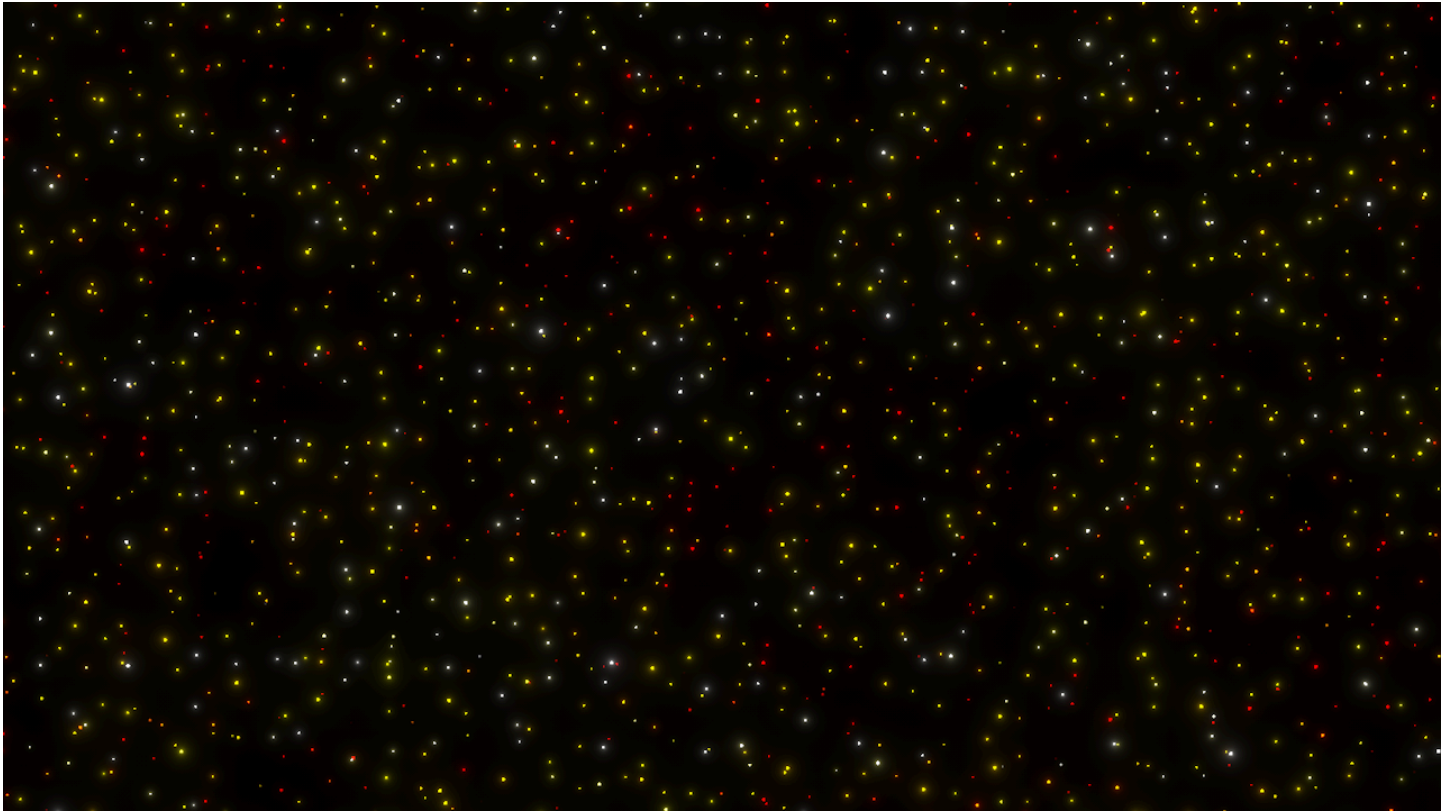
This is the default star field render except that the density setting has been increased to 300%. All other settings are the same.



Example 1. Dense field of small stars

2. Star colours

This is the same as the first example, but the scale has been increased to 100% and the star color gradient loaded with one of the presets supplied with C4D.



Example 2. Coloured stars

3. Star field with a lot of small stars with a few larger ones in the foreground

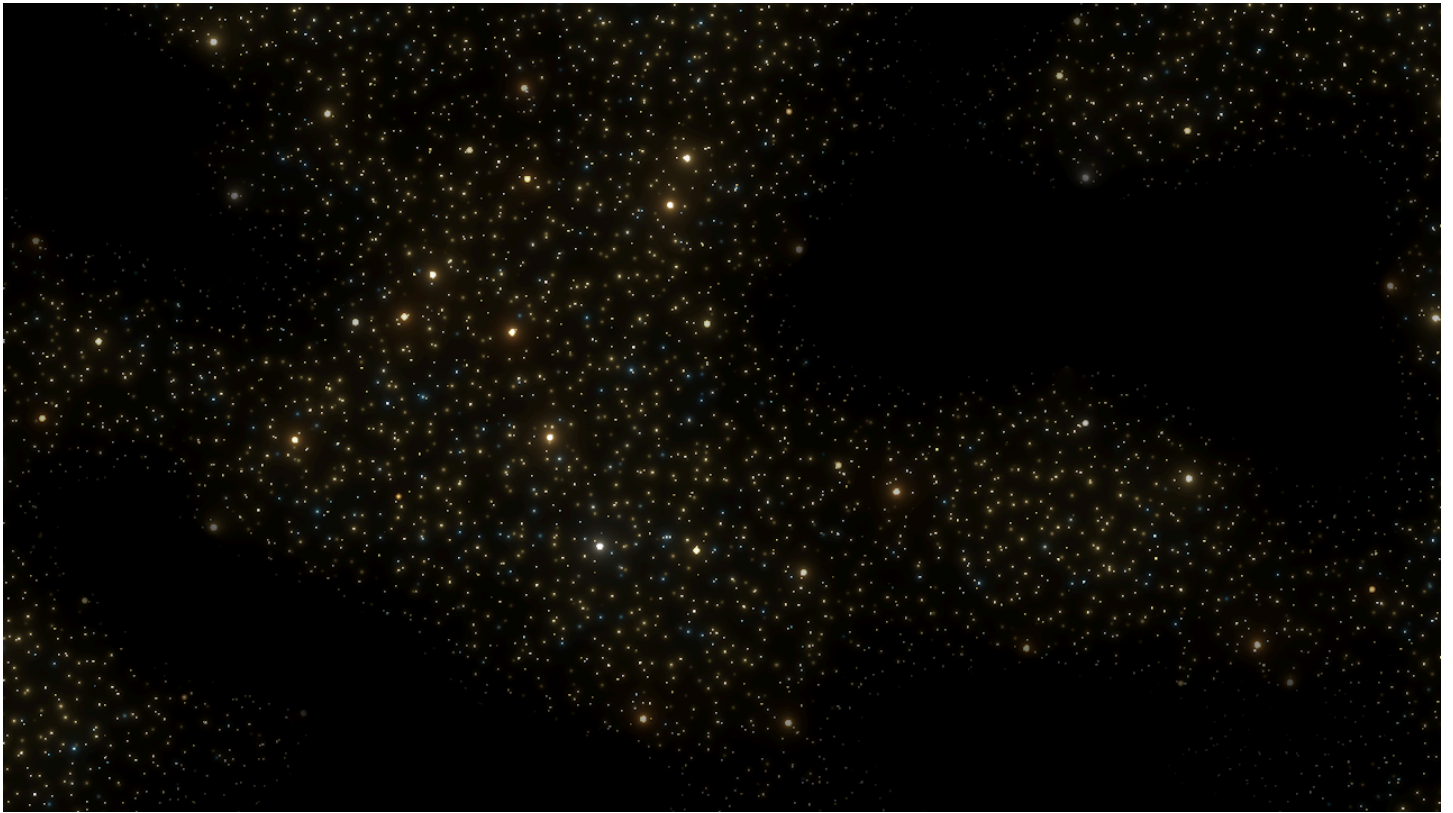
Example 3 uses the same settings as example 1, but with two more layers added. Layer 2 contains larger stars which all use a red to yellow gradient and a glow width of 35%, then layer 3 has a few much larger stars using a blue gradient and showing flares.



Example 3. Star field with larger foreground stars

4. Masking out part of the star field

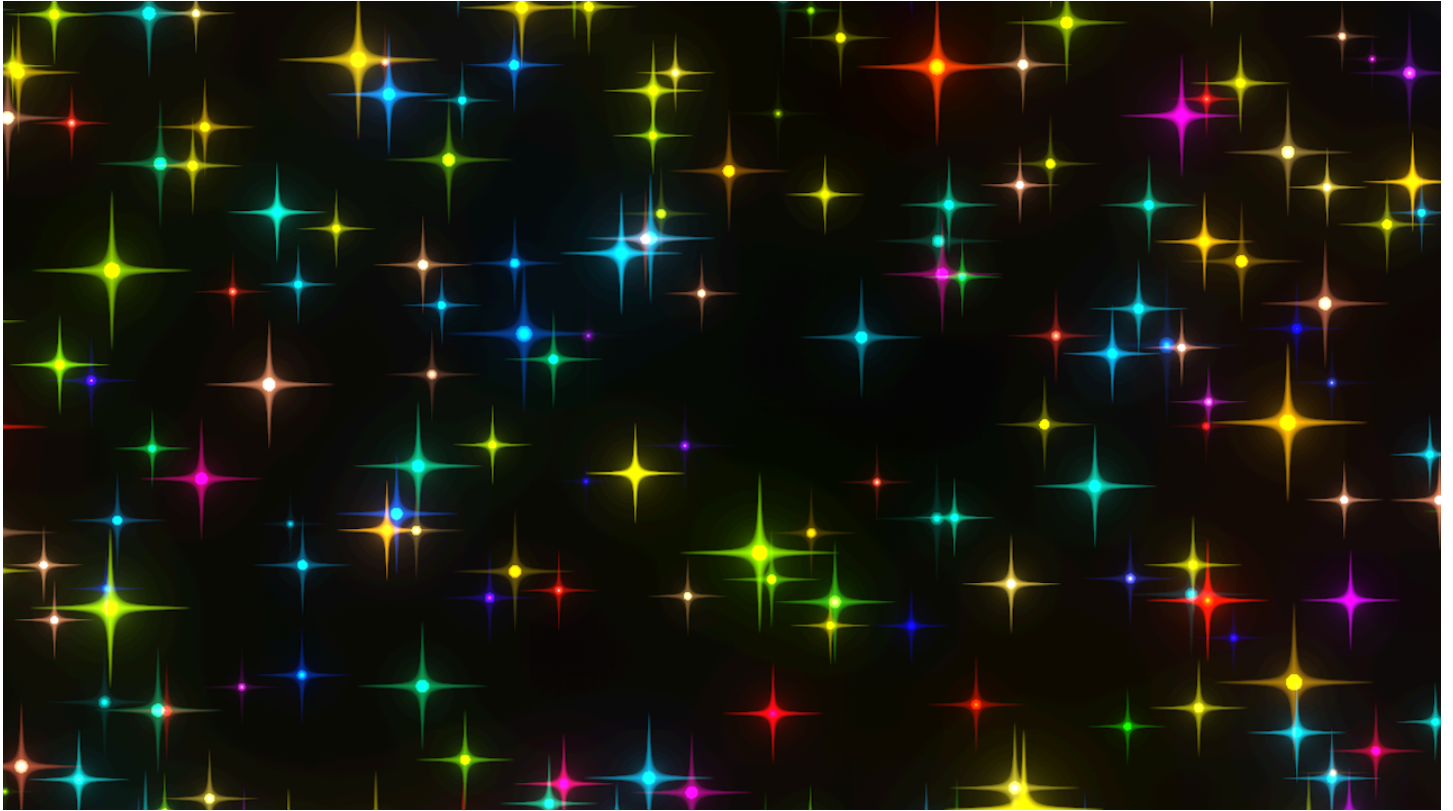
Normally, the generated star field is uniformly distributed across the shaded object. But this might not be what is required; you might want some areas which are empty space rather than full of stars. The way to do this is to add a shader or bitmap to the 'Mask' link field. In example 4, a Noise shader has been used to mask off part of the star field. Two layers were used, with the same mask in both layers.



Example 4. Masking part of a layer

5. Creating non-realistic results

All the above examples have focused on creating realistic star fields or night sky effects. But you can use this shader to produce purely decorative results for whatever need you have. This next example is completely unrealistic but could be useful in some cases. This was produced with two layers, density at 300%, scale 500% and 400% respectively, flares on all stars and a multicoloured gradient used.



Example 5. Non-realistic, decorative render

Using this shader with Redshift

Since it isn't possible to write a native Redshift node to reproduce this effect, you must use the C4D Shader material to use this shader in Redshift. It's not difficult but there are a few steps to follow. Because this applies to all the shaders I've written, there is an [article on my website](https://www.microbion.co.uk/html/blog31_01_25_c4dshader_redshift.php) with full details of how to use standard Cinema 4D shaders in Redshift. You can find it at https://www.microbion.co.uk/html/blog31_01_25_c4dshader_redshift.php.

For this particular shader, there are additional steps to take.

Step 1. Create the C4D Shader material as laid out in the above link to my site. In the RS Material node, set 'Reflection Weight' to zero. You don't really want a shiny starfield. Note that the 'Disable Reflectance' switch in the options settings is disabled in Redshift and you'll need to do this manually.

You can use that material as it is, but for best results you can add it to an Incandescent material, as shown in the next step.

Step 2 (optional). Create a new Redshift Incandescent material. Open it in the node editor (this will be the nice new editor, not the old Xpresso-style one). Add a new Reference node from the Utility group and connect its 'Surface' output to the 'Illumination Color' input of the Incandescent node. In the Reference node, there is a field labelled 'Material'. Drag and drop the C4D Shader material you created earlier into that field. That's it. You can turn up the luminance with the 'Intensity Multiplier' setting in that node (this works really well!).

The final node tree would look like this (Figure 9):

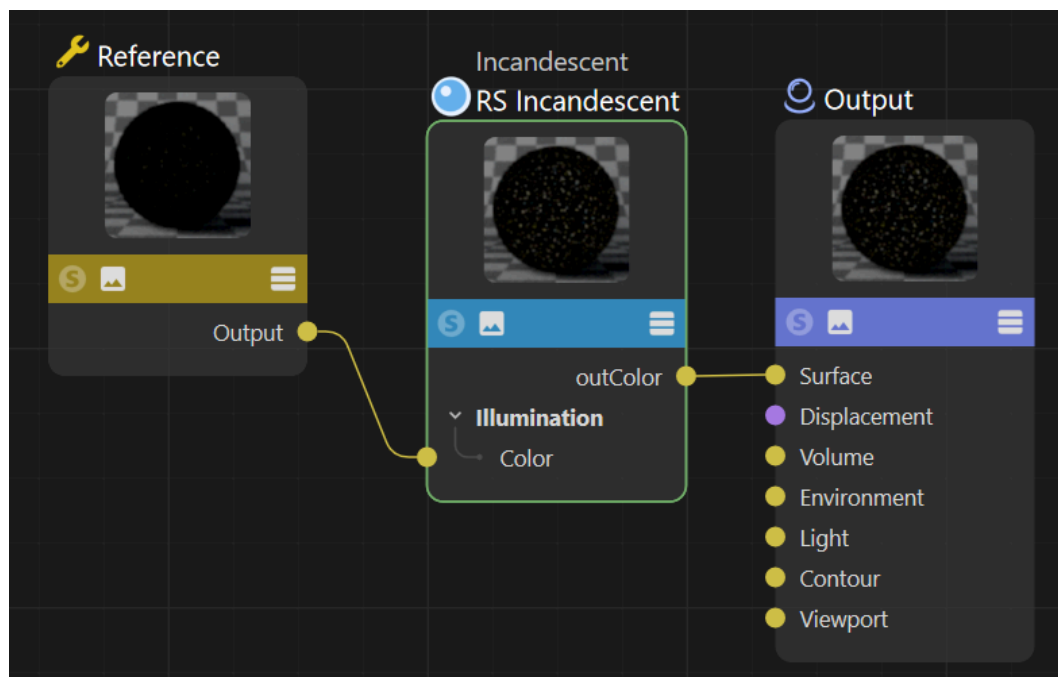


Figure 9. Redshift incandescent material using the StarScape shader

Step 3. Add the Incandescent material to whatever object you are going to use. This will probably be a Plane object, but it doesn't have to be. If you are setting up the Plane as a background object, you may need to make a few small changes which are outside the scope of this manual, but are very well explained in this video <https://www.youtube.com/watch?v=2CVvcH2Fluc>.

Other render engines

StarScape has only been tested in detail with the Cinema 4D standard renderer and Redshift. However, a brief look shows that it also works with Cycles 4D from Insydium. If you have that, create an Emission material, add an Image Texture node, add the StarScape shader to that texture node and link the node's output Color port to the input Color port of the Emission node. That's all that's needed. The node tree is shown in Figure 10.

StarScape has not been tested in other engines such as Corona, Vray, Arnold, Octane, etc. but it may be possible to use it in these engines by adapting the procedure for Redshift and Cycles 4D.

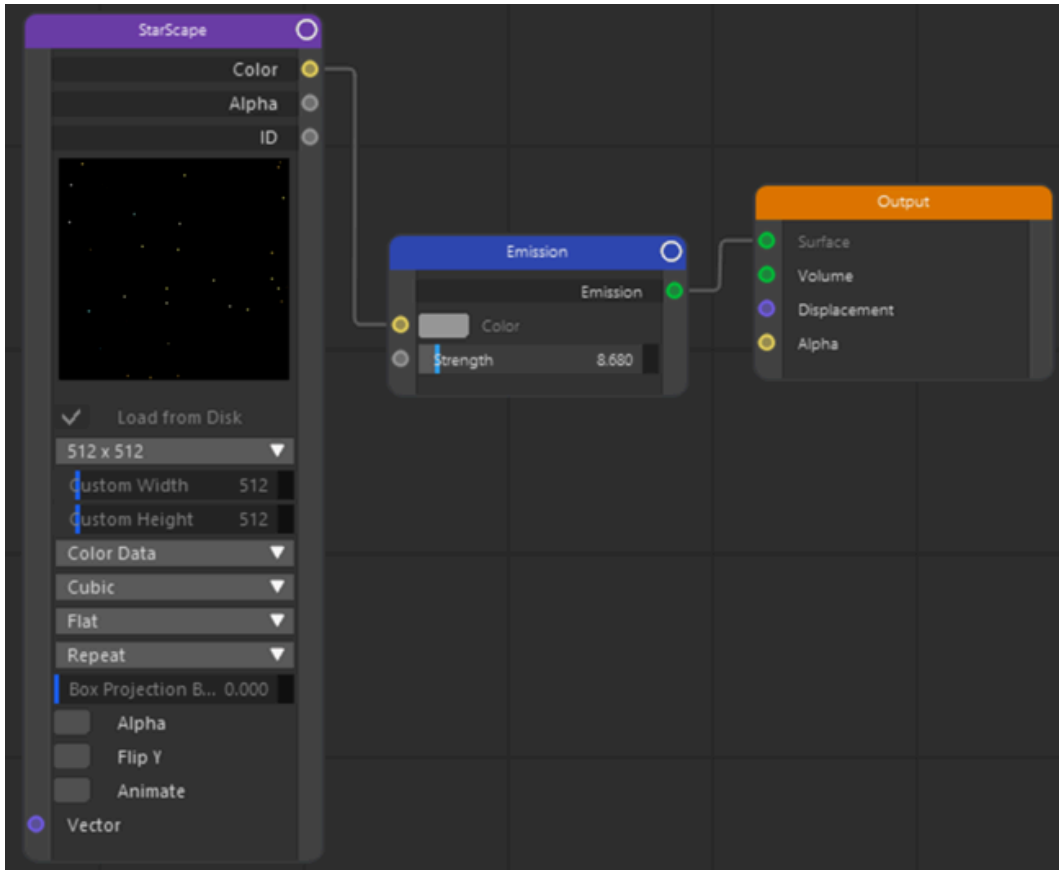


Figure 10. StarScape in cycles 4D node tree

And finally...

I hope you enjoy StarScape. This is the first in a series of shaders to be used for creating space scenes, with more to follow!

You can get the latest version from my site at <https://microbion.co.uk/html/starscape.htm> and if you have any comments (or find any bugs) you can contact me at <https://microbion.co.uk/html/contact.htm>.

Steve Pedler

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