BRYCE 7 pro

TUTORIAL SERIES

Creating deep space nebulae

from the scratch

a tutorial by

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1. Create the nebula material.
2. Capture this material into a HDRI.
3. Re-combine this HDRI back into the Bryce scene.

The first step is to make an appropriate material. It is possible to capture a voumetric material from inside if the right approach is taken. The trick is to hollow out the material to make a space for the camera. That's not that hard for anyone familiar with the material lab - but I will cover it for completeness.

Incidentally, you may wonder, why having made a nebula material I do not simply propose that is used in the scene directly? Why all the extra faffing of making a HDRI backdrop? Well, the reason is due to the new features available in Bryce 7 Pro, recombination of the HDRI with the Bryce scene allows the addition of "special effects" which would otherwise not occur with the material alone. Also, once a HDRI the rendering will be blisteringly quick and it is easier to manipulate. Many pro's. The con's - that's the initial set up and rendering.

So... the setup...

Image 1.
Atmosphere off, no fog, no haze, no clouds. Leave the sun for now.

Image 2.
Put the camera and a sphere primitive, in the world centre. Camera co-ordinates shown. The sphere should be quite a bit bigger than the camera.

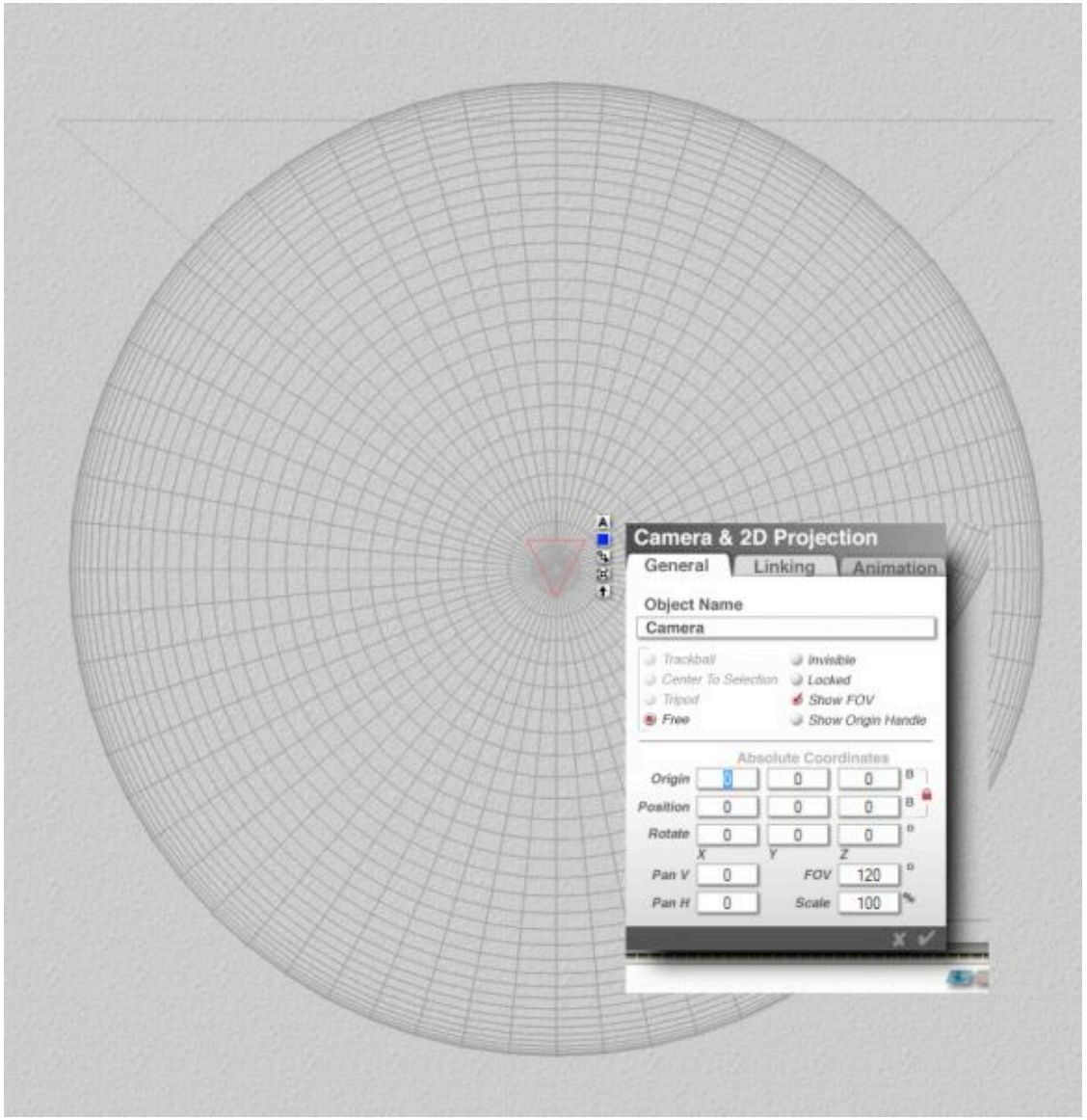


Image 3.

For the time being choose panoramic projection. This will allow you to see most of the sphere in one shot. Although only a proportion of this will be visible in your final render, it is easier to assess the material if you can see more of it - I reckon so anyway.

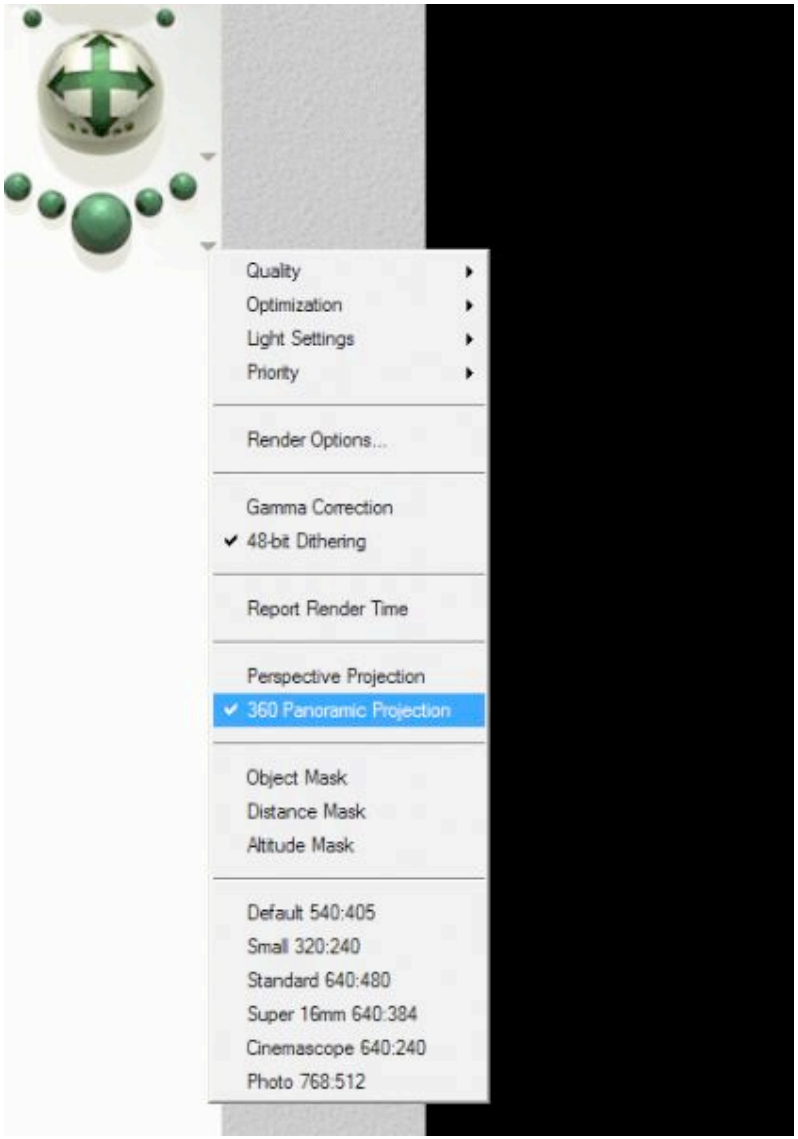


Image 4.
Is the starting point for the material. This has to be set up right, then things get a bit more straight forwards.
Just a brief explanation of the theory before I show you where to find and how to make the pieces.

A - is the structure of the nebula. This cannot be used on its own because it would overlap the camera at the origin and obscure what the camera could see of the rest of nebula.

B - is just empty space. The aim is to use channel C to put empty space in the core of the sphere so the camera can see the entire outer portion of the nebula material. In essence hollowing out the sphere.

C - uses distance origin to blend A and B.

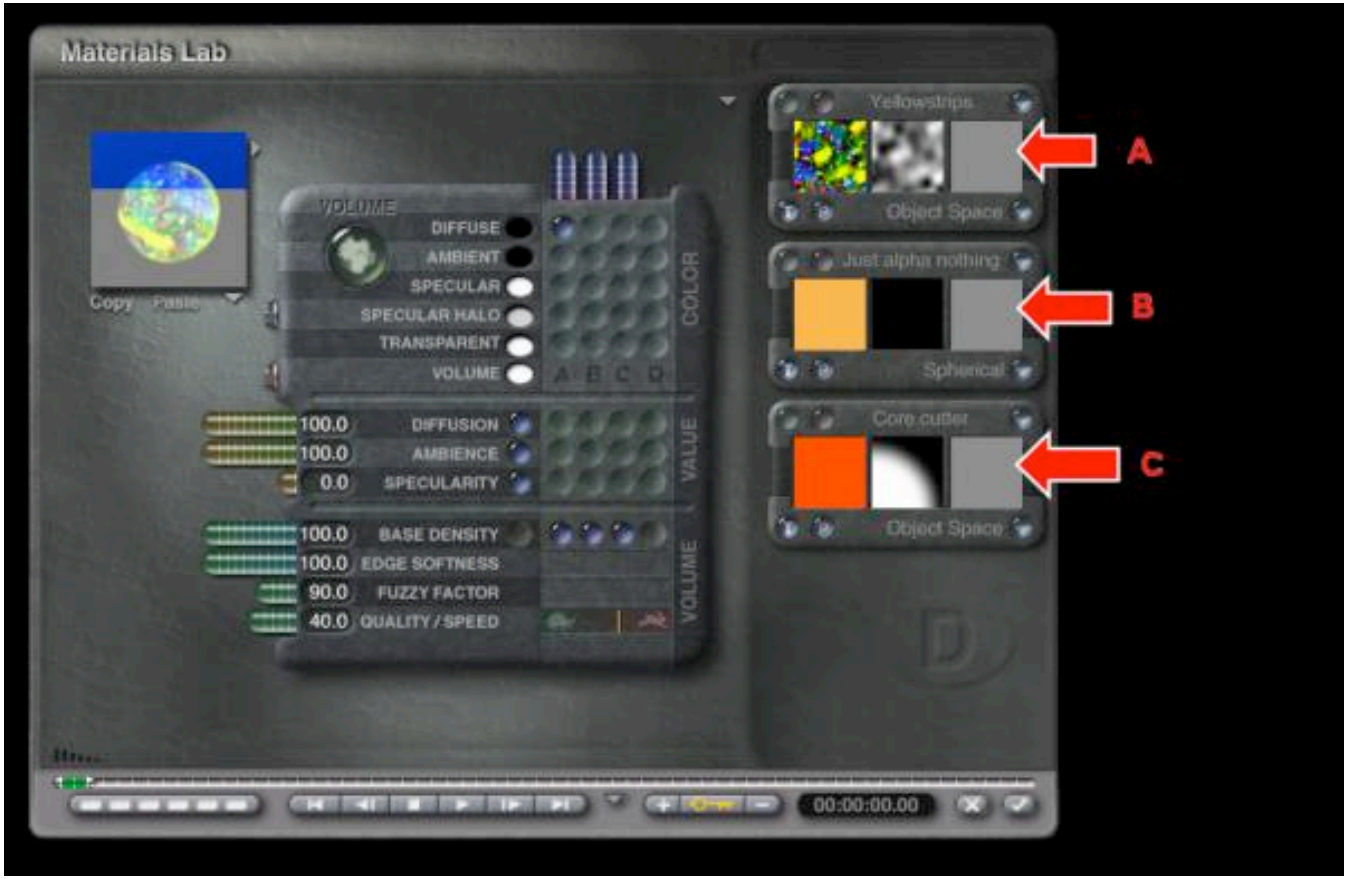


Image 5.
The texture in channel A. These is the scale and you can see the mapping mode is object space.

Image 6.

The texture itself can be found in the default texture library under psychedelic. This will have to be modified but it is a good starting point. If you give me your email, I can post you the modified materials to make life easier. Depends how much of the spade work you wish to do yourself. However, we've not got to that point yet, the first step is to get this material shell set up going.

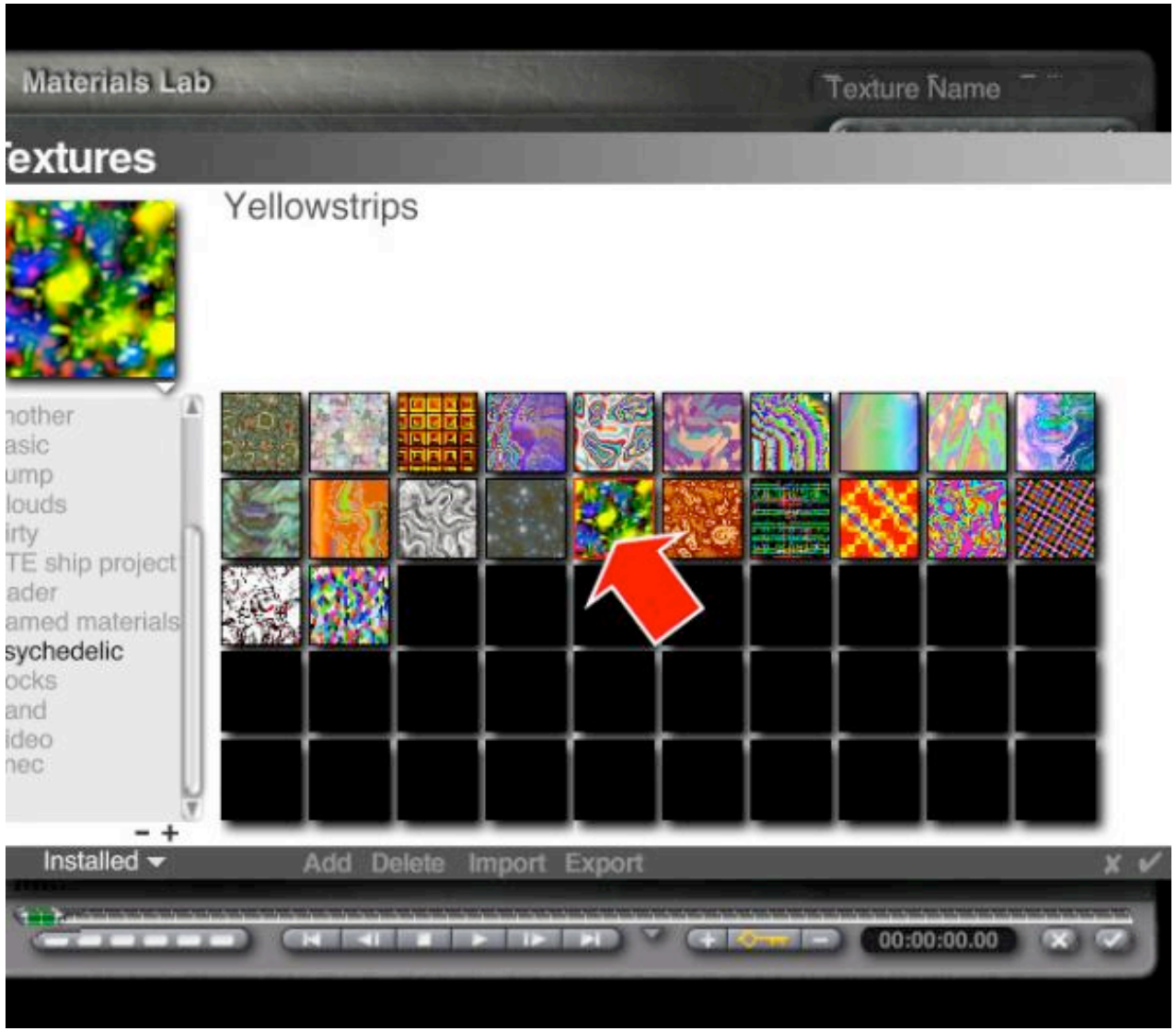


Image 7

Right channel B is easy, being empty, the mapping mode and scale do not matter. All that needs to be achieved is 0 alpha output. Alpha output and the sin filter to modify that to zero. Other approaches can be used to achieve the same result. Just as long as the output is alpha 0 is all that matters here.

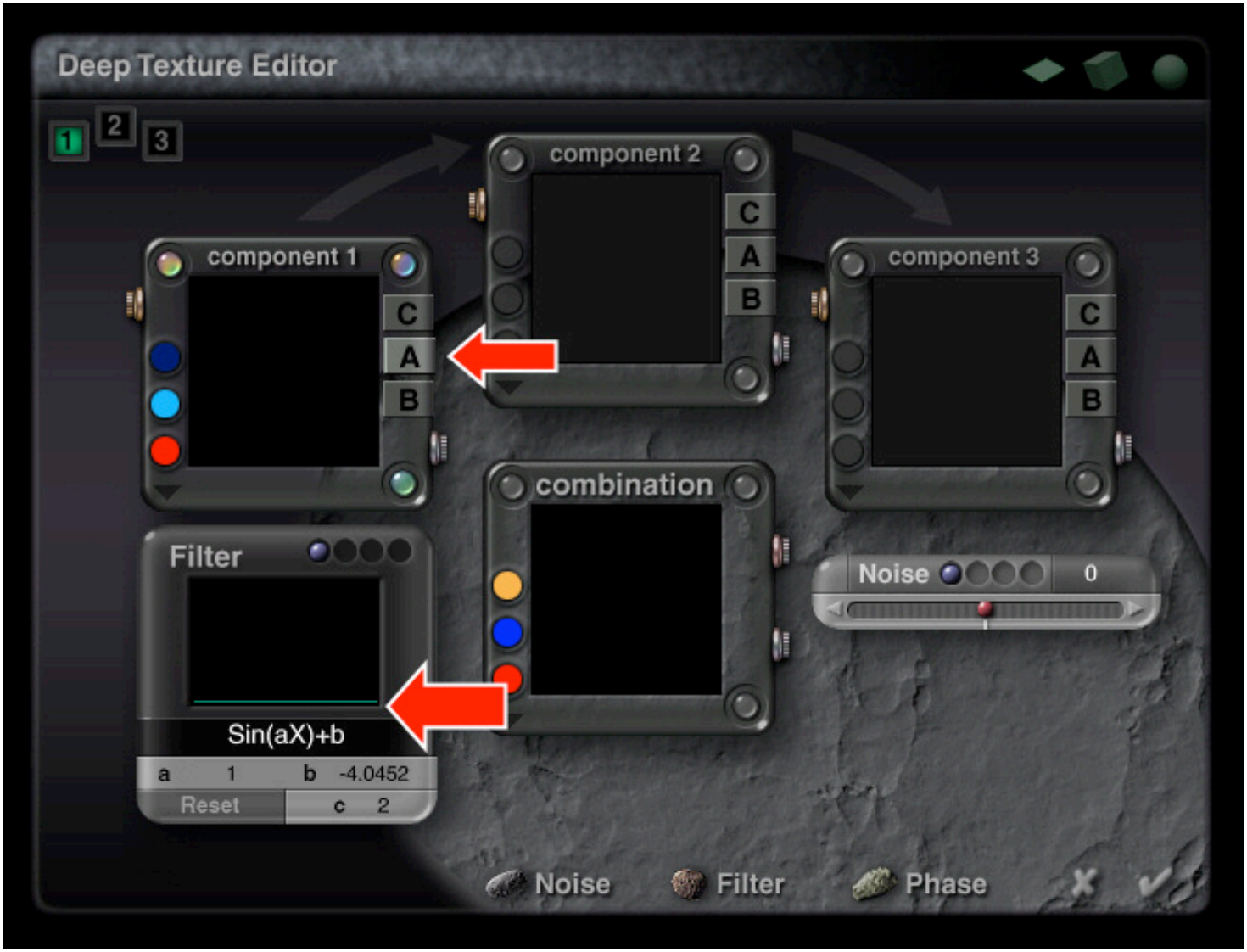


Image 8

The set up of C is a little bit more fiddly. Here is the scale for the texture component. And note the mapping mode is object space.

Image 9

Here in the DTE, component 1 uses the inverse of the trick for getting Alpha 0 to give out full Alpha. component 2 is subtracted from this. I've put the filter setting beside the components (you may need to click on the images to see the numbers) and for component 2 the noise setting is displayed. The frequency being critical since this is controlled by the scale in the material lab and determines the size of the hollow in the final material.

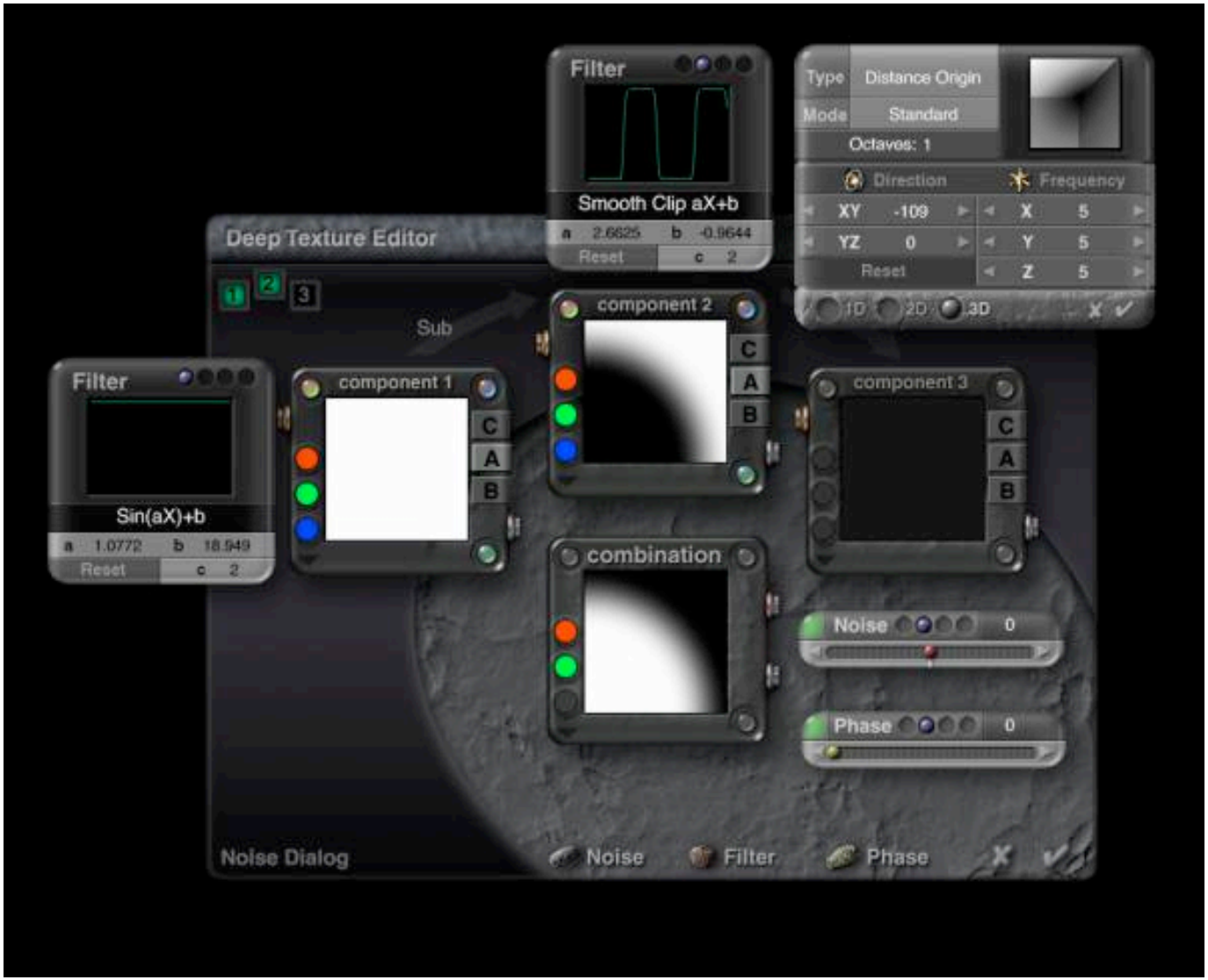


Image 10

The material options settings. Use lower quality settings for previewing eg. 40 and then for the rendering stage up this value to say 80 - or lower depending on the speed of your computer.

Image 11
Your render should now look like this.

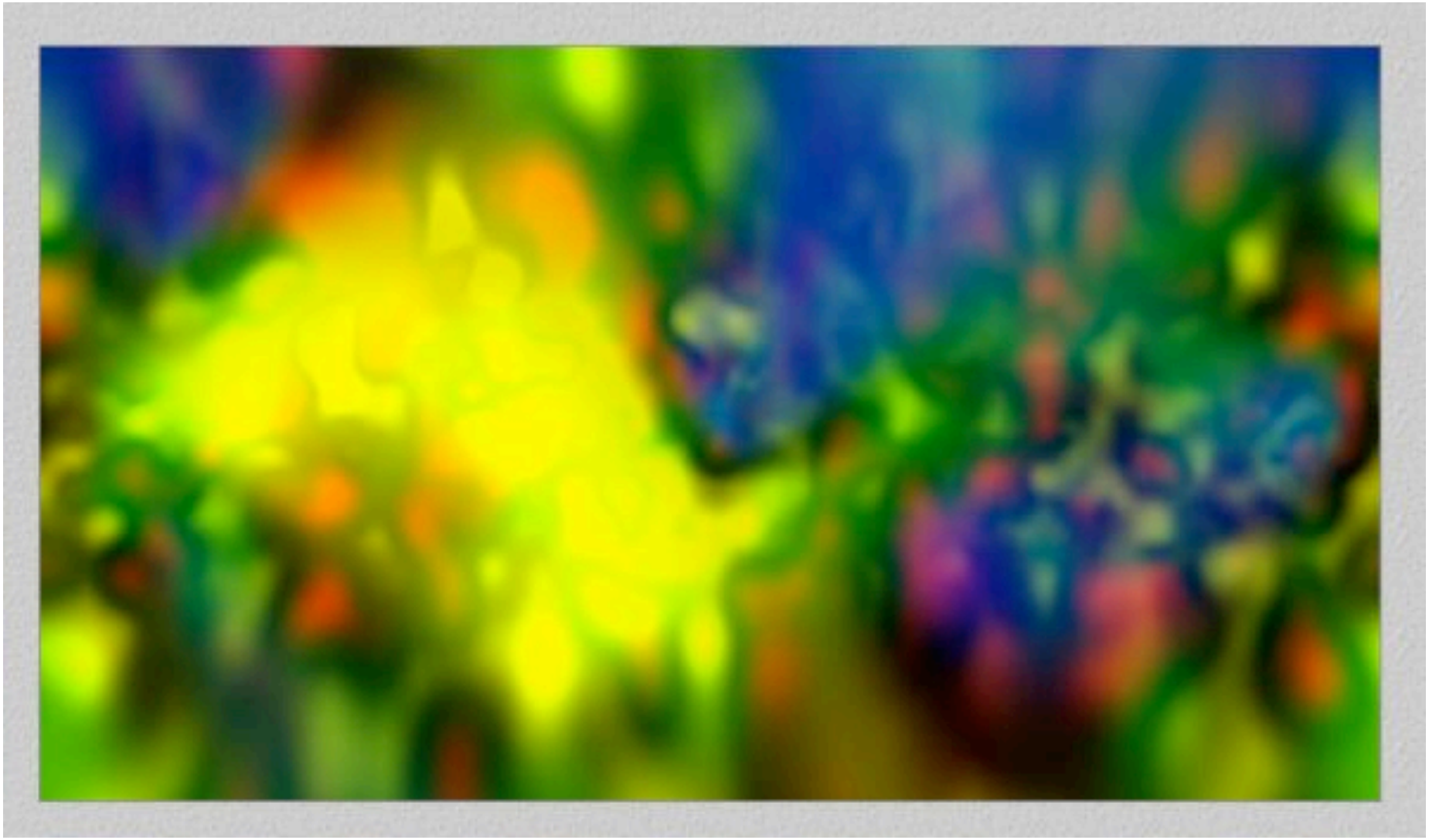


Image 12
And the overall form of this is determined by channel A so it is this which needs to be modified next.

Let me know when you've got to this stage and if you want to continue, I'll take you through changing this to be more nebular(ish).

The next step. This is focused on the texture component in channel A.

Image 13 - we will need it to be a bit brighter so increase the global ambiance to full white.

Image 14

- add a dot in for ambient colour and be ready to increase render quality to 80 for the final render. You don't need to do this just yet, but it is worth taking note of how different the render will look when you are done depending on the quality setting.

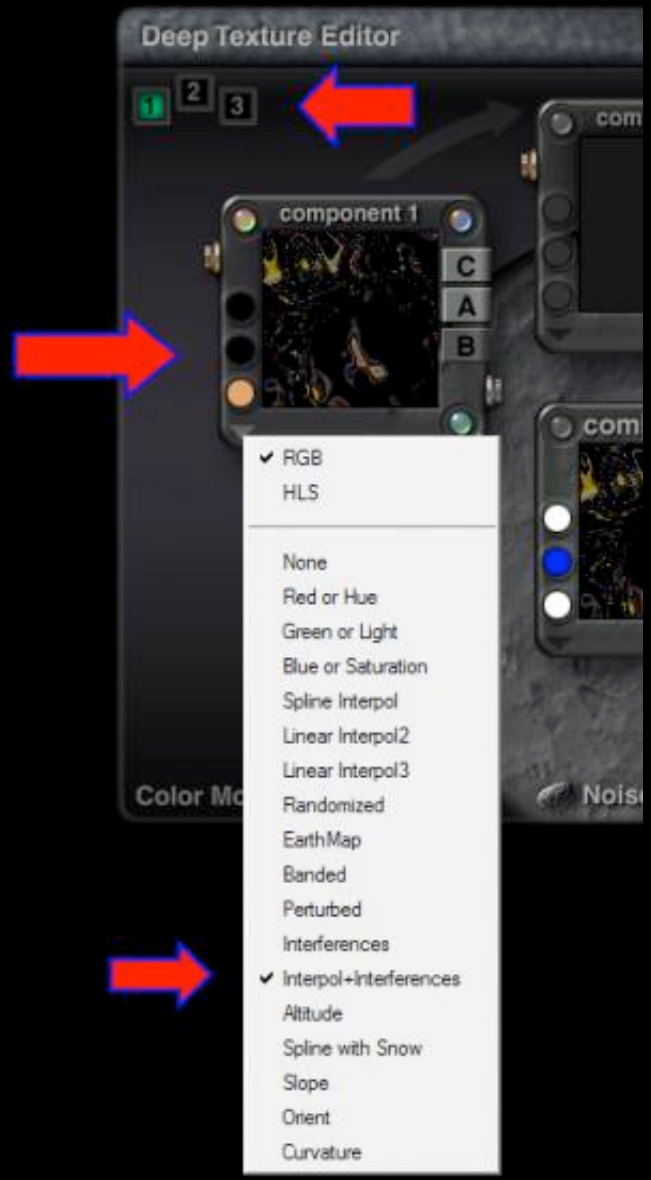


Image 15

- use only component 1 (the other two will only slow things down - you can add them in later if you wish to experiment making the material more complex) - change the colour dots and the colour mode.

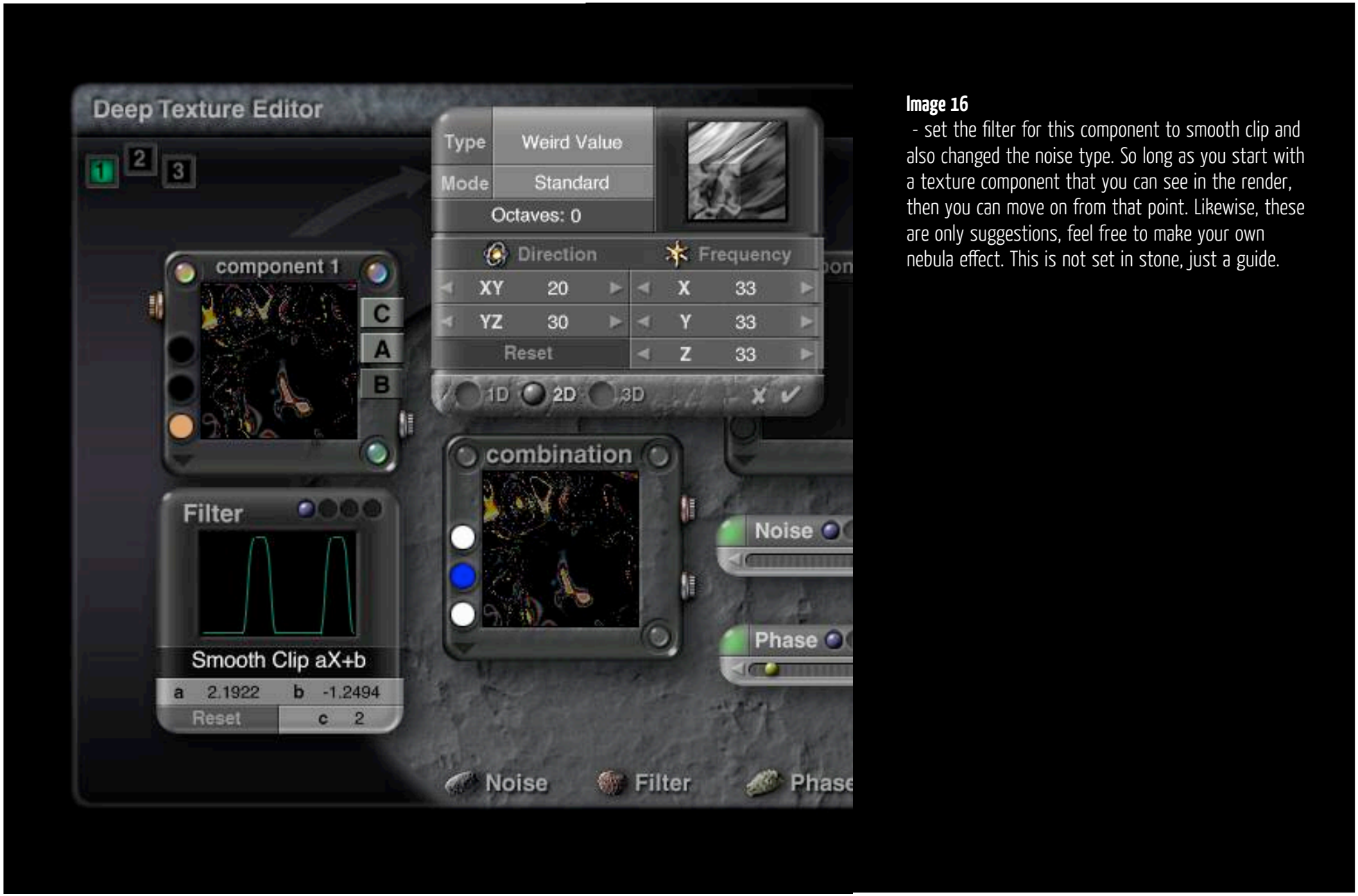


Image 16

- set the filter for this component to smooth clip and also changed the noise type. So long as you start with a texture component that you can see in the render, then you can move on from that point. Likewise, these are only suggestions, feel free to make your own nebula effect. This is not set in stone, just a guide.

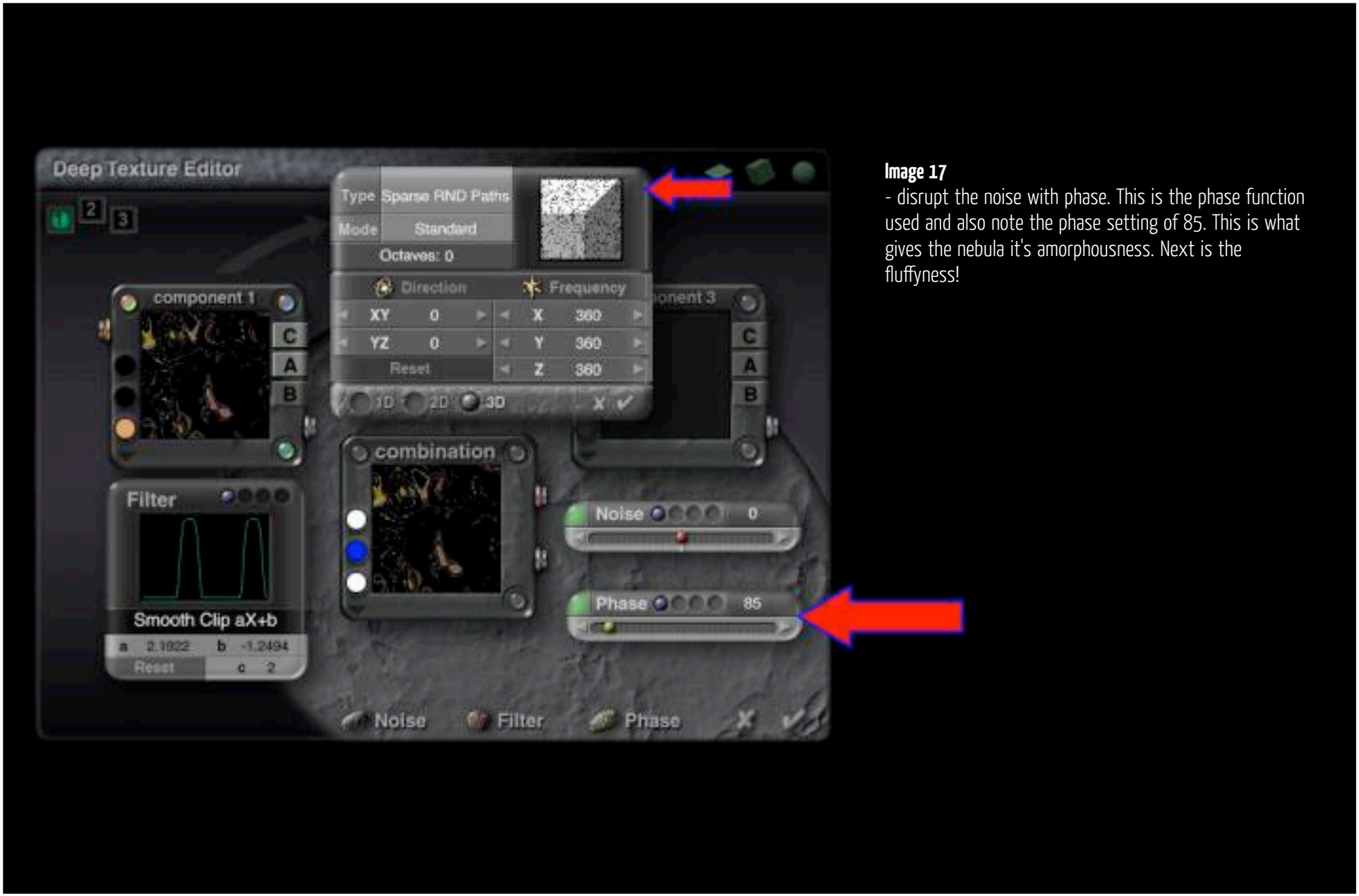


Image 17

- disrupt the noise with phase. This is the phase function used and also note the phase setting of 85. This is what gives the nebula it's amorphousness. Next is the fluffyness!

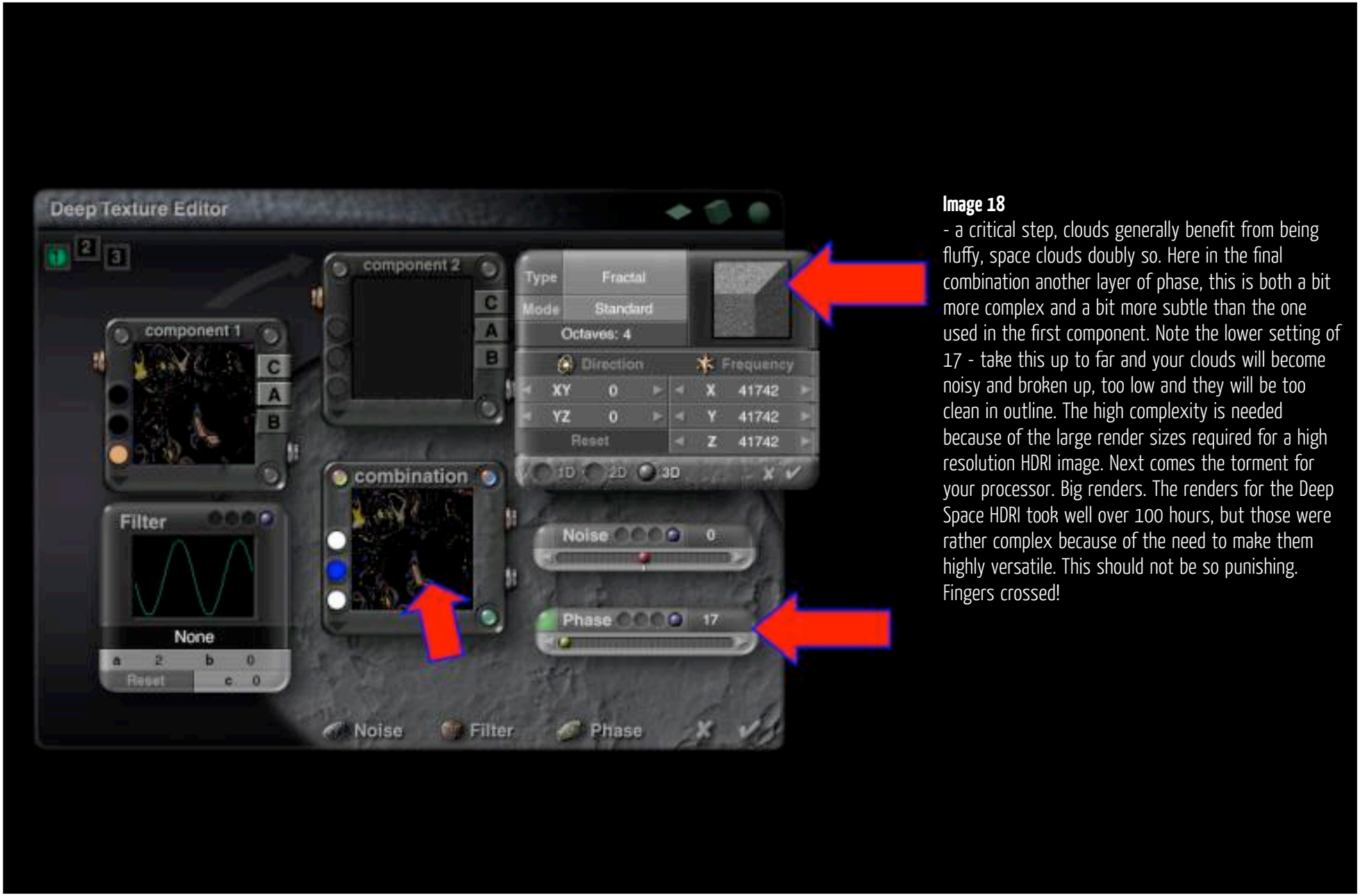
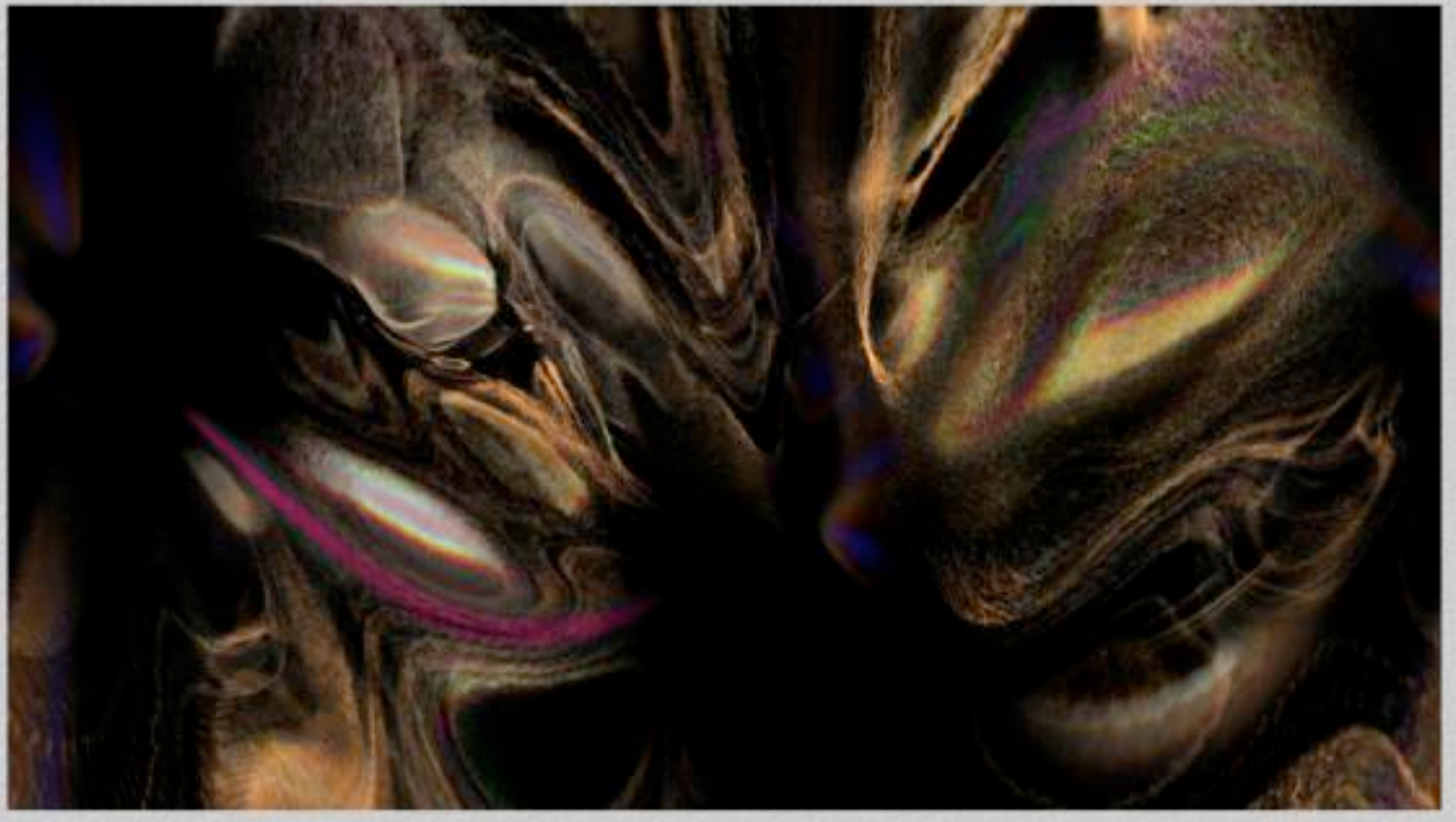


Image 18

- a critical step, clouds generally benefit from being fluffy, space clouds doubly so. Here in the final combination another layer of phase, this is both a bit more complex and a bit more subtle than the one used in the first component. Note the lower setting of 17 - take this up to far and your clouds will become noisy and broken up, too low and they will be too clean in outline. The high complexity is needed because of the large render sizes required for a high resolution HDRI image. Next comes the torment for your processor. Big renders. The renders for the Deep Space HDRI took well over 100 hours, but those were rather complex because of the need to make them highly versatile. This should not be so punishing. Fingers crossed!

Image 19
This is the render as it should look like now.



Presently I am rendering six scenes. See the cube tutorial Horo mentioned for more details.

Nebular tutorial 3_ft
Nebular tutorial 3_rt
Nebular tutorial 3_bk
Nebular tutorial 3_lt
Nebular tutorial 3_up
Nebular tutorial 3_dn

The naming of the renders in exact that way (yourprefix_ft ..and so on) is very(!) important, as it is needed some steps later for correct processing the HDR file.

Image 20
Remember to select perspective projection (yes I've rendered 6 panorama's before - very irritating to forget this).

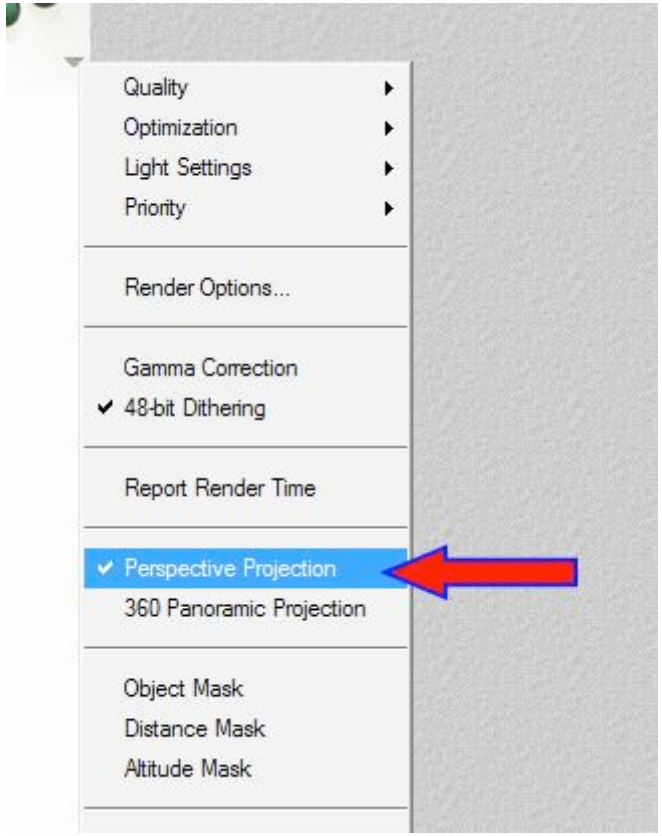


Image 21
- document setup - ratio 1:1 size to render 2550x2550

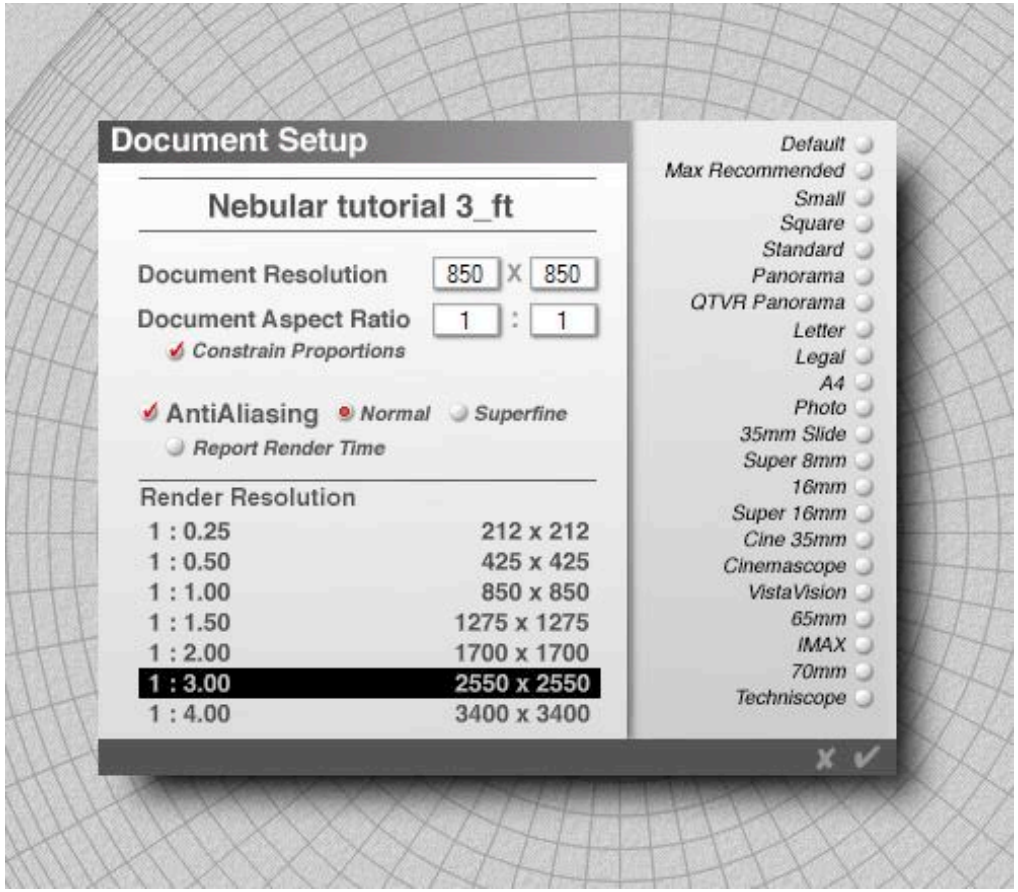
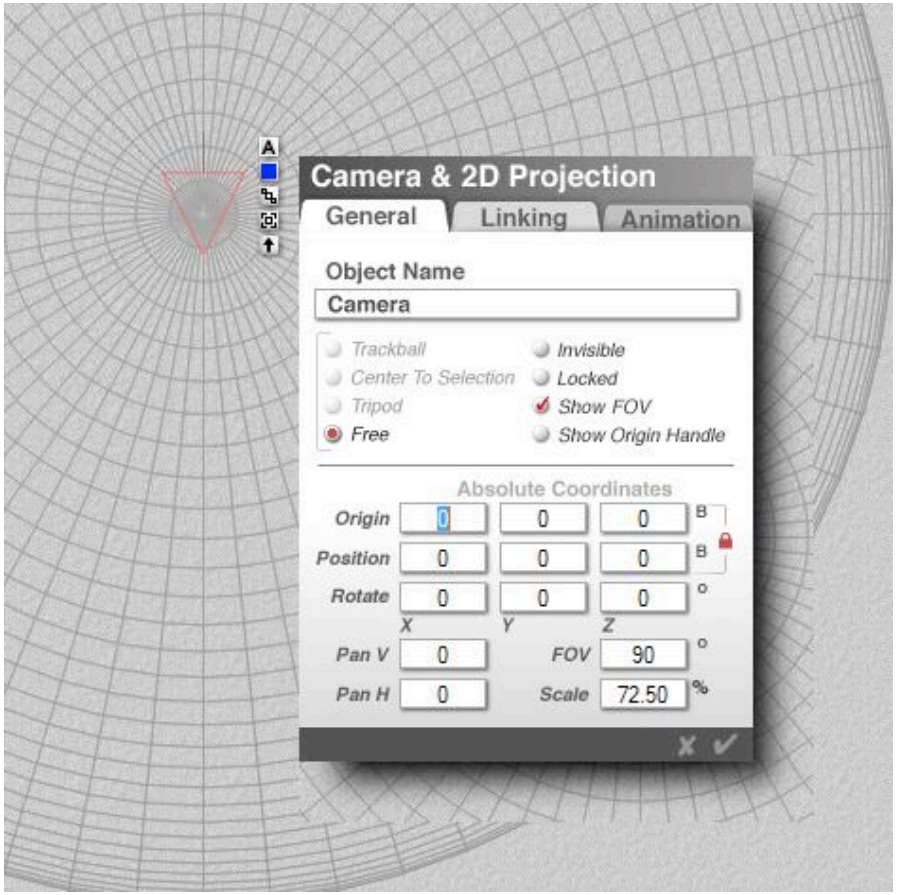


Image 22
- is the camera setup for _ft

Critically important the entire render is completed in one go, without intermediate saves. This is so we can capture the floating point information from the renderer and crystallise that into our HDR. I've not tested this with render to disc, but I suspect it will not preserve the floating point data we wish to capture. This data only exists in memory and has to be exported directly to retain it - this rule follows for all the higher resolution bit depth formats Bryce exports.



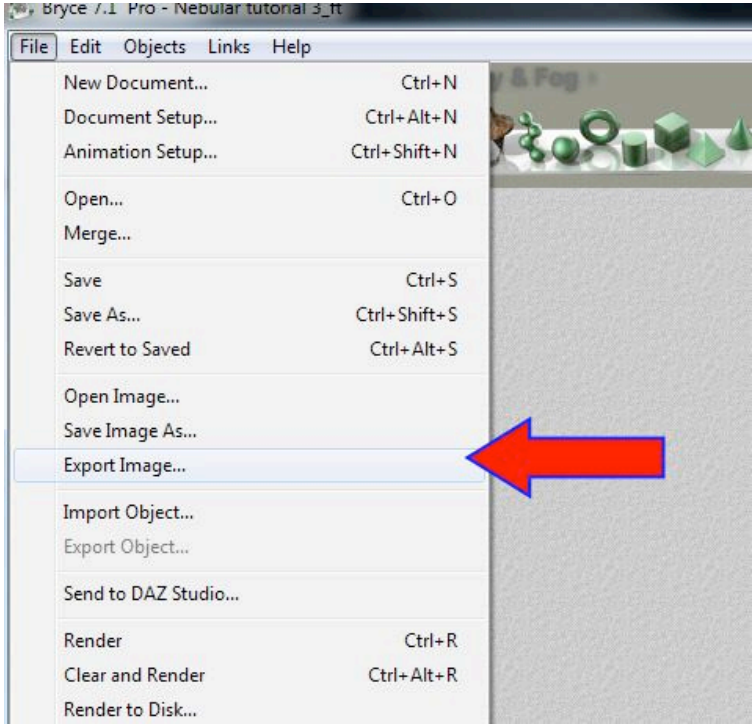


Image 23
Once the render is complete the first thing to do is export the image as a hdr.

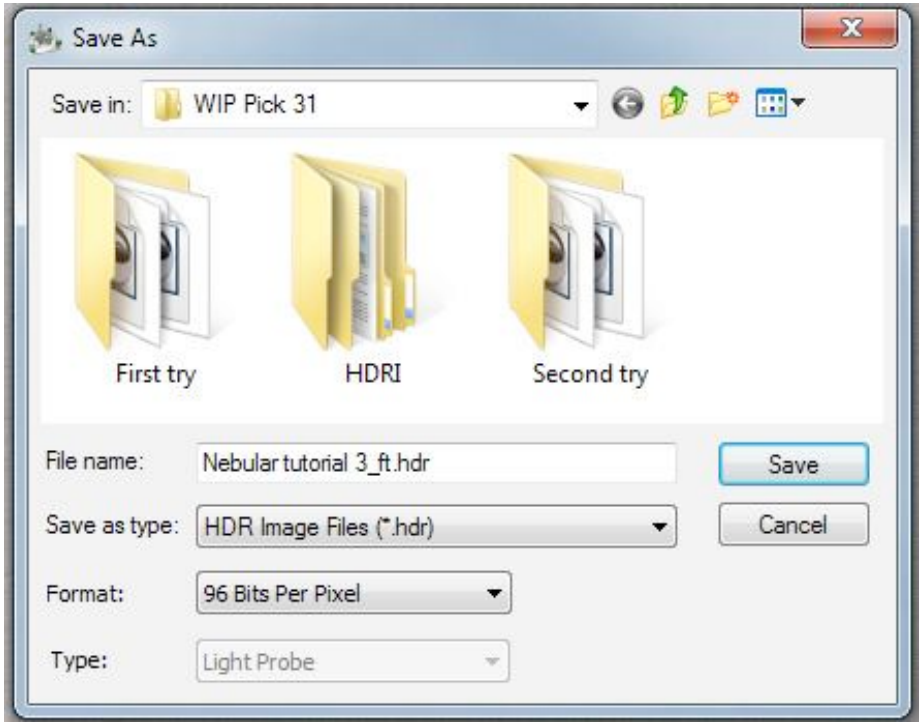


Image 24
use this dialogue.

Image 25 - progress... still rendering...

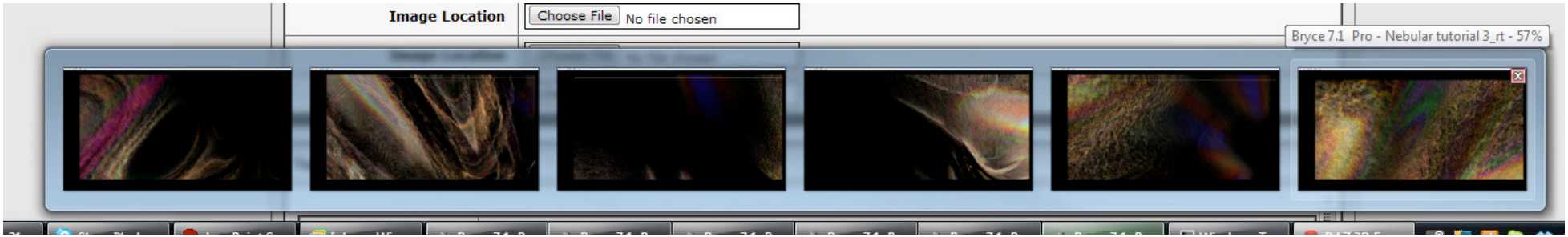


Image 26
Righto... all six renders are complete and exported as hdr's.

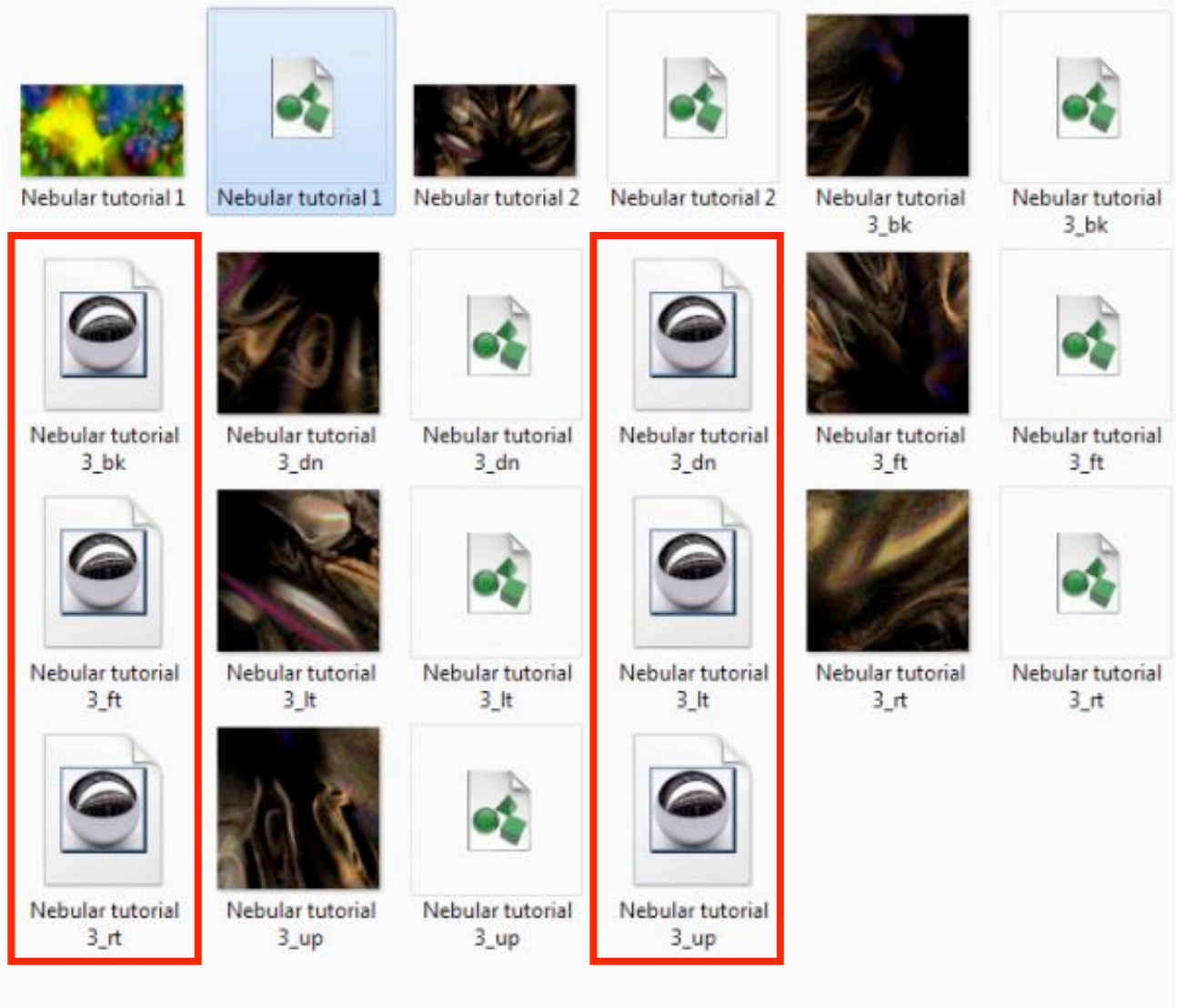


Image 27
cube2cross converts these into the vertical cross.

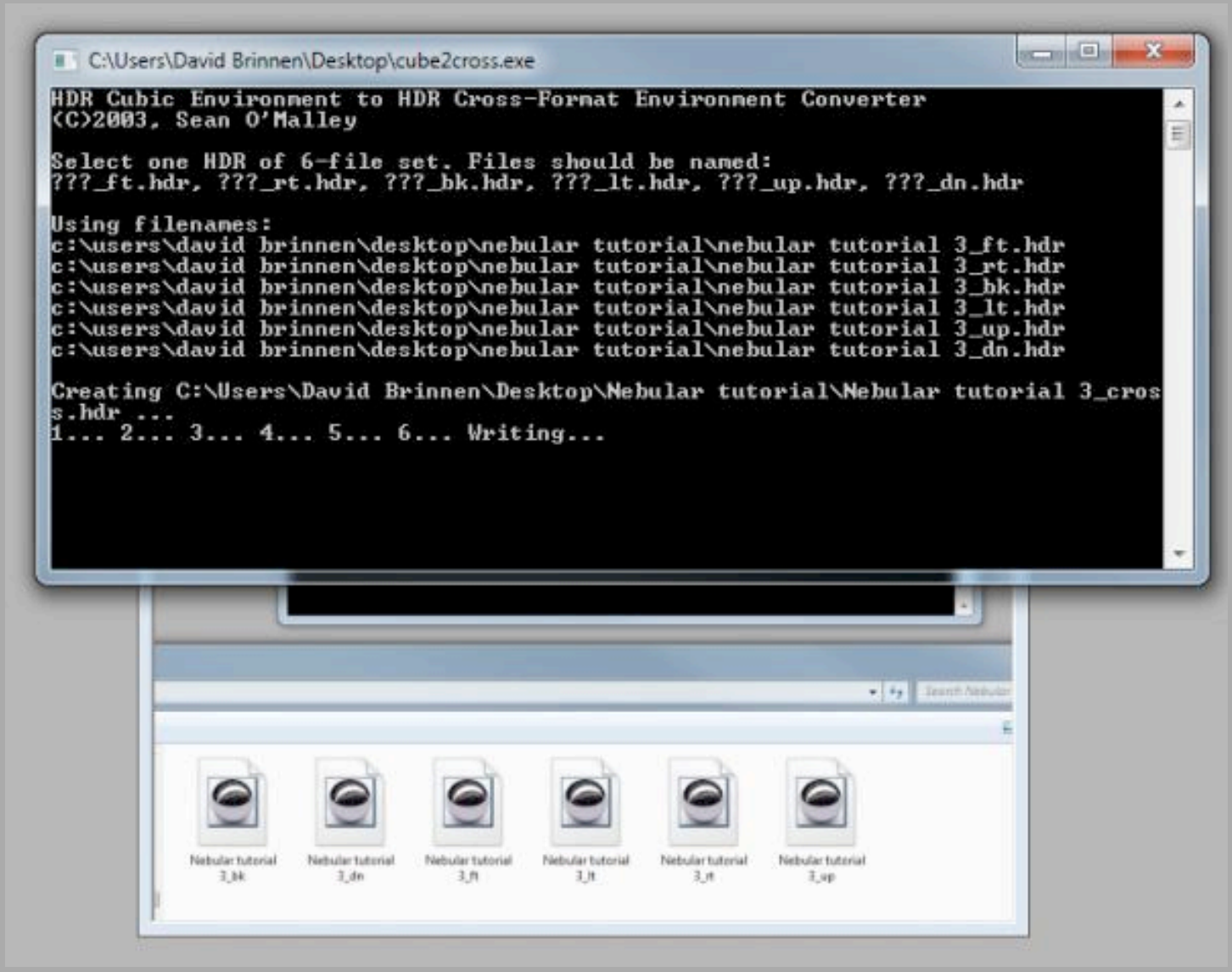


Image 28
HDR shops panoramic transformations to turn this into a lightprobe

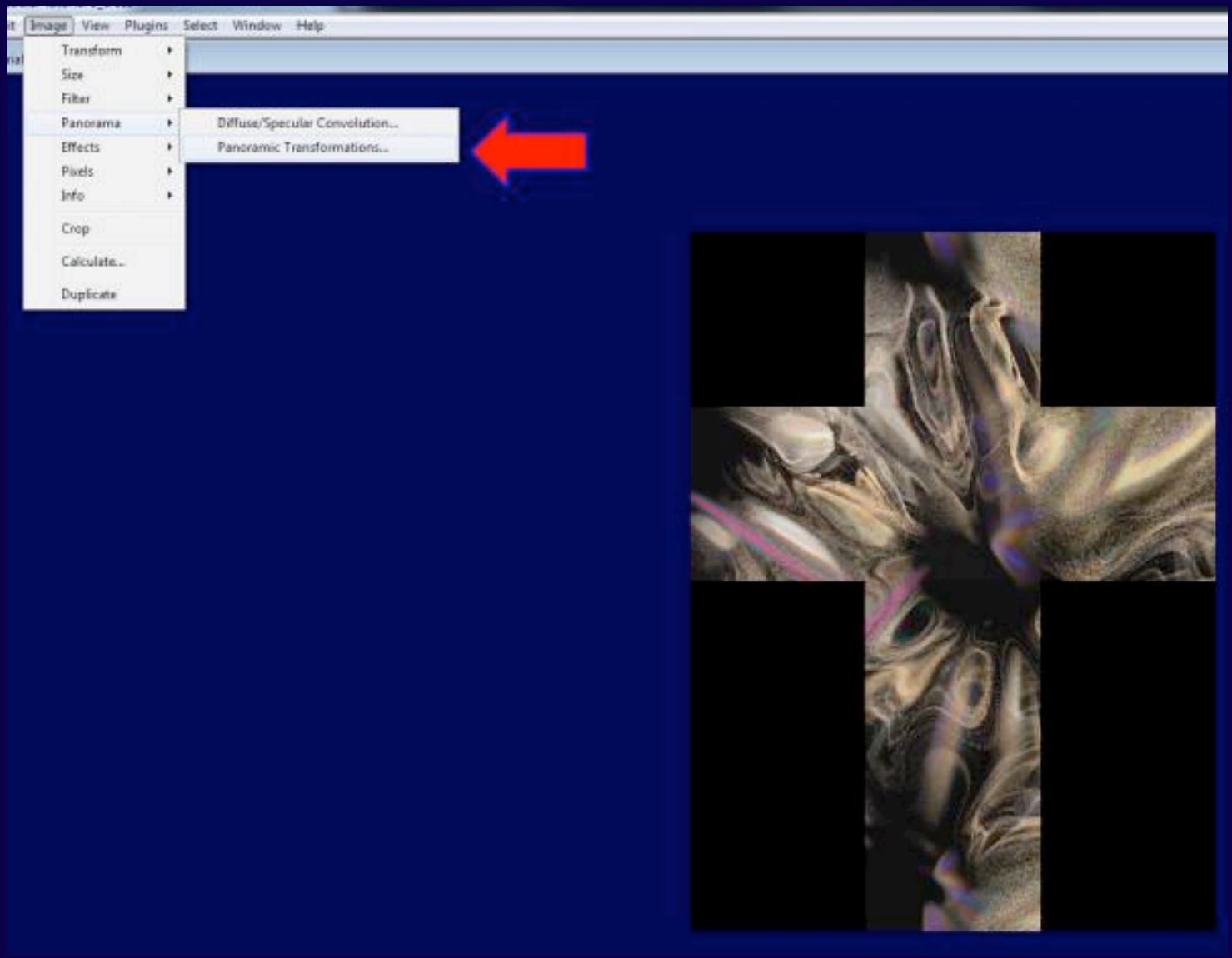


Image 29
Note the settings with arrows, particularly unchecking Bilinear Interpolation!

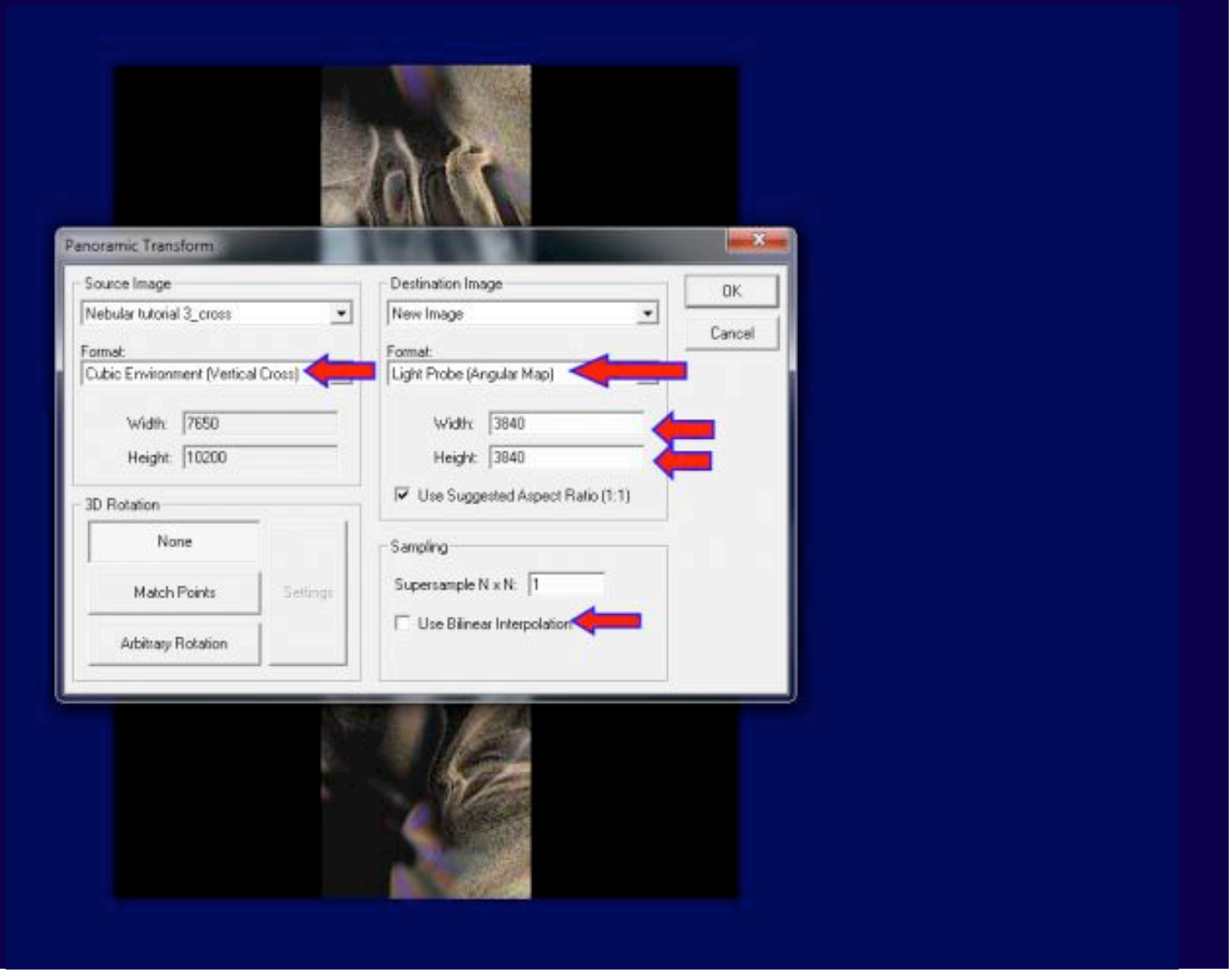


Image 30
File > Save as > hdr

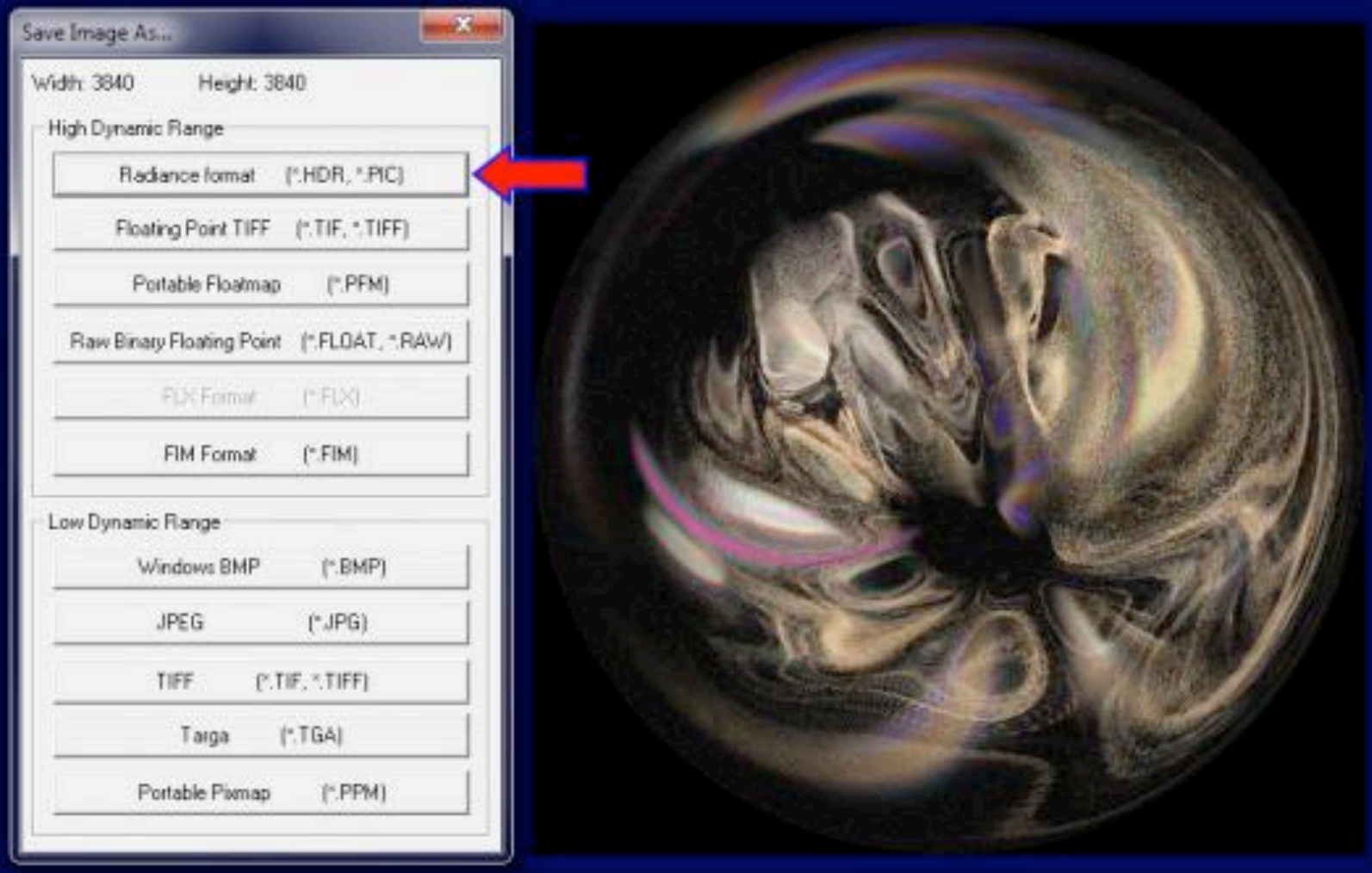
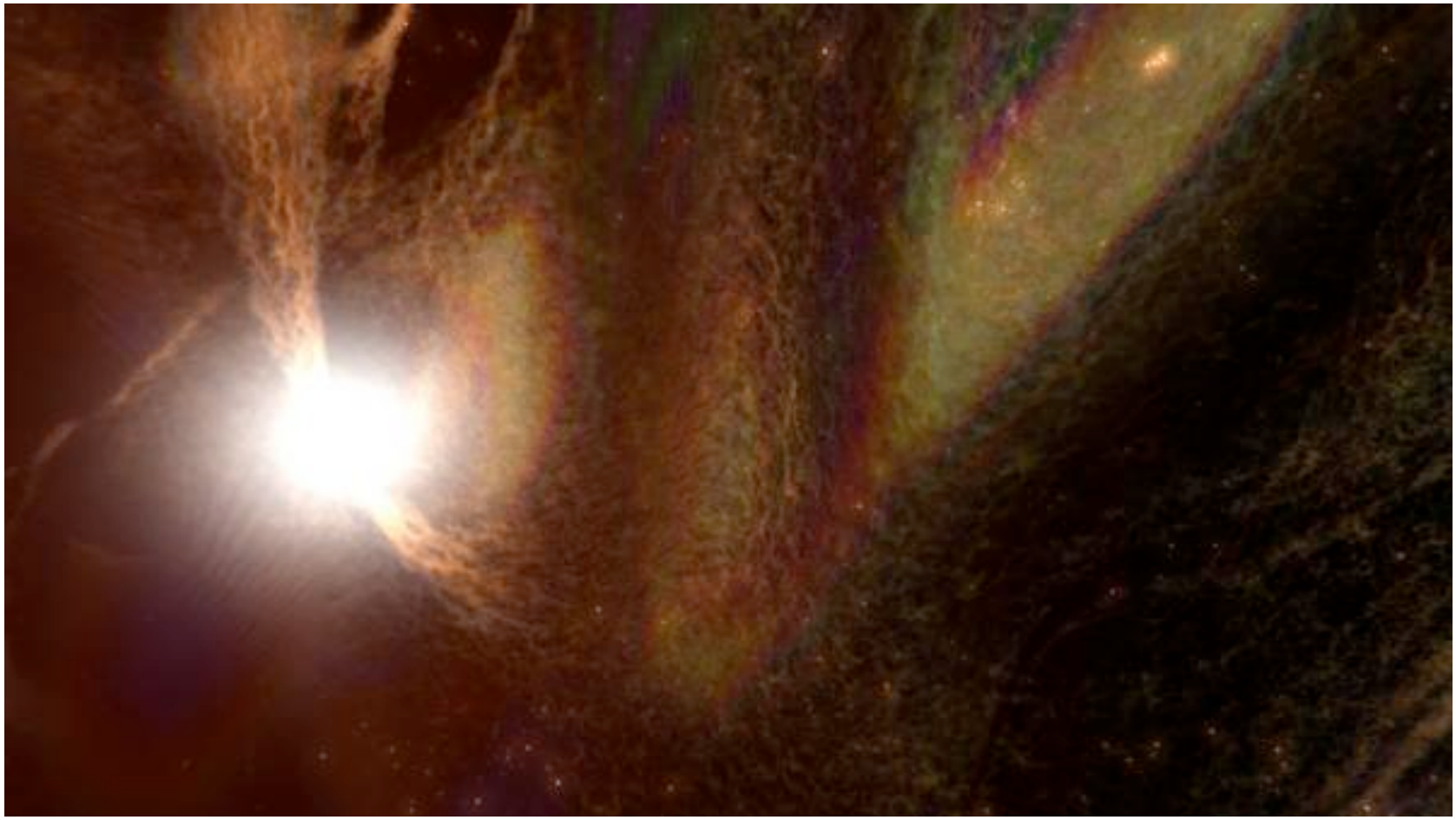


Image 31
Quick test render in Bryce. Four seconds.



Anyhow, having got your lightprobe sorted... I'll go over how to set the sky to interact with the hdr backdrop. And look at ways to add star features.

Image 32

- use as background and add to sky. This lets you modify the appearance of the probe with the sky settings. A very useful feature as I hope to demonstrate. Also, when the HDRI loads, the sun is disabled. This may not be desirable. Indeed you may wish to use the sun as the only light source and forget the HDRI light. Depends on your scene. Whatever, for setting up your scene the quality wants to be 16. You can decide later if you want to use the light. Probably best to turn off HDRI specularity for this application. It will only slow things down with no real gains.

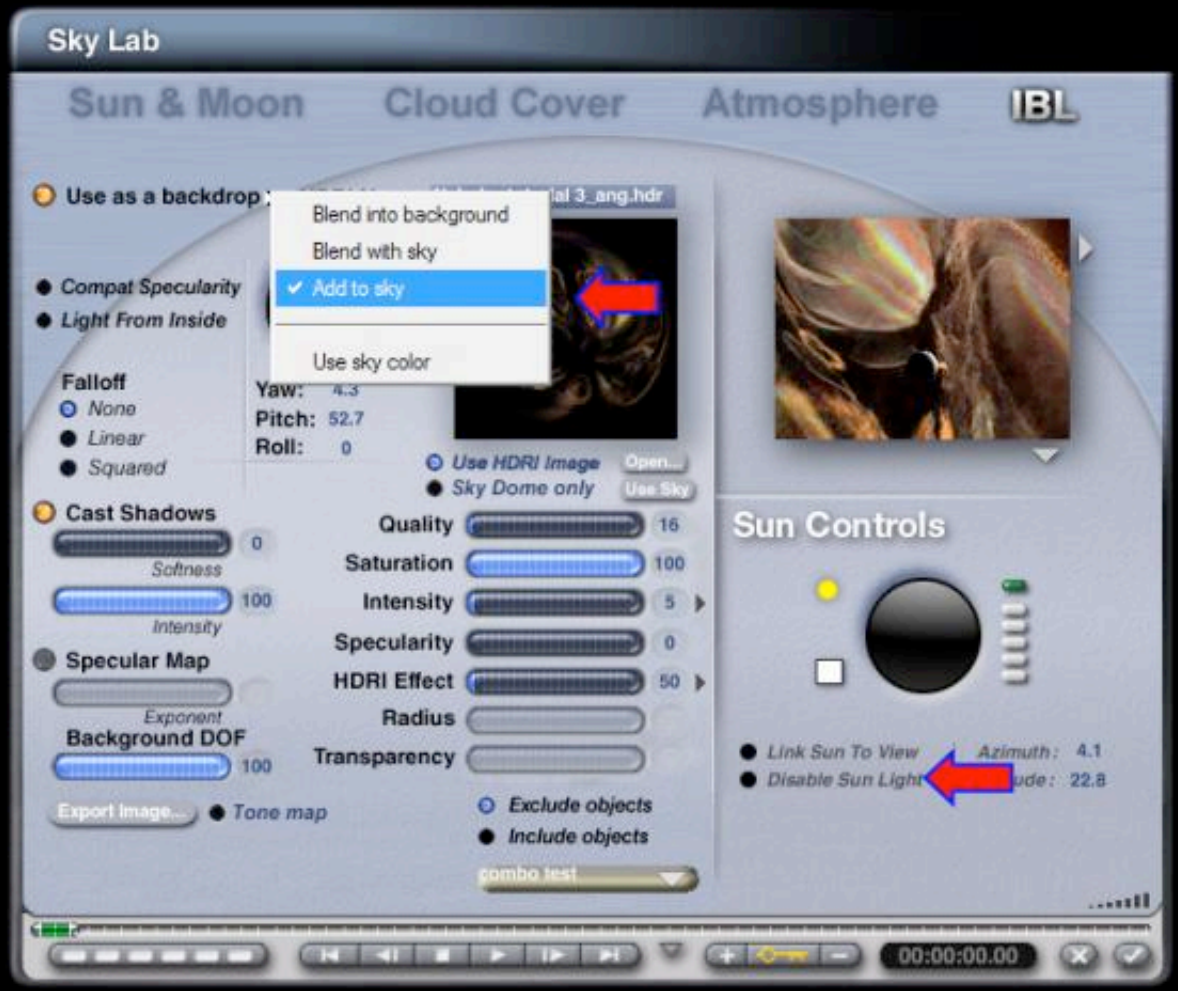


Image 33
Bryce stars, custom field, maximum settings. Also sun glow can be very useful. Shadow intensity 100 is more efficient for rendering and definitely no soft shadows.

Image 34

A haze setting of 1 density (the others at 0) will allow you to control the star glow effect via the colour perspective. To work out the colour of the glow, convert your r,g,b of your desired colour glow into a percentage and enter that figure. Eg, 255, 127, 255 would become 100,50,100.

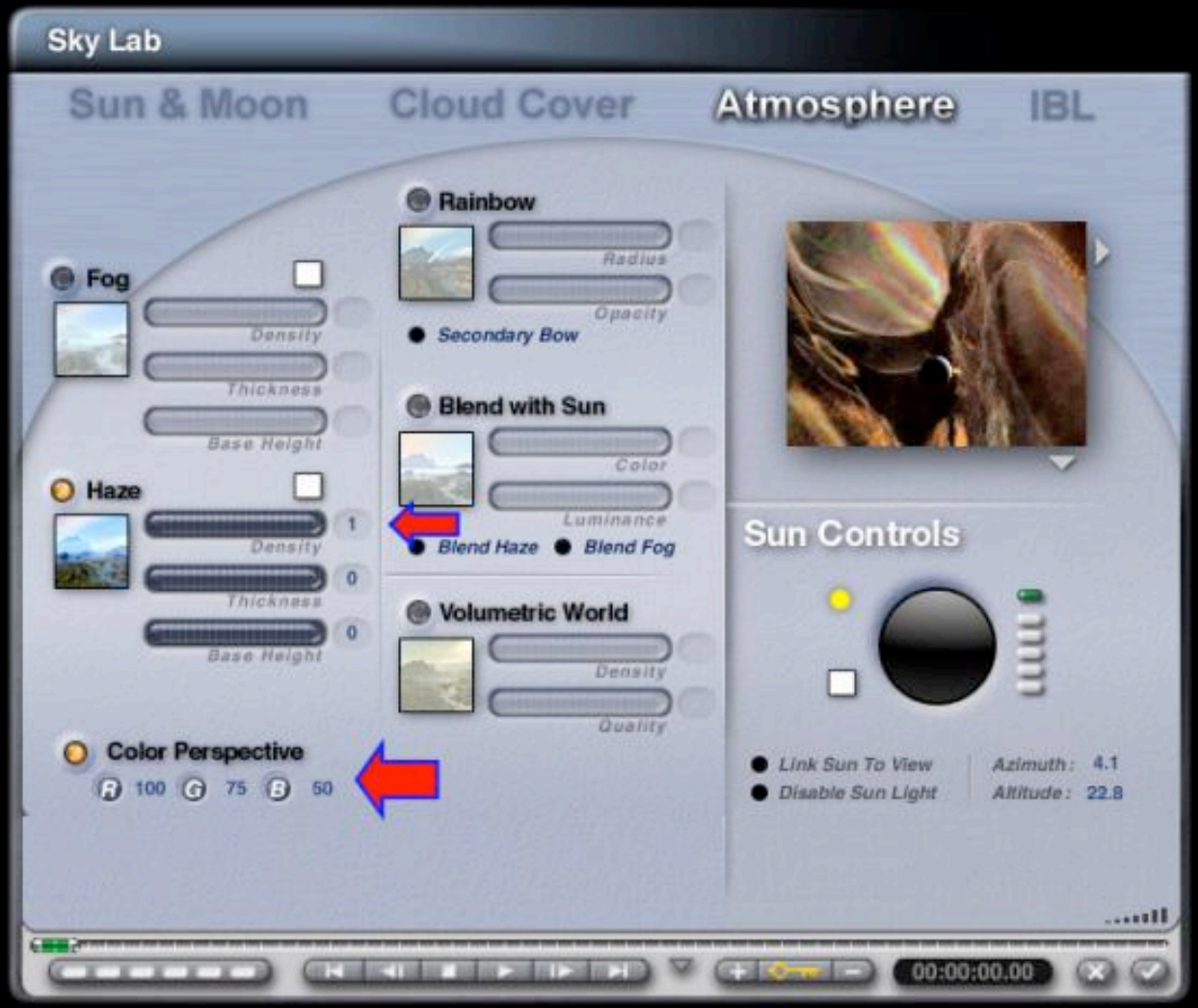
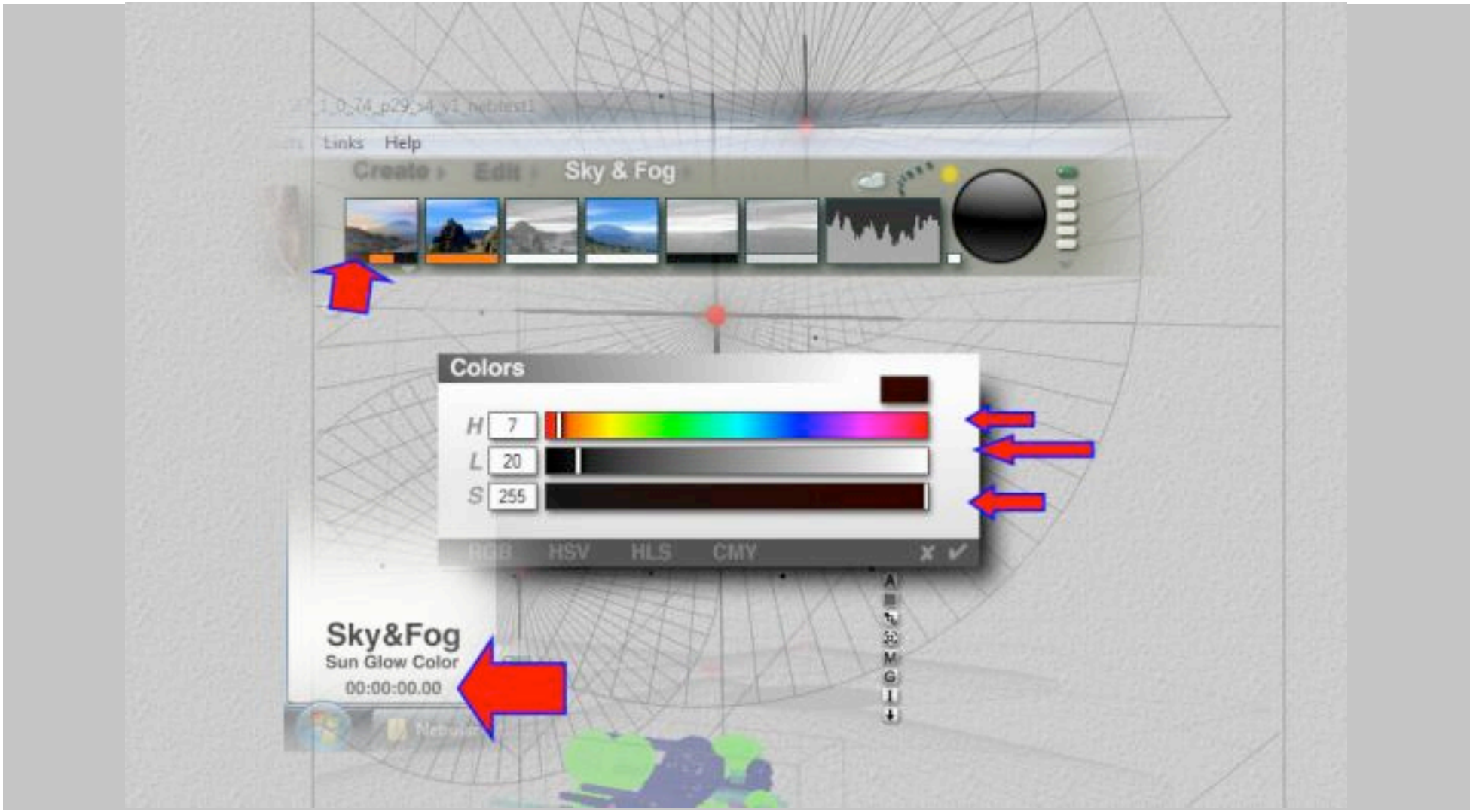


Image 35

Custom sky colours, the left most swatch, sun glow colour. This colour, even at low luminance - but with high saturation, modifies the appearance of the backdrop where it interacts with the HDRI. The brighter this gets, the more it changes the backdrop but the less visible the stars will be near the sun. Sun colour can also be used to change the backdrop right on top of the sun, however, it also changes the light colour - which may not be desired.



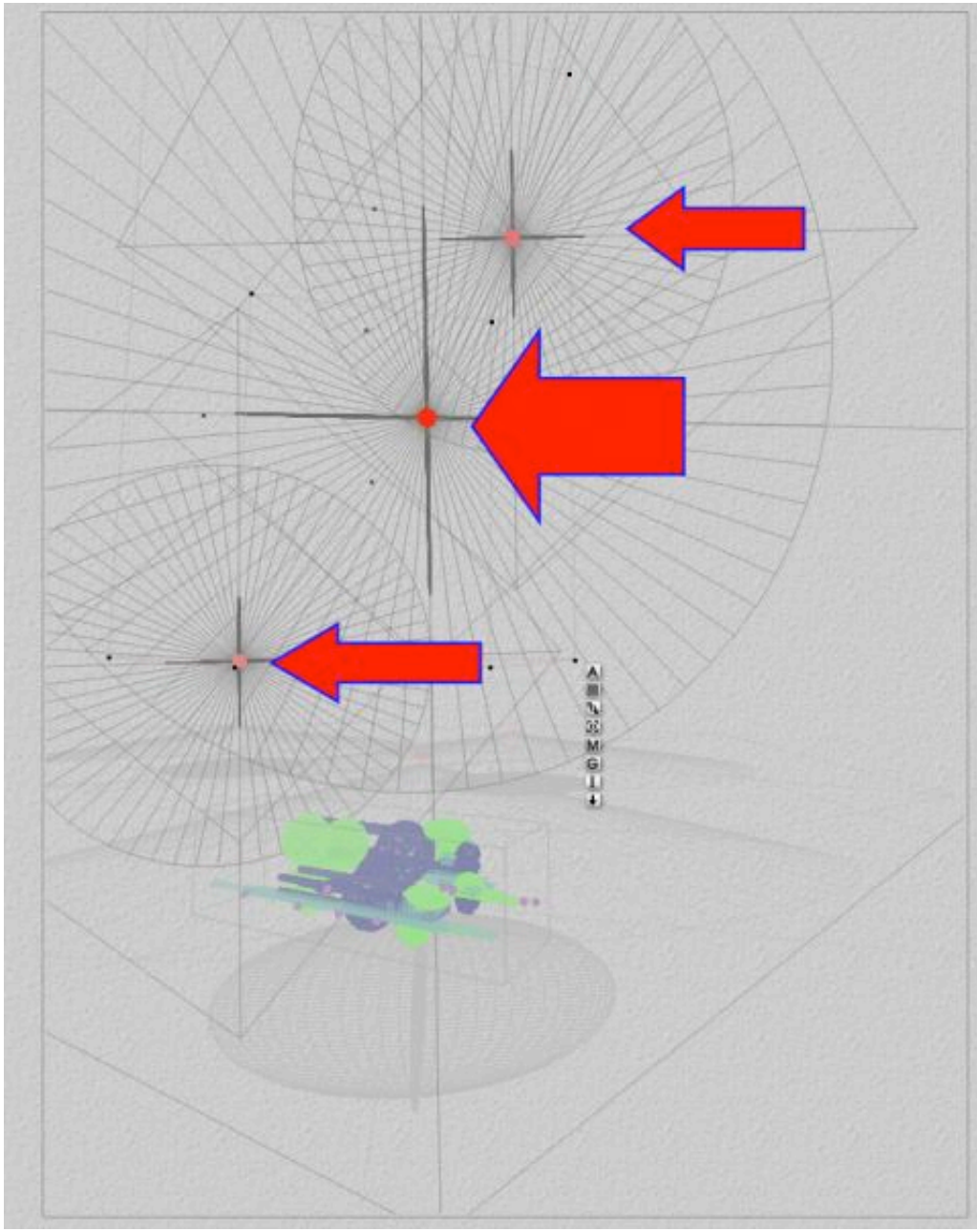


Image 36
Using primitives with "additive" materials applied to them can be used to boost the background or introduce "effects". These generally have not noticeable impact on render time.

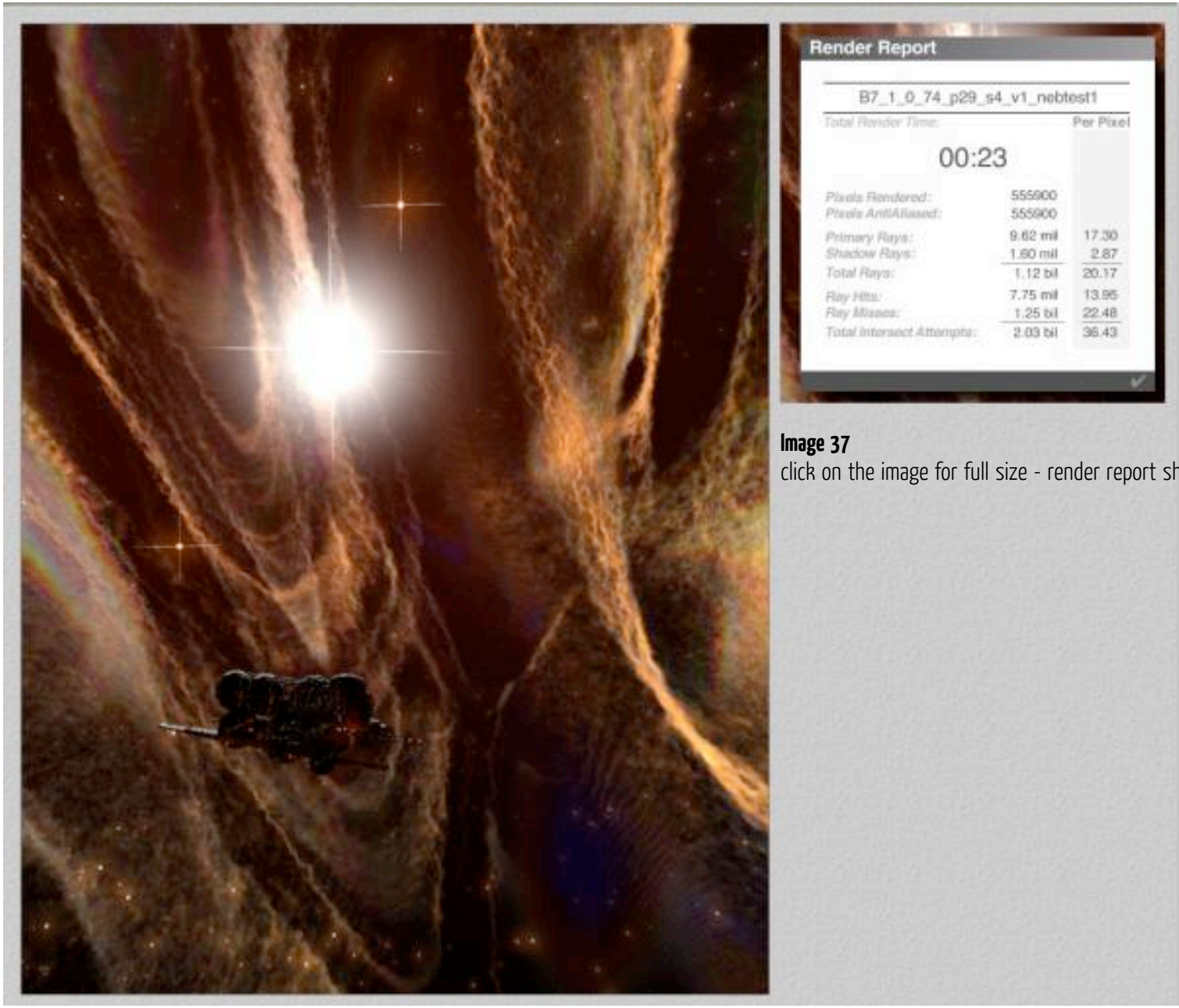


Image 37
click on the image for full size - render report shows this was completed in 23 seconds.

I've probably missed out something, so feel free to ask any questions that spring to mind.

Once you are familiar with HDRshops calculate feature, you can use this to combine multiple HDRI images together and if you are a HDRI wizzard like Horo (as is embroidered onto his hat) - then you can also include a mixture of features. But essentially, that's the theory. Once you've got over the labour of making your HDRI you have a flexible resource that can be used over and again in any number of scenes - and renders very quickly! Which is always a blessing.

THANK YOU

for reading and follow the steps of the tutorial!

Sincerely yours,

David Brinnen