

Image Based Light with True Ambience

Image Based Light and True Ambience can be combined. The effect of some options depends on how other options are set. Combining IBL with TA can result in very sophisticated renders if the right options are used.

IBL and TA Lights

Image Based Light uses a high dynamic range image (HDRI) that is mapped on the inside of a huge sphere which is about as far away as the Bryce sky. This light probe can be likened to an infinite dome light in the Light Lab. The image can be rendered as backdrop. It is either linear tone-mapped to fit the range of the display, or can be subjected to a photographic tone-mapper that shows the image in a more natural manner.

Bryce features two different render engines. The standard one creates point lights from any light source in the Light Lab and also creates point lights from the HDRI that the render engine can use to illuminate the scene. The number of lights created can be set with IBL *Quality*.

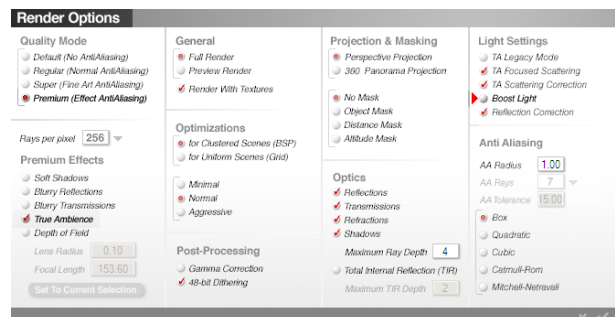
A point light source is a location in space from which light emanates. It does not have any size. A Bryce light source, like a radial for instance, is shown with a size in the wireframe view. This is only a help when building up the scene. The actual light emanates from its centre and scaling the wireframe does not change the light output.

True Ambience was first implemented in Bryce 5 and was driven by ambience. This worked but was an unfortunate choice. Bryce 7 works with diffuse, which is more appropriate and the result is what you get from global illumination (GI). TA is therefore a GI implementation.

True Ambience looks at the size of the wireframe of a radial and the size of it matters as far as light is concerned. The render engine sends out feeler rays and finds the light on the surface of the radial if it is set to *True Ambience Optimization*. This is the same for the lights in the HDRI, though its size cannot be changed.

This may all sound a bit theoretical, and it is, but it helps understanding what happens when IBL is combined with TA.

The following concentrates on the highlighted parts in the *Sky Lab*, IBL tab and the *Render Options* below. The pop-up right of *HDRI Effect* can be opened by clicking on the white right arrow. The *Ignore tone mapping* option is implemented and works (even if you were told otherwise, I thought so myself for a long time).



All the pictures in this document are embedded in the original size. Use the zoom function in your PDF viewer to see them larger.

Variations

A scene lit by an HDRI can be rendered regular with four settings: not tone-mapped with and without *Boost Light* enabled and the same tone-mapped. There is not always a visible difference if *Boost Light* is enabled or not. However, when subtracting the one without from the one with, a faint difference can be observed. The material used on all objects is the default grey with additional white *Specular*, full *Specularity* and default *Halo* colour of grey 204.

Regular IBL

Regular renders with an HDRI will not be dwelled upon here; two are included below for comparison. At left not tone-mapped, at right tone-mapped, both rendered regular with IBL Quality 256. The render time for 1000 x 800 pixels was 38 seconds.



01 IBL



03 IBL tone-mapped

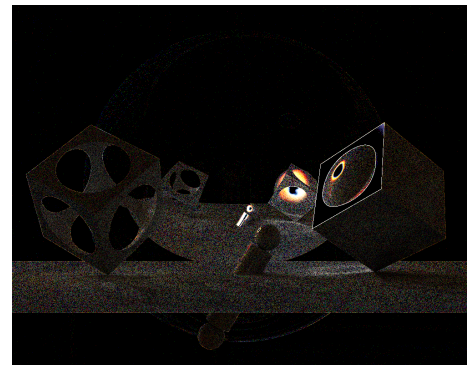
Premium TA without TA optimisation

If rendered premium with TA, the HDRI can be set to *True ambience optimization* or not, the HDRI can be tone-mapped or not, *Ignore tone mapping* can be engaged or not, *Boost Light* can be on or off. This gives twelve different results and not all look good.

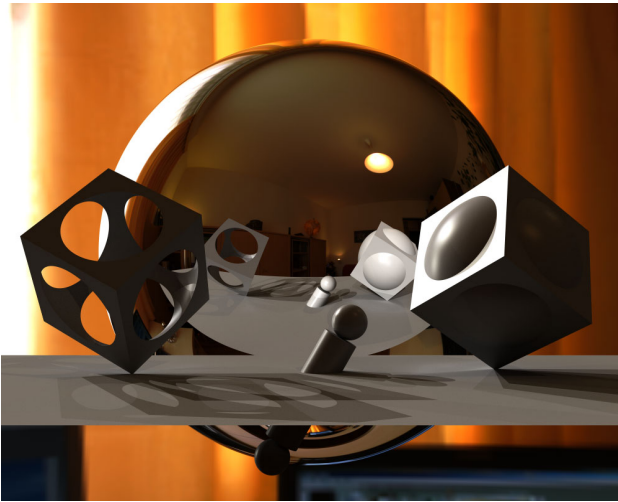
The first set of six has *True ambience optimization* not enabled. This means that the point light sources in the HDRI are mainly used. There is only a tiny bit of yellow on the grey surfaces. The shadows are from the HDRI and *Quality 16* was used. Premium rendering with TA and 256 rpp, the renders took between 14 and 15 minutes. To be fair, you may get away with 64 rpp and then the render time is well below a more reasonable 4 minutes.

The first two are not tone-mapped, the left one (11) without *Boost Light*, the right one (12) with. There is a small difference that is not easy to see.

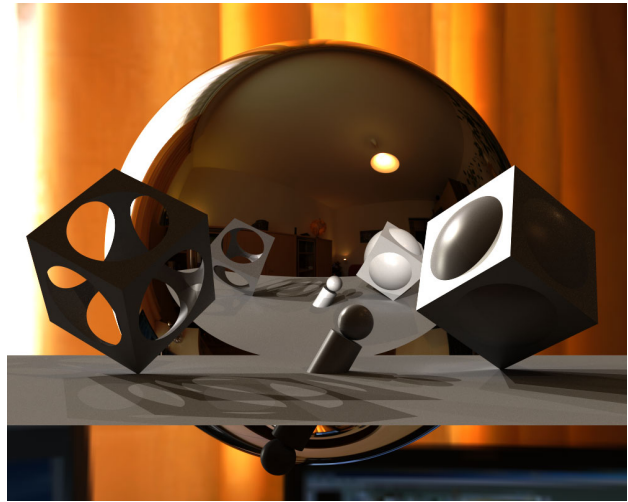
The next two rows using the tone-mapped HDRI as backdrop also show only very small differences. The lower row (15, 16) has *Ignore tone mapping* enabled, the upper (13, 14) not. The right ones (14, 16) have *Boost Light* enabled, the left ones (13, 15) not. The *HDRI Effect* was set to 20 for all six renders.



Differences are difficult to see. The image above at right shows the difference between *Boost Light* on or off (13 - 14) with the brightness boosted considerably to make the difference more obvious.



11



12 Boost Light



13 tone-mapped



14 tone-mapped, Boost Light



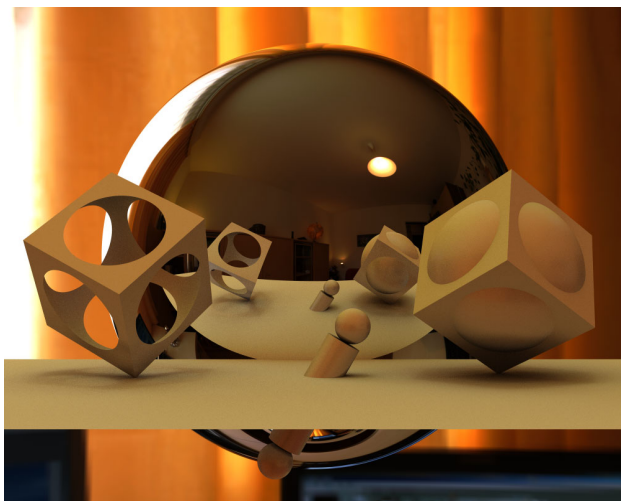
15 ignore tone-mapping



16 ignore tone-mapping, Boost Light

Premium TA with TA optimisation

True ambience optimization was enabled for the following series of renders. If *Ignore tone mapping* is enabled (25, 26), the feeler rays look at the original HDRI, and if it is not enabled (23, 24), the feeler rays look at the tone-mapped HDRI. If the HDRI was not tone-mapped (21, 22), the *Ignore tone mapping* option has no effect. Render time was around 3½ minutes. *Light From Inside* has no effect because the feeler rays go to the outer sphere.



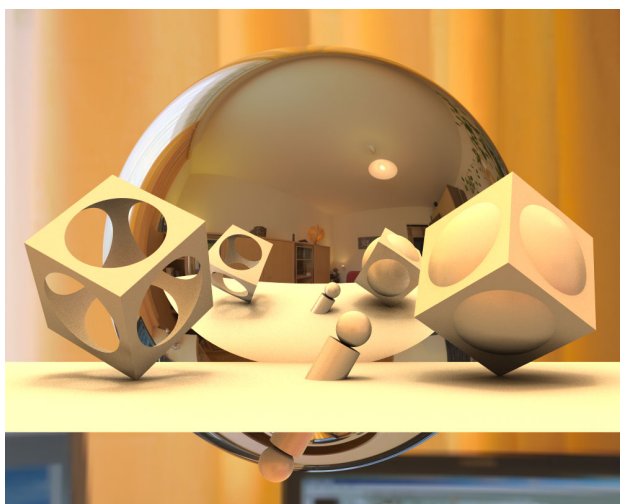
21 TA optimise



22 TA optimise, Boost Light



23 TA opt, tone-mapped



24 TA opt, t-m, Boost Light



25 TA opt, t-m, ignore t-m



26 TA opt, t-m, ignore t-m, Boost Light

Boost Light creates noise and fireflies even when rendered at the maximum of 256 rays per pixel if the feeler rays look at the original HDRI (22, 26). However, and this is the nice surprise, this is not the case if the tone-mapped HDRI is used (24).

Boost Light was not enabled for the renders 23 and 25 and the saturation of the light is lower. Render 25 ignores tone-mapping and the ambient light is more saturated. Render 24 is my hero even though it looks a bit generously saturated.

All example renders were made with *Saturation* set to maximum. What you see is all the colour saturation you can get out of this HDRI. Too much saturation can be corrected by lowering the *Saturation* level.

Render Table

The table below shows the settings for the renders shown above. Numbers 2 and 4 thru 6 are not included above; 5 is identical to 3 and 6 identical to 4.

Render No.	Premium TA	TA Optimise	Tone Mapped	Ignore Tone Mapping	Boost Light	HDRI Effect	Render Time
01	No	No	No	No	No	30	0:38
02	No	No	No	No	Yes	30	0:38
03	No	No	Yes	No	No	30	0:38
04	No	No	Yes	No	Yes	30	0:38
05	No	No	Yes	No	No	30	0:38
06	No	No	Yes	No	Yes	30	0:38
11	Yes	No	No	No	No	20	14:52
12	Yes	No	No	No	Yes	20	14:48
13	Yes	No	Yes	No	No	20	14:17
14	Yes	No	Yes	No	Yes	20	14:09
15	Yes	No	Yes	Yes	No	20	14:00
16	Yes	No	Yes	Yes	Yes	20	14:02
21	Yes	Yes	No	No	No	100	3:36
22	Yes	Yes	No	No	Yes	100	3:36
23	Yes	Yes	Yes	No	No	67	3:19
24	Yes	Yes	Yes	No	Yes	67	3:19
25	Yes	Yes	Yes	Yes	No	200	3:28
26	Yes	Yes	Yes	Yes	Yes	100	3:23

Observations

The option ***True ambience optimization*** has only an effect when rendered Premium with True Ambience. The premium render engine can either look at the point lights in the HDRI or at the surface. When *True ambience optimization* is enabled (default), the render engine sends feeler rays to the HDRI. This can be likened to area lights opposed to point lights; this is not exactly true but helps to understand what is going on and the result is comparable.

The option ***Ignore tone mapping*** has only an effect if rendered Premium with True Ambience and the HDRI was tone mapped (*Tone map* enabled). The feeler rays looks at the loaded HDRI if *Ignore tone mapping* is enabled (default). If this option is disabled, the feeler rays look at the tone mapped HDRI, which has usually a much lower dynamic range (256:1): less contrast and less saturation.

Boost Light increases contrast and colour saturation when enabled. It seems to have the strongest effect when rendering Premium with True Ambience and *True ambience optimization* enabled. With a high contrast HDRI, the output can reach the limit of the brightness range which manifests itself by fireflies; randomly distributed white pixels that cannot be anti-aliased anymore even at the highest rays per pixel setting of 256. If the HDRI is tone mapped, which reduces contrast and saturation, it enhances brightness and saturation if *Ignore tone mapping* is not enabled and the render engine sends the feeler rays to the tone mapped HDRI. The render 24 shows this nicely.

Shadows

For a conventional IBL render, the point lights in the HDRI can cast shadows. *Quality* defines how many point lights are generated for the HDRI. The higher *Quality* is set, the more lights can brighten up shadows cast by the other lights. This results in less strong and blurred shadows. However, even with the highest setting 4096, there may still be shadow bands in the final render. Using *Shadow Softness* often helps but the render time increases dramatically because of the many shadow rays that have to be calculated. Here, a low *Quality* setting is often the better choice.

The above also applies to Premium renders with True Ambience if *True ambience optimization* is disabled. The ratio key light versus ambient light is determined by the contrast of the HDRI used. If the sun is in the HDRI, there is often not enough ambient light. Rendering Premium with True Ambience adds a bit of ambient light without changing the shadows. *Boost Light* even adds a tad more ambient light and colour from the environment. This setup can increase render time, on the other hand, rays per pixel can often be reduced to as low as 16 or even 9.

Rendering Premium with True Ambience and having *True ambience optimization* enabled changes shadows because there are no point light sources anymore. *Cast Shadows* can be disabled; *Quality* can be set to the lowest value 16. If directional shadows are needed, the sun can provide it. Also, any light source from the Light Lab can do so as long as that light source is not set to *True Ambience Optimization*.



The HDRI used for the tests; dynamic range 11,616:1.