Projecting Light – Approximate Transcript of Video

Note: This is not the tutorial. The pictures point to the video and are an orientation aid only.

With light projection we mean a light source that shines on a surface. Here is an example:

Here, we have a 2D face as screen, a square spot with a gel which is projected on the screen. Screen, spotlight and gel have the same aspect ratio of 5:4. The size of the spot and the distance to the screen were adjusted so that the picture falls on the screen and a border remains. The backdrop is an HDRI that also casts light. The room is too bright for a slide show and we note a low contrast.

- The screen is full white, Diffusion at 100.
- The spot is set to Diffusion 4 and no falloff.
- HDRI Effect is at a high 750, the screen is included and receives light from the HDRI.

Since an HDRI is used that brightens the screen undesirably, we can just exclude it from receiving IB light. We can now increase Diffusion from the spot from 4 to 6 and get a good brightness and a nice contrast.

If the interfering light is not from an HDRI and we cannot dim it, we have another option. Reduce screen Diffusion from 100 to 1 and increase spot Diffusion from 6 to 600. Again, the projection is bright and has good contrast. If an HDRI is used as here, with these settings it does not matter anymore whether the screen is included to or excluded from receiving light from the HDRI because the screen is very unresponsive to light.

All this is probably not very new news to you.

Let us therefore proceed to project light around us, not just on a screen in front of us. In order to do that, we need a screen that is all around us: a sphere with the camera at the centre.

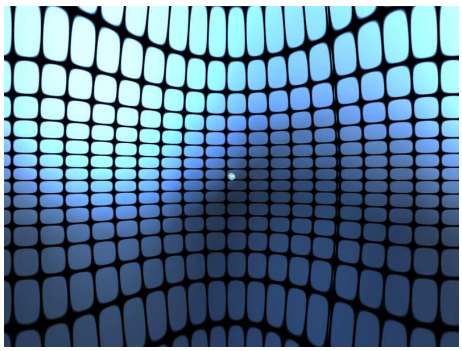
We have a sphere with white Diffuse and full Diffusion. Transparency is set to 20 but this is not important at this moment. The sky is full black without any atmospheric effects. The camera is inside the sphere and a bit offset to the centre. Rendered as a 360° panorama.

The HDRI Room from the Tourbillion series is used as Light from inside. What we see in the render are only some blurred dark and bright spots, mostly blue because of the sky. Whatever HDRI you use as Light from Inside, it will be diffuse convolved.

Moving up Quality from 16 to 4096 is a small step for the render quality but a giant leap for render time.

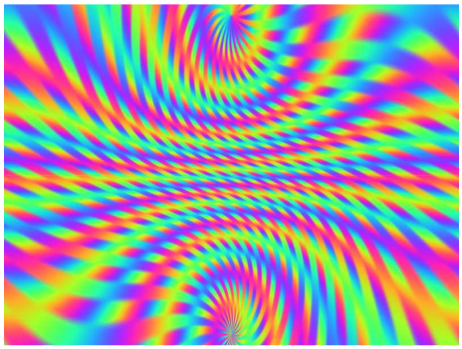
If we Use as backdrop and Add to sky – which is pitch black – and render, we understand where the light comes from. This was the reason to set the sphere 20% transparent.

The light on the sphere does not change, this proves that the light comes from the HDRI from inside. However, this is all not very exciting because there is not enough resolution, except if the surrounding sphere is made partly transparent perhaps.



A sphere was added and given a pattern for transparency. The sphere is in the world centre and surrounds the HDRI from inside. The pattern on the sphere is projected on the spherical screen. Here, the sphere is visible, if you do not want it visible; it can be scaled down to 0.001 without any effect on the screen. The HDRI from inside is even smaller than that.

Because of the very coarse spatial resolution of the HDRI from inside, it has limited use for projecting an image on a screen. It does have other uses, though.



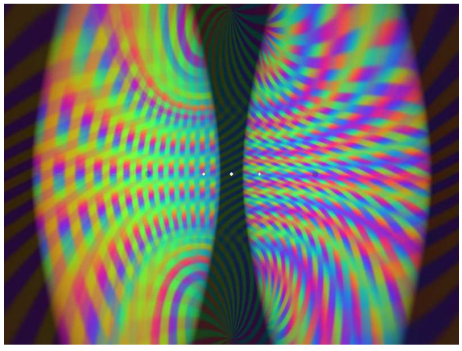
The alternative is to use a radial as light source. Here, we have our sphere as projector screen, set to white Diffuse and 100 Diffusion. Surrounding the Radial is another Sphere with the “gel”.

I used a Rainbow pattern from David’s *Material Project - Rainbow Sphere 4* video. There are two modifications:

1. We need Transparency, otherwise the light is trapped within the sphere. If Transparency is used, the light from the radial lights the screen with the colour it was set, white in this case.
2. We need to set the Transparent colour as well. Then, we get the “gel”. Again, without Transparency, the light is trapped within the sphere.

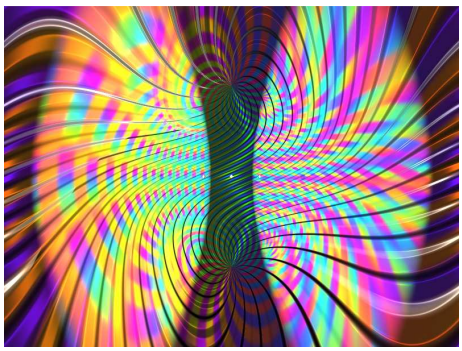
A note about the light Diffuse value which is set to 10 here. You can double this value to 20 and reduce Diffusion for the screen to 50% or set Diffuse to grey 127/127/127 instead of full white. It may come in handy to know that these values correspond exactly – not only here, always. Light Diffuse only accepts integers, no reals or fractions. This means 1, 2, 5, 10, … but not 2.5, 10.75 or so. This can be compensated either by the Diffuse colour or the Diffusion value for the material.

The textures use the Spherical mapping mode, which is the most logical for a sphere. Unfortunately, there is a minor flaw that is sometimes visible and sometimes not: a one pixel wide line at the equator. If this flaw is visible, use Parametric mapping. However, the texture is rotated 90° CW when looked at the sphere from the outside o r 90° CCW if the camera is within the sphere. In our case, we can simply rotate the sphere Y -90° to compensate for that.



Here we have just an extension of what we had before. There are three “gel” spheres with different textures from David’s *Material Project - Rainbow Sphere 4* video.

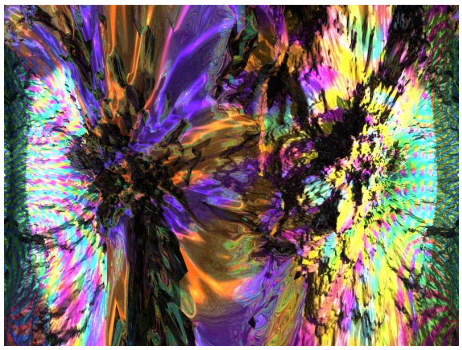
In the centre, there is a fainter radial, left and right are two round spot lights, the left one shines to the left and the right one to the right. They are set to be very wide and have full Edge Softness and they are also brighter. This is again a 360° panorama render.



Generally the same setup as before but for the screen, I added bump and Anisotropy Radial and Tangent mapped and conforming to Y the axes. Also, there is white Specularity but no Specular Halo. This is again a 360° P anorama render and it looks more interesting.

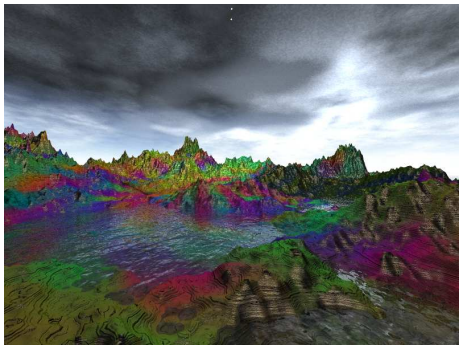
What is this light projecting and gel thingy good for?

Your imagination will tell you.



Here, the screen sphere was replaced by a SymmetricaL Lattice rotated more or less vertically and the camera looks in the opposite direction. The light sources and “gels” have not changed. There is Anisotropy, Specular and a bit of Reflection. Rendered as a 360° Panorama. The hot sp ots from the spot lights look quite out of place. Rendering as a panorama has the advantage to show everything. There are some interesting parts around the centre. Rotate and tilt the perspective camera to show one of the interesting parts. Mind that the symmetrical lattice is grey in colour. All colour come from the three gels used.

That is just an idea what could be done. You will come up with something better and more surprising. If you populate the inside of the screen with objects, do not forget that you can exclude selected objects separately from receiving light from any of the light sources.



Here is a fairy landscape. The terrain is white and has specularity. The colour comes from the gel applied to the lights visible above and a bit of sun light.

October 2011/horo