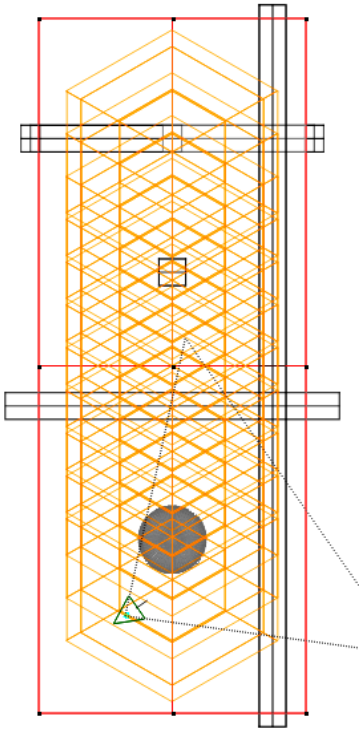
Obscure Light for Indoors

Obscure Light — as developed by David Brinnen — essentially works with an HDRI from inside and a True Ambience optimised radial with a gel surrounding the scene. To light an enclosed room must be tackled differently.

Preamble



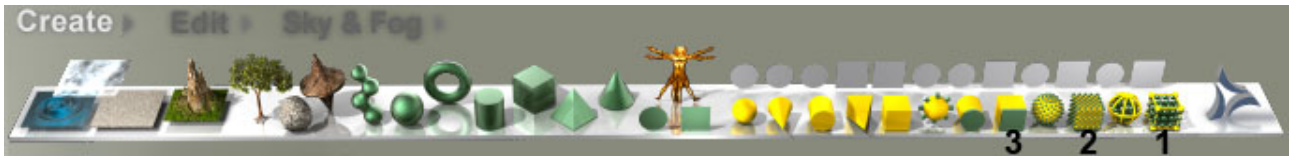
The Obscure Lighting method (OL) can be used to light an enclosed room successfully if the True Ambience (TA) optimised light source is set within the room. A TA optimised light source is not a point light source anymore, but an area light source, where the perimeter shown in the wireframe is usually that surface or area. The larger the area, the more light generated.

In a scene that is surrounded by a TA optimised radial, the inside of the sphere acts as the area light. If the radial is inside a room, the outside of the radial acts as the area light. The light falls off with the distance of the object from the area light. The surface of a sphere is not equidistant from the walls in a cubical room and hence the room is not evenly lit by the radial.

David came up with the idea to use many TA optimised radials to fill the room as closely as possible. At right, red shows the room's walls, the amber coloured objects are 11 radials that more or less fill the room. Luckily, there is no render time penalty whether one or many such radials are employed. For the render engine, the area of the light source consists of the area that makes the outer perimeter of the combined radials.

Cube or 3D and Square Light Sources

Bryce has three light sources that have a cubical area and can be TA optimised. They can be sized to fit the room exactly. The walls are lit and the room is actually inside the light source.



***1**: Cube Fill Light; **2**: Cube Dome Light; **3**: Square Parallel Light.*

The Cube Fill (**1**) and the Cube Dome (**2**) Light constrict the light sources within the cubical boundary. If used as TA optimised light sources they behave exactly as a TA optimised single radial. Neither the cube Fill nor the cube Dome lights are cubical light sources with six faces for area light if used as TA optimised light sources. They are just more straightforward to place within a room than a radial and they do have a three-dimensional surface: a sphere.

The Square Parallel (**3**) Light is different. As a TA optimised light source, there is only a two-sided face. Light is generated from both sides on this single face. This light source can be placed in the room as some sort of a sheet-light.

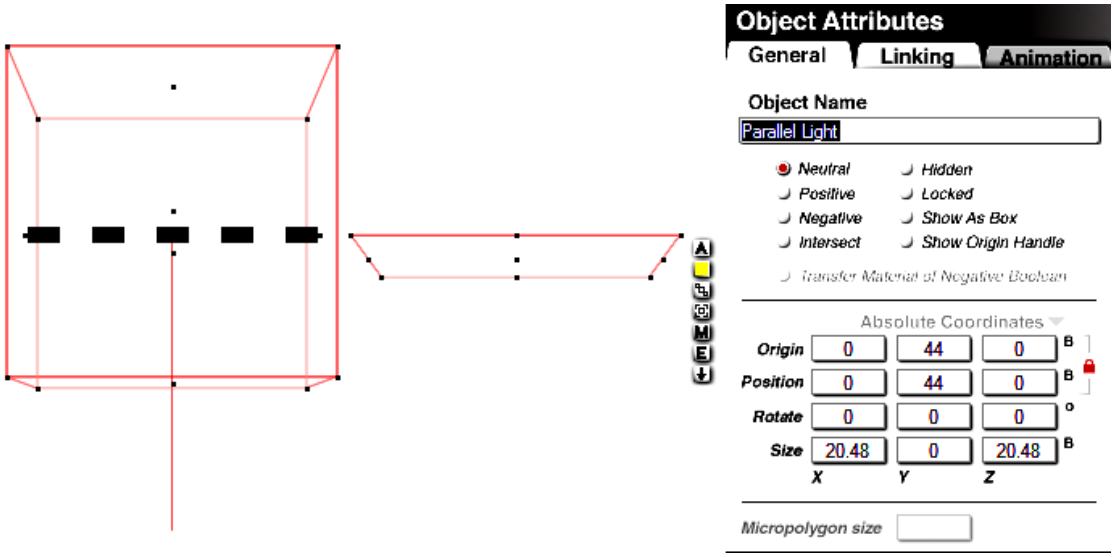
The Light Lab

In the Light Lab below, both cube and the square light sources are identified with their settings. The arrows at right point to the mandatory settings for each of the light sources, also if radials are used. Of course, whichever light source is used, it must be named *Background*.

1: For the Cube ***3D Fill Light***, the *Distribution* setting has no function at all if the light source is set to TA optimisation. Set it to 0.

2: Cube ***Dome*** Light. Used as a TA optimised light source, it does not matter whether *Outward*, *Inward* or *Self Shadows* are enabled or not. Keep them disabled.

3: Square ***Parallel*** Light. Neither *Infinite Width* nor *Direction control* has any effect if the parallel light is used as TA optimised light. No need to enable them.



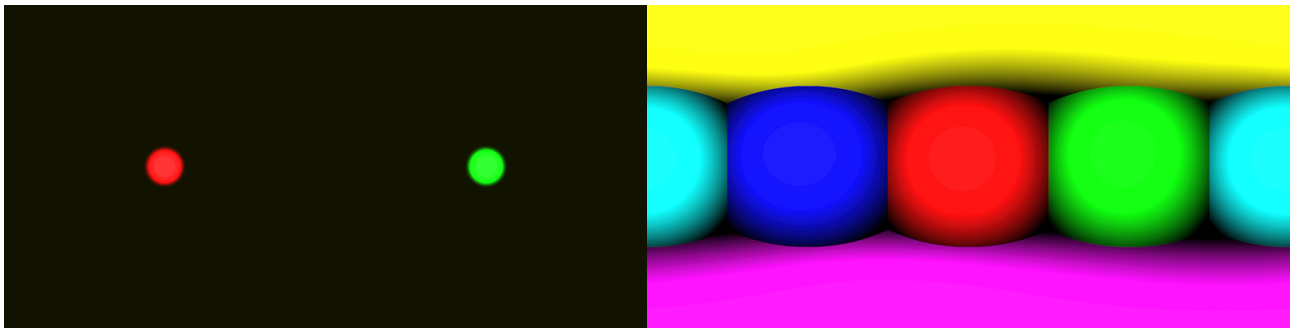
Since the Parallel light has only one light emitting face in the axes shown with the black dotted line, the Y-Size can be set to 0. This gives you a light plate or light sheet.

The Test Room

The room is a simple cube, 200 Bryce Units (BU) wide and high, and 520 BU long with the Bryce default grey. Four differently coloured oblong cubes are set inside (see picture on the first page). The HDRI from Inside used is a uniformly white sphere. The outside of the room is black; the HDRI is not rendered as backdrop.

In front of the camera is the Extreme Wide-angle Lens (EWL) set to give an angle of view horizontal and vertical of 170°. The EWL is a fisheye lens that can be fixed on the Bryce camera. It is available here: http://www.daz3d.com/bryce-7-1-pro-lenses-and-filters.

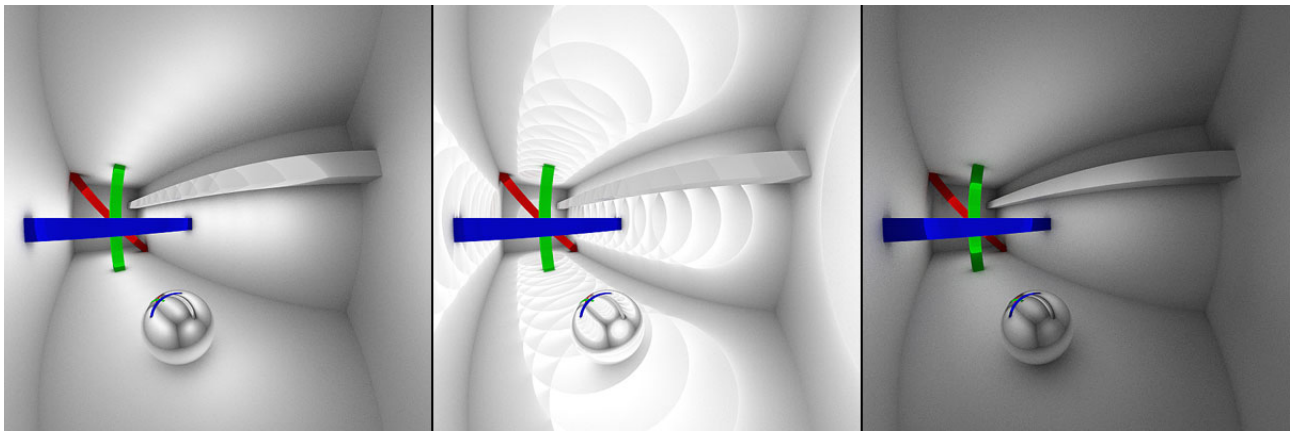
Alternate HDRIs



The HDRI at left is nearly, but not completely black and has exactly at left a red light and exactly at right a green one. The one at right is an HDRI with six colours for the six cube faces. The front is read, the back cyan, right is green and left is blue. The ceiling is yellow, the floor pink.

Cluster of Radial Lights

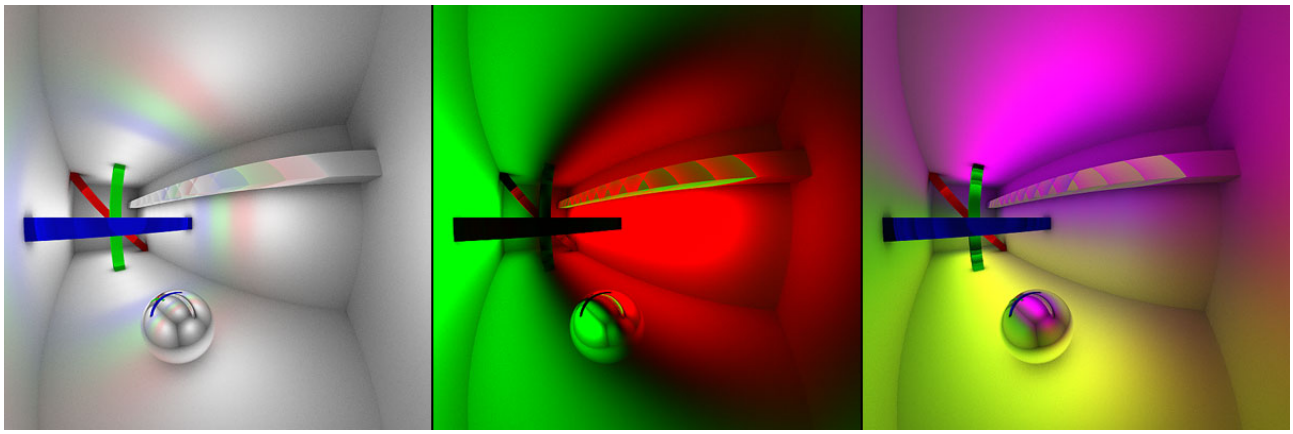
This is the method suggested by David. At left, the Radials almost reach the walls, as shown in the picture at the first page. The surface of each Radial is visible on the long beam; the coloured beams do not have the light up to the wall.



The centre picture has the Radials a bit larger than the room and the Radials can be very well counted. The lines are not where the Radials intersect with each other but where each Radial passes through the wall.

The picture above at right has the size of the 11 Radials reduced to fill about half of the room. There is less light, this could be compensated by increasing HDRI Effect. There are no lines on the walls, but the coloured cubes show where the Radials end.

Investigating the colour behaviour: on the left, three Radials got a Diffuse colour. From the camera to the far end: the first Radial has white Diffuse, the next a bit red, followed by the Radial with green, the next one has a bit of blue Diffuse. The remaining seven Radials have again white Diffuse.

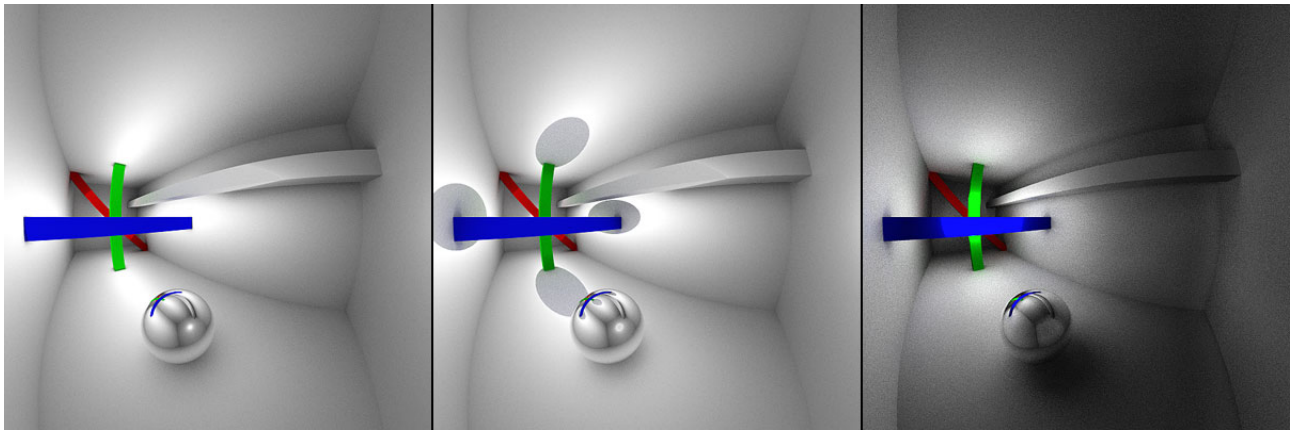


The centre image was rendered using the HDRI with a red light at left and a green one at right. We get the same result as if a Fill or Dome light is used — except that the perimeter of the Radials is very much emphasised.

At right the colour cube HDRI was used. This is again the same result as if a Fill or Dome light was used — and again the very pronounced outline of each radial's surface.

Fill and Dome Light (Single Radial)

These two types work exactly the same as a single Radial. It does not matter in what direction they point. They can be set to the exact size of the room so that their wire frame matches the room walls. There is a brighter spot in the centre of the light were a radial is. Therefore, the walls nearest to the centre get a brighter spot. If the light protrudes any wall, the bright spot becomes a dark one.



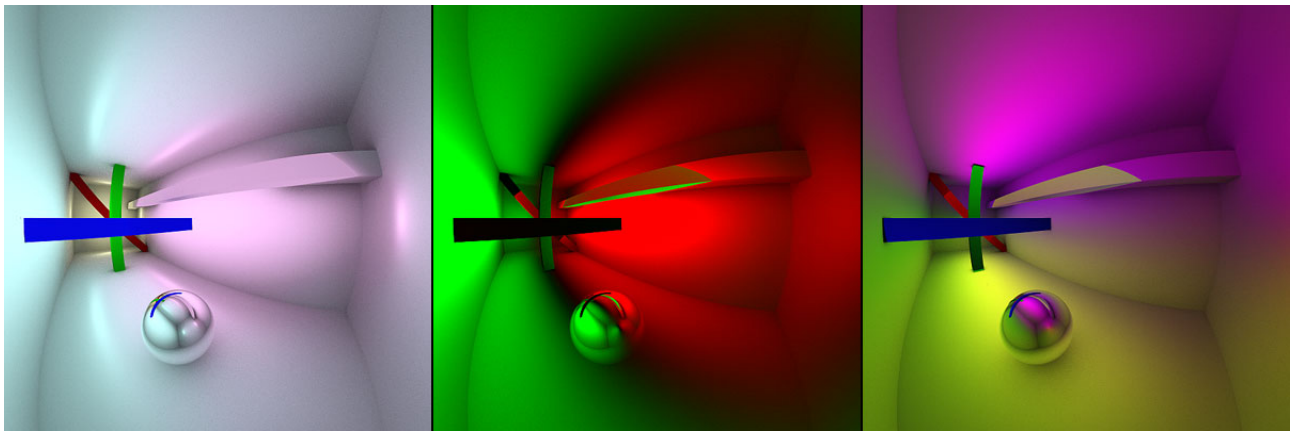
At left, the Fill light has the same size as the room; its surface converges with the walls. The bright spot in the centre of each of the walls, ceiling and floor are obvious. On the grey beam, a slightly brighter line can be made out where the light inside the Fill light ends. If a cluster of radials are used (discussed on page 8), such a line can be seen for each radial.

The centre render has the Fill light larger in all three directions by 10 BU. Where the bright spot is in the left image, here it is dark. The larger the light is made, the larger and darker the spots grow until the room is completely black. The Fill light must not be larger than the room.

Finally, at right, the Fill light has half the size of room and the HDRI Effect was doubled. The brightest spots have approximately the same brightness as in the left image. However, the light does not reach the walls. What is worse than the missing light is the dramatically increased noise. All pictures were rendered with 256 rays per pixel (rpp). In all three renders, the dimming of the light on the red beam at the back can be observed.

How about colours? More than one Fill, Dome or Radial light can be used to light a room. Below at left, three Fill lights were used and each one given another Diffuse colour. Far in the background yellow, the one at the left side got some pale blue and at right a pale pink.

The lights must not touch each other or overlap. If they overlap, the result is unexpected. Again, the number of lights can be counted because of the bright spots — or streaks because of the distortion of the fisheye lens used.



The centre image uses another HDRI. Instead of a uniformly white sphere, this is an almost black HDRI with a bright red spot at left and a bright spot at right. Since we look at the inside, the colours are swapped. There is only one TA optimised light, the two colours come from the HDRI.

At right, the one with six different colours was used. Again, there is only one Fill light. The colours are mirrored and upside down.

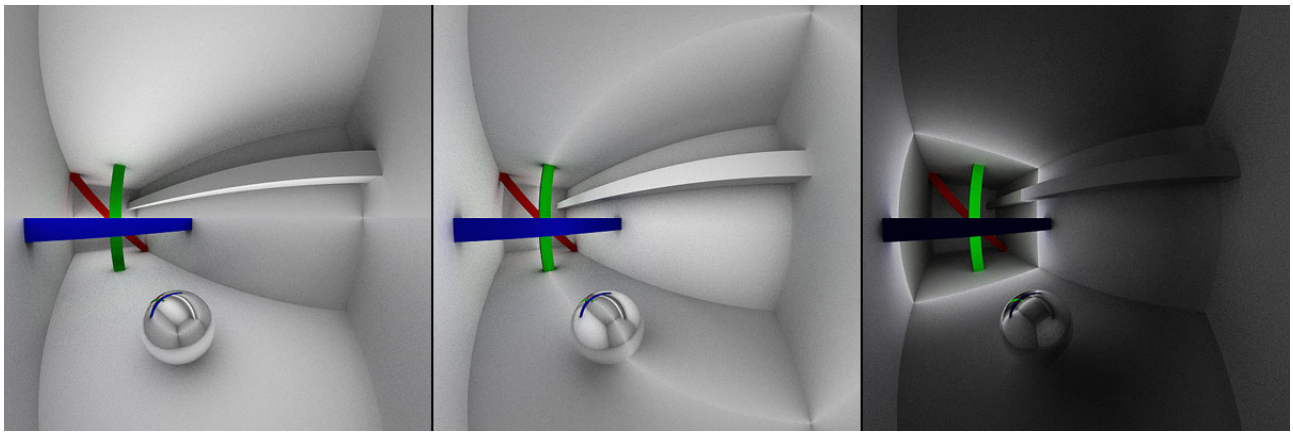
Two example-renders below use http://www.daz3d.com/the-ministry *The Ministry* by *Stonemason*. At left just the 4 radial lights. At right one Fill light with the white HDRI.

The Fill light goes from the ground up to just under the lamps. The perimeter of the bright centre part is quite good visible on the red and green cylinders. However, on the walls and the

floor it is difficult to make it out. This half an hour render at 144 rpp demonstrates that the bright centre part is not always an issue. It depends on the scene used.

Parallel Light

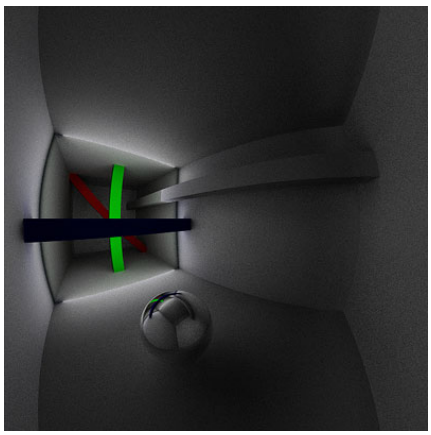
Using the Parallel light TA optimised behaves differently than the Fill, Dome and Radial lights, as mentioned before. Since this is only a light sheet, there is a bright line at the edge, but no bright light blob.



At left, the Parallel light is set horizontal and it covers the surface of the room. At the walls, the bright edge can be seen; the corner seems the most prominent. It is less offensive than the bright centre blob when using Fill, Dome or Radial light.

In the centre image, the Parallel light is turned vertical and is placed in the centre of the room. The edge line appears more offending than in the left render with the light set horizontal. But that is most probably due to the angle of view and the distortions from the lens.

At right, the Parallel light was turned so that it cuts the room in the middle. There is not much light reaching the far sides. However, the edge is very prominent. This can be used for effect, but in this case it is really not very good because the less light we get at the walls the more noise is introduced. All pictures were rendered with 256 rpp.



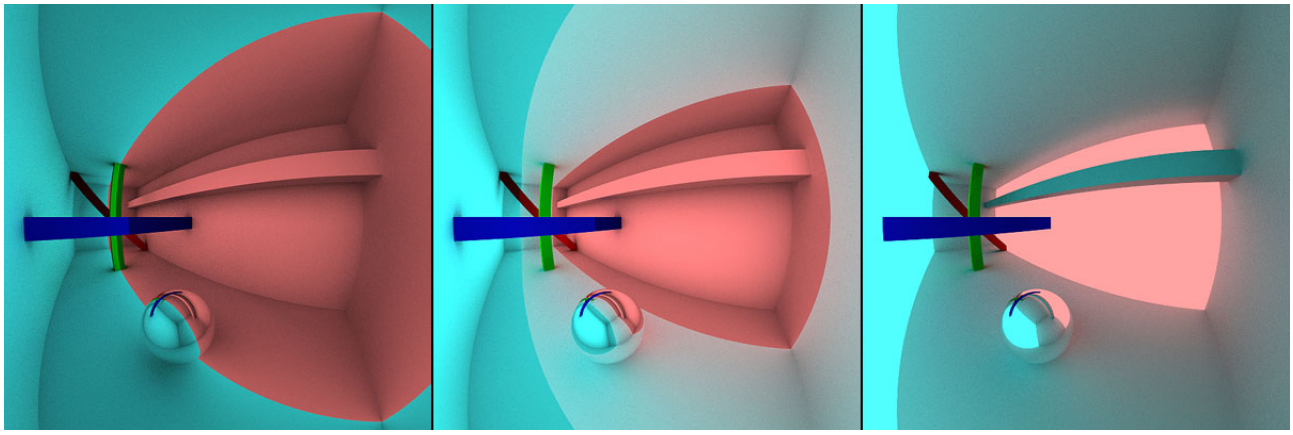
The brightness of the frame increases if the edges protrude out of the room, as the right example above shows. In the left and centre images, the edges touch just the walls, the Parallel light has exactly the same size as the room. Reducing the size a tiny bit does not help. The bright edge line not only gets dimmer, it actually turns to dark — even at a distance of 0.001 BU. This is indeed disappointing. So the light emitting 2D face must be exactly meeting the walls.

The image at right shows this behaviour. The Parallel light is higher than the room, but narrower. We have the bright edges on the above and below, but dark ones at the sides.

How about using more than one Parallel light and giving them different Diffuse gel colours? This can be done, but the result is a bit unexpected. The 2D faces of two Parallel lights must not converge. One of the two takes precedence and the effect of the other one is lost. This is not different than for the Fill and Dome lights, which must not touch. Below, two Parallel lights with different gels — left cyan, right reddish — are used and turned vertical.

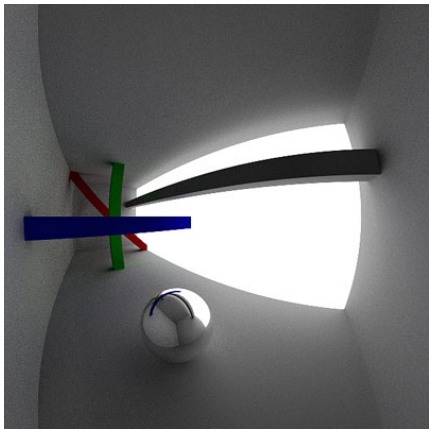
Below, the left image has the two Parallel lights in the centre, 0.002 BU apart. There is a hard line between the two colours. That much we would have expected.

In the centre image, the Parallel lights are both offset from the centre of the room by ±50 BU. Each one is 50 BU off its nearer wall. Here, we would have expected a better blend of the two colours. Instead, one side of each 2D face retained its gel colour and illuminates the near wall. The other side of the 2D face seems de-saturated and mixes nicely with the other. It is important to note that both Parallel lights have the same orientation: both look to the right.



At right, each face is 0.1 BU away from the wall. The walls appear to glow and emit light into the room. The colours are nicely mixed. It may not appear so in the example shown, but this is due to the distortion introduced by the extreme wide-angle fisheye lens.

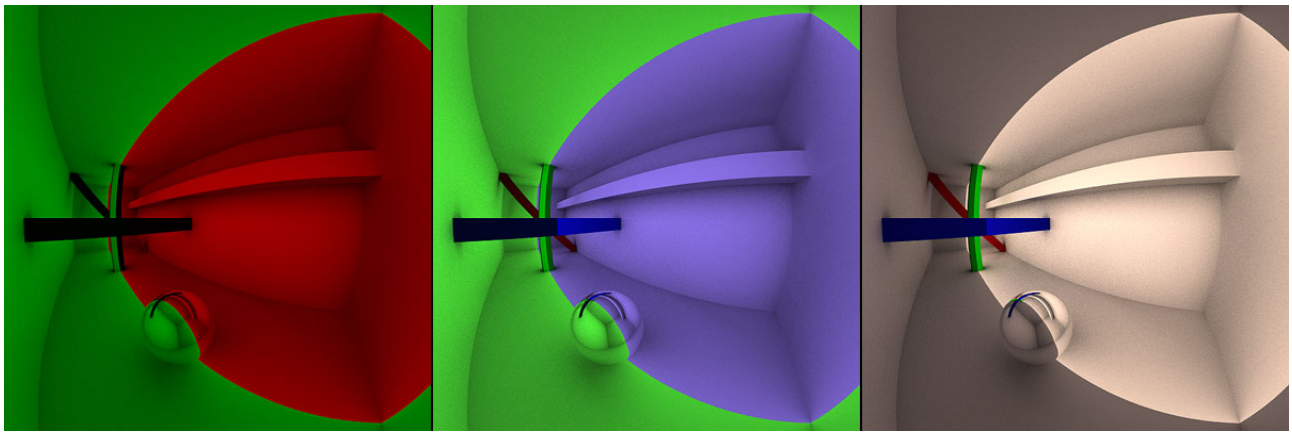
The centre and right renders show beautifully how the light is reflected from the mirror ball to the floor. The floor is not reflective; this is actually a brightening from the light energy mirrored.



We can capitalise on the bright shining wall if we put a Parallel light near a wall and use a neutral gel as shown at right, where the Parallel light with the same size as the wall is 0.1 BU in front of it. If the light is moved outside the room, only lightless black is left. The orientation of the Parallel light is towards the wall, not away from it. Unfortunately, the noise increases towards the dimmer wall.

Using other HDRIs than just a white sphere as we did up to now reveal again the flat property of the Parallel light if it is TA optimised.

Below, at left, the HDRI with a red light at left and a green light at right was used. These two colours are shown and nothing else, not even the very dark rest of the HDRI that can be at least inferred when using a TA optimised Fill or a Dome light.



The centre image looks almost the same, but here, the colour cube HDRI was used. The green face and most of the blue face with a bit of the red face are seen by the 2D face of the Parallel light. It is difficult to miss where the face is located.

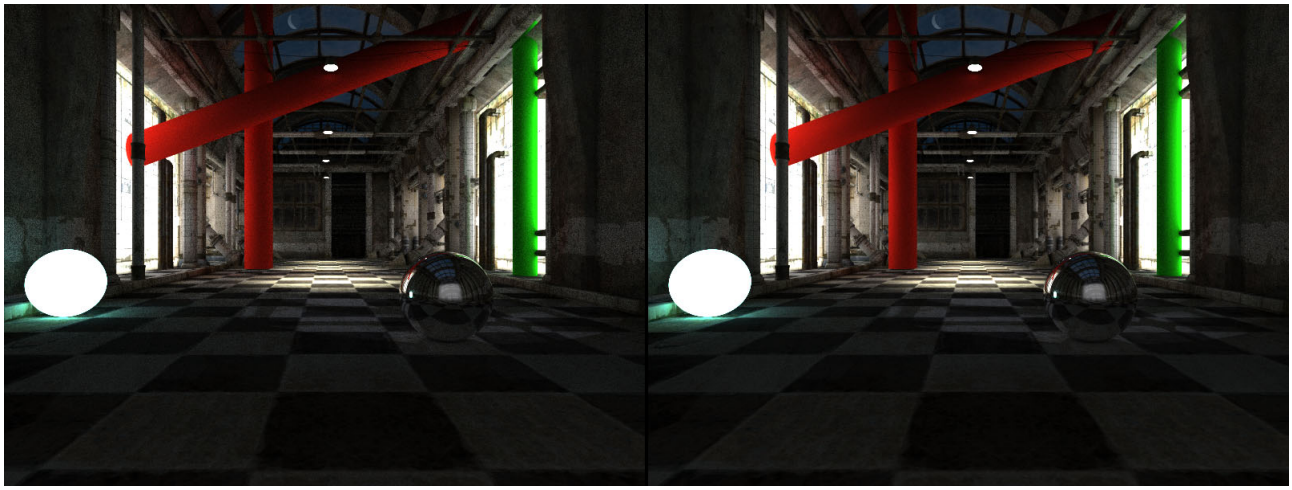
The right example uses the *Sunset* HDRI, which comes with Bryce 7.1 Pro. It is yet another example that shows that the Parallel light is of very limited use if not a uniform HDRI is used. Of course, we can still use such an HDRI, which functions as just a two-colour HDRI, if we set scene and camera accordingly.

Stonemason's The Ministry again. At left, the Parallel light is vertical, in the centre of the hall. On the red, slanted cylinder we see where the light is placed. There is no bright line but the left side is brighter than the right one.

In the centre, the orientation of the Parallel light was turned to horizontal. We see a dark shadow at the left end of the slanted red cylinder and a touch of a brighter line on the green cylinder.

At right, there are two Parallel lights at right angles to each other. In fact, the light from the left and centre picture were combined.

The following renders feature three Parallel lights. Two on each side, set as far back to be visible only in the alcoves, hence they are very bright. The third one is near the back wall and its Diffusion is only 50%, making it much darker. It is visible in the mirror ball. An additional sphere as a glowing object was introduced.



The two renders are not exactly identical. The left one was rendered with 144 rpp in just under one hour; the right one was rendered with 256 rpp in 1 ¾ hours. Noise is evident in both examples, though less so in the 256 rpp one.

The Best Method

There is no best method. Each method has advantages and disadvantages and each method may be more suitable for a particular room than the others. The following table attempts to list the positive and negative qualities of the three methods, though a negative quality may very well give exactly the result the artist is looking for.

Method	Positive	Negative
Radial Cluster	Each Radial can be given a different colour. No bright spots on the walls. Forgiving if much smaller than room. Colour and light from HDRI are fully represented.	Cannot cover the walls completely. Perimeter of Radials create pattern on objects they cut through. A bit tedious to set up, high object count.
Single Radial, Fill or Dome	Several differently coloured lights can be used. Colour and light from HDRI are fully represented.	Bright centre spot on walls. Dark centre spot if larger than room. Big light loss if smaller than room. Lights must not tough each other.
Parallel	Easy to set up and place. Several intersecting lights can be used. Makes wall full bright if placed very close to it. Gives strong colour bleed. Light up to walls. Flexibility: several can be placed to light dark parts.	Bright edge line where light sheet meets the wall, dark line where it passes through the wall. Only 2-sided light. Does not properly blend colours if more than one light is used. Only represents 2 colours from HDRI.

Ideal HDRI

The selection of useable HDRIs is limited. Parallel lights are worst in this respect. On the other hand, a rainbow HDRI is seldom used to light a room. A fully white HDRI may be the best choice for most scenes. The light source can always be given some colour hue.

There is no necessity to render the HDRI as backdrop since it should light the inside of a room. If there are windows, a Bryce scene lit by the Sun can be set up. Any fitting HDRI can be exported as an LDRI in the spherical projection and mapped on a sphere which surrounds the room in order to have some scenery visible through the windows.

Noise

Noise is, of course, a nuisance. It can be combatted by having the room lit quite brightly and by using the highest rays per pixel setting — with the consequential render time penalty.

On the other hand, photographs taken in a low light situation with a fast film exhibit quite some noise — though it is called *film grain*. A grainy photograph can have some charm, why not a noisy render? It is all in the eye of the beholder.

A bumpy material is also helpful to cover noise. Comparing the example renders above at the end of page 7, left with 144 rpp and right with 256 rpp shows the noise mostly on the coloured cylinders. There is not that much of a difference on the walls and the floor.

Final Example The render uses two horizontal Parallel lights: at the height of the lamps with a weak blue Diffuse colour and one just above the ground with10% white Diffusion to light up the shadow below the *PSI-CITY Heavy Cargo Transporter* by *Simon D* which is available at DAZ 3D (http://www.daz3d.com/psi-city-sector-2). The four radials have 25% soft shadows, the sun as well. The Sun Diffuse is at 200. The FLO (Fisheye Lens Object) was attached to the camera. The angle of view in the diagonal is exactly 180°.