

# Panoramic Background

*A panoramic background encompasses the entire scene. An HDRI or a LDRI on a sphere can provide such a background, or even a combination of both that can lead to interesting effects.*

## Introduction

Bryce features IBL and the HDRI can be rendered as backdrop, either at high contrast or lower contrast tone-mapped. Using the HDRI as omnidirectional light source has many advantages. A high contrast background is good for space scenes and with bright light sources there are nice reflections. If the background depicts a landscape, it can be tone-mapped to make it look more natural. The tone-mapper (Erik Reinhard's Photographic operator) has all parameters pre-set in Bryce to make it easier to use — at the cost of flexibility.

An LDRI panorama can also be used as background, though the contrast is lower. The HDRI can be tone-mapped in an external application that lets the user control colour, contrast and other parameters to fit or at least approach the expectations. Such an LDRI panorama must be mapped on a sphere that completely surrounds the scene and the camera must be inside the sphere.

There is also the possibility to combine HDRI and LDRI for the background. Though more memory intensive, this opens new possibilities to create artwork.

## The Sphere with the LDRI Panorama

The size of the sphere primitive does not really matter as long as it encompasses the complete scene. Nevertheless, the recommended size is the maximal one of 102,400,000 Bryce Units (BU); after all, it makes the backdrop. It is mandatory that the sphere is positioned in the world centre and the perspective camera as well. If camera and sphere are not in the world centre, the HDRI backdrop and the panorama on the sphere are not congruent.

## The LDRI Panorama

The panorama must be in the spherical projection and should be high resolution. If no program that can transform projections and tone-map an HDRI is available, the loaded HDRI can be exported as LDRI in the spherical projection from the *Sky Lab IBL* tab. The tutorial *HDRI Export* shows how this can be done (see links on page 6).

The LDRI is mapped on the outside of the sphere and the camera is inside it, therefore the panorama must be mirrored. The *Resize Options* under the *Edit* menu features a *Flip Z* option that could be used to mirror the sphere. This is not recommended because the result is not always reliable. To synchronise the rotation angles of the HDRI backdrop and the panorama on the sphere, the LDRI must be shifted by 180°. This could be done in the *Materials Lab* with the *Transformation Tools* by rotating Y to 180°. Again, this is not recommended because once the HDRI is rotated, it gets difficult to align the sphere in all three axes.

It is simpler to rotate and mirror the LDRI panorama outside Bryce and loading the processed one. If you miss a tool that can mirror and rotate HDRI and LDRI of almost any size, get free *PanoRot* that handles Radiance HDR as well as 96, 48 and 24 bit TIF (see links on page 6).

If the LDRI is derived from the HDRI (or if exported from the IBL tab with Yaw at 0, Pitch at 90 and Roll at 0) the sphere can be easily adjusted to the HDRI backdrop or vice versa:

Looking from the IBL tab: Yaw = Y rotation, Pitch = 90 - X rotation, Roll = Z rotation.

Looking from the sphere: X rotation = 90 - Pitch, Y rotation = Yaw, Z rotation = Roll.

Using a pre-rotated, pre-mirrored LDRI panorama makes it easy to adjust the sphere with it if the HDRI has to be rotated on any axis to get the light and backdrop right.

## The Panorama on the Sphere

The sphere is at maximal size (102,400), in the world centre and the LDRI mirrored and shifted by 180°. Load it into the *Pictures* lab and check the *Materials Lab* settings.



In the *Material Options*, disable *Cast Shadows*, *Receive Shadows* and *Self Shadows*. Check that in the *Transformation Tools* dialogue *Edit Texture* all values are at 0. Make sure *Spherical* is selected in the *Texture Mapping Mode* drop down, it defaults to *Sinusoid*, which is wrong.

Without shadows for the sphere, the inside gets lit, which is important to get light on the objects within. The panorama on the inside of the sphere is lit by *Ambience*, make sure global *Ambient* is fully white. *Diffusion* can also be used and will be discussed below. With *Transparency*, the HDRI backdrop can be mixed with the LDRI backdrop. The idea for this setup is to leave the HDRI backdrop un-tone-mapped high contrast to boost the contrast of the LDRI.



HDRI



HDRI tone-mapped



LDRI



Both 50% / 50%

The differences are subtle. Use the zoom option of your PDF viewer to enlarge; each render is 800 pixels wide. The scene consists of the HDRI, the ground plane making the water, a default grey sphere and a mirror ball — and the backdrop sphere.

To align the backdrop with the water, the HDRI is rotated to Yaw 153°, Pitch -81° and Roll 176°. The sphere is accordingly rotated to X 171°, Y 153° and Z 176°. Bryce modifies these values to X -9°, Y 27° and Z -4°, which is the same. The camera FOV is 120°.

The HDRI is high contrast; the tone-mapped HDRI has low contrast. The LDRI was externally tone-mapped and has a bit higher contrast, which could be more enhanced by mixing the HDRI with it.

What cannot be appreciated in the small examples above is that there is more detail in the combined render. Behind the door is a sign that is visible in the HDRI but in neither of the tone-mapped ones. In the combination, it can be discerned in a large render and a narrow camera FOV as shown at right in the mixed render.



## Diffusion

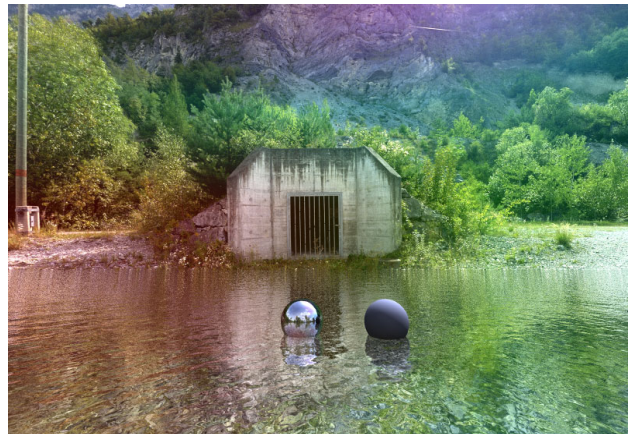
If the panorama on the sphere cannot be made bright enough with full white global *Ambient* and full *Ambience*, *Diffusion* can be used. Technically, *HDRI Effect* could be used but the result changes with the HDRI used. A better option is to *Exclude* the sphere in the *IBL* tab from the *IB* light and use it exclusively to light the objects in the scene.

A radial can be positioned near the world centre. *Cast Shadows* disabled, *Falloff* *None* and *Include* only the sphere. *Diffuse* at 5 is a good start, no *Specular*. With *Diffusion* for the sphere, the brightness can be controlled. Of course, *Transparency* in the *Materials Lab* and *Intensity* in the *IBL* tab also control how bright the panorama background appears.

For special effects, *Diffuse* for the sphere can be set to any colour as shown at right to make the environment look warmer.



Additionally, effects can be added with a texture for bump, reflection, transparency, diffusion, etc. Not natural, but the artist is free to pursue what is on his or her mind.



At left a texture for bump was added that also controlled part of transparency. At right a texture was put into *Diffuse* instead of the panorama and a bit of *Diffusion*.

## Orton Effect

This scheme can also be used to create an Orton effect on the background without resorting to post processing in a graphics application. It can be done directly in Bryce by using a specular convolved HDRI for the backdrop instead of a sharp one.

### Bryce 7.1 Pro — Panoramic Background

The Orton effect was invented by *Michael Orton* before there were computer images. Essentially, he took two photographs from the same location: one sharp and normal exposed, the second defocused and a bit over exposed. He put them together in the same slide and the result was some glow around the objects.



Above three examples of the Orton effect are shown. At left a render where I had created the HDRI backdrop in post processing (the halo around the lady is another matter), the other two are photographs I made some time ago and processed for the effect, the right one came out a bit exaggerated. This glowing effect gives an image a dreamy angle but if overdone it soon gets boring.

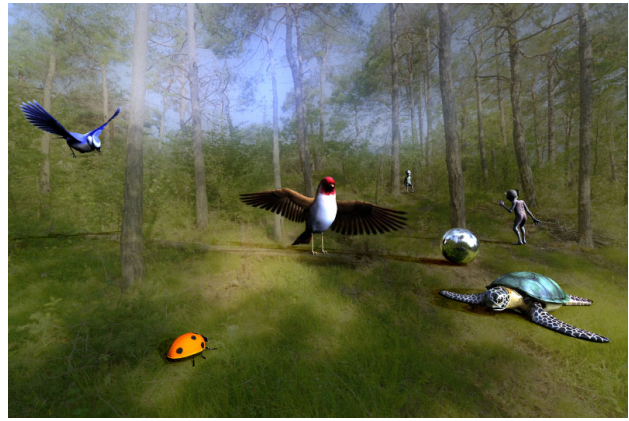


Above at left the same scene setup like above but with a specular convolved HDRI for light and backdrop. With the transparency of the sphere (here 60%) the strength of the effect can be controlled. The picture on the right shows again a photograph where I attempted to get the effect only on the brightest leaves.

The background at right is the LDRI panorama only. The birds, turtle and ladybird are too big compared to the gremlins. This is a fairy scene but does not look magic, rather like a failed natural scene.

Below at left, the tone-mapped specular map is mixed with the LDRI, resulting in a low contrast dreamy scene; and at right the specular map was not tone-mapped and the contrast is better and makes this look like a fairy world.





Blending a specular convolved HDRI with a LDRI panorama makes the backdrop magical without affecting the objects in the scene. Hardly something you would use very often, it is good to know how simply this effect can be accomplished directly in Bryce, though. The scene is exclusively lit by the HDRI.

### More Ideas for Effects

At right the *DS-Sky02* HDRI from our *Deep Space HDRI 1* set, the spaceship is the *Hog* by *Phillip Drawbridge*. HDRI and LDRI are blended at 50% each. The red nebula is brighter in the LDRI.

To give the illusion of speed below left, the camera is off centre by 2500 BU. HDRI and LDRI backgrounds do not converge.



Depending on the amount the camera is out of the world centre (Z direction), the distance between two similar spots in the HDRI and LDRI increases; towards the edges of the render more so. The camera FOV is at 90°, the effect is amplified with a wider FOV. Adding a smaller copy of the panorama sphere (i.e. 50,000 BU) enhances the effect of speed, giving three stars instead of one or two.

For the picture at right, the camera is in the world centre but the sphere with the LDRI is rotated differently than the HDRI backdrop. Both have the same brightness and show a different part of the panorama each which is blended into one background.

### Light and Atmospheric Effects

Below is a comparison of light effects. The sun is visible in the leftmost picture and the trees are almost black, silhouettes in a backlit HDRI image. The next is the tone-mapped LDRI panorama, the sun is visible and the trees are lit because of the low contrast. The centre image

has HDRI and LDRI mixed and there is more contrast on the trees, the sun is still visible and the sky lost some saturation on the blue.

The second last example has more of the HDRI mixed in and it looks over exposed. The last one at far right uses the specular convolved HDRI. The air appears very humid with the trees in the distance fainter with lower contrast and saturation. A bit of haze could be added to enhance the effect of a clearing in a jungle environment.



*HDRI*

*LDRI*

*LDRI+HDRI 1*

*LDRI+HDRI 2*

*LDRI+SC-HDRI*

All five examples above only use the HDRI and a sphere with an LDRI. No additional light, sky, haze or clouds were used.

It was mentioned that a radial and diffusion can be used if the sphere with the LDRI panorama is not bright enough. An alternative is to put a phased hyper texture (PHT) in the *Ambience* channel of the sphere.

There are many possibilities how to use an HDRI background combined with a LDRI panorama on a sphere as an additional backdrop; even the sky can be mixed in. I hope I could give you the basics and encourage the gentle reader to experiment with such combined backgrounds for your artwork.

## Links

Free simple tone-mapper *HDRT9624* Windows 2000 and newer):

<https://horo.ch/docs/progs/zip/HDRT9624.zip> (2.5 MB incl. documentation).

Free program mirrors and rotates HDRI and LDRI panoramas *PanoRot* (Win 2000 and newer):

<https://horo.ch/docs/progs/zip/PanoRot.zip> (3.3 MB incl. documentation).

Document *HDRI Export* from Bryce:

<https://horo.ch/docs/mine/pdf/HDRIexport.pdf> (0.5 MB).

Document *Phased Hyper Texture* (PHT):

<https://horo.ch/docs/mine/pdf/PhasedHT.pdf> (0.3 MB).

Many other documents and links to videos:

<https://horo.ch/> (go to Raytracing and Documents).