

Reference

Panel:

Render • Light Paths

Ray Types

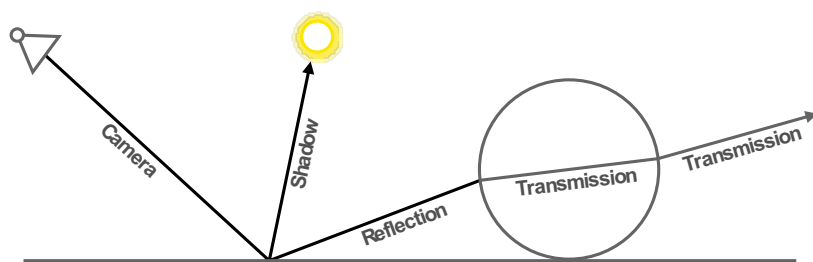
Ray types can be divided into four categories:

1. Camera: the ray comes straight from the camera.
2. Reflection: the ray is generated by a reflection off a surface.
3. Transmission: the ray is generated by a transmission through a surface.
4. Shadow: the ray is used for (transparent) shadows.

Reflection and transmission rays can further have these properties:

- Diffuse: the ray is generated by a diffuse reflection or transmission (translucency).
- Glossy: the ray is generated by a glossy specular reflection or transmission.
- Singular: the ray is generated by a perfectly sharp reflection or transmission.

The Light Path node can be used to find out the type of ray the shading is being computed for.



See also

The object [ray visibility](#) settings.

Bounce Control

The maximum number of light bounces can be controlled manually. While ideally this should be infinite, in practice a smaller number of bounces may be sufficient, or some light interactions may be intentionally left out for faster convergence. The number of diffuse reflection, glossy reflection and transmission bounces can also be controlled individually.

Light paths are terminated probabilistically when specifying a minimum number of light bounces lower than the maximum. In that case, paths longer than minimum will be randomly stopped when they are expected to contribute less light to the image. This will still converge to the same image, but renders faster while possibly being noisier.

Transparency

The [Transparent BSDF](#) shader is given special treatment. Rays pass straight through it, changing neither direction nor type as if there were no geometry at all.

Alpha pass output is also different for the transparent [BSDF](#). Other transmission BSDFs are considered opaque, because they change the light direction. As such they cannot be used for alpha-over compositing, while this is possible with the transparent BSDF.

Note that, while semantically the ray passes through as if no geometry was hit, rendering performance is affected as each transparency step requires

executing the shader and tracing a ray.

Settings

Max Bounces

Total

Maximum number of light bounces. For best quality, this should be set to the maximum. However, in practice, it may be good to set it to lower values for faster rendering. A value of 0 bounces results in direct lighting only.

Diffuse

Maximum number of diffuse bounces.

Glossy

Maximum number of glossy bounces.

Transmission

Maximum number of transmission bounces.

Volume

Maximum number of volume scattering bounces.

Transparent

Maximum number of transparency bounces.

Note, the maximum number of transparent bounces is controlled separately from other bounces. It is also possible to use probabilistic termination transparent bounces, which might help rendering many layers of transparency.

Clamping

Direct Light

This option limits the maximum intensity a sample from rays which have not yet bounced can contribute to a pixel. It reduces noise at the cost of accuracy. Setting this option to 0.0 disables clamping altogether. Lower have a greater affect (dimmer samples) on the resulting image than higher values.

Note

This option provides a way to limit [Fireflies](#). However, note that as you clamp out such values, other bright lights/reflections will be dimmed as well.

Care must be taken when using this setting to find a balance between mitigating fireflies and losing intentionally bright parts. It is often useful to clamp indirect bounces separately, as they tend to cause more fireflies than direct bounces. See the *Clamp Indirect* setting.

Indirect Light

The same as *Direct Light*, but for rays which have bounced multiple times.

Caustics

A common source of noise is [Caustics](#).

See also

See [Reducing Noise](#) for examples of the clamp settings in use.

Filter Glossy

When using a value higher than 0.0, this will blur glossy reflections after blurry bounces, to reduce noise at the cost of accuracy. 1.0 is a good starting value to tweak.

Some light paths have a low probability of being found while contributing much light to the pixel. As a result these light paths will be found in some pixels and not in others, causing [Fireflies](#). An example of such a difficult path might be a small light that is causing a small specular highlight on a

sharp glossy material, which is observed through a rough glossy material. In fact in such a case there practically occurs a caustic.

With path tracing it is difficult to find the specular highlight, but if you increase the roughness on the material, the highlight gets bigger and softer, and so easier to find. Often this blurring will hardly be noticeable, because it is blurred by the material anyway, but there are also cases where this will lead to a loss of detail in lighting.

Caustics

Reflective

While in principle path tracing supports rendering of caustics with a sufficient number of samples, in practice it may be inefficient to the point that there is just too much noise. This option can be unchecked, to disable reflective caustics.

Refractive

The same as above, but for refractive caustics.

Fast GI Approximation

Reference

Panel:
Render ▸ Light Paths ▸ Fast GI Approximation

Approximate diffuse indirect light with background tinted ambient occlusion. This provides fast alternative to full global illumination (GI), for interactive viewport rendering or final renders with reduced quality.

Method

Fast GI approximation method.

Replace:

Replace global illumination with ambient occlusion after a specified number of bounces.

Add:

Add ambient occlusion to diffuse surfaces.

AO Factor

The strength of the ambient occlusion.

AO Distance

Distance from shading point to trace rays. A shorter distance emphasizes nearby features, while longer distances make it also take objects farther away into account.

This option can also be overridden per object in the [Object Properties](#), which is useful when you have both small and large scale objects in the same scene.

Viewport Bounces

Replace global illumination with ambient occlusion after the specified number of bounces when rendering in the 3D Viewport. This can reduce noise in interior scenes with little visual difference.

Render Bounces

Number of bounces when rendering final renders.