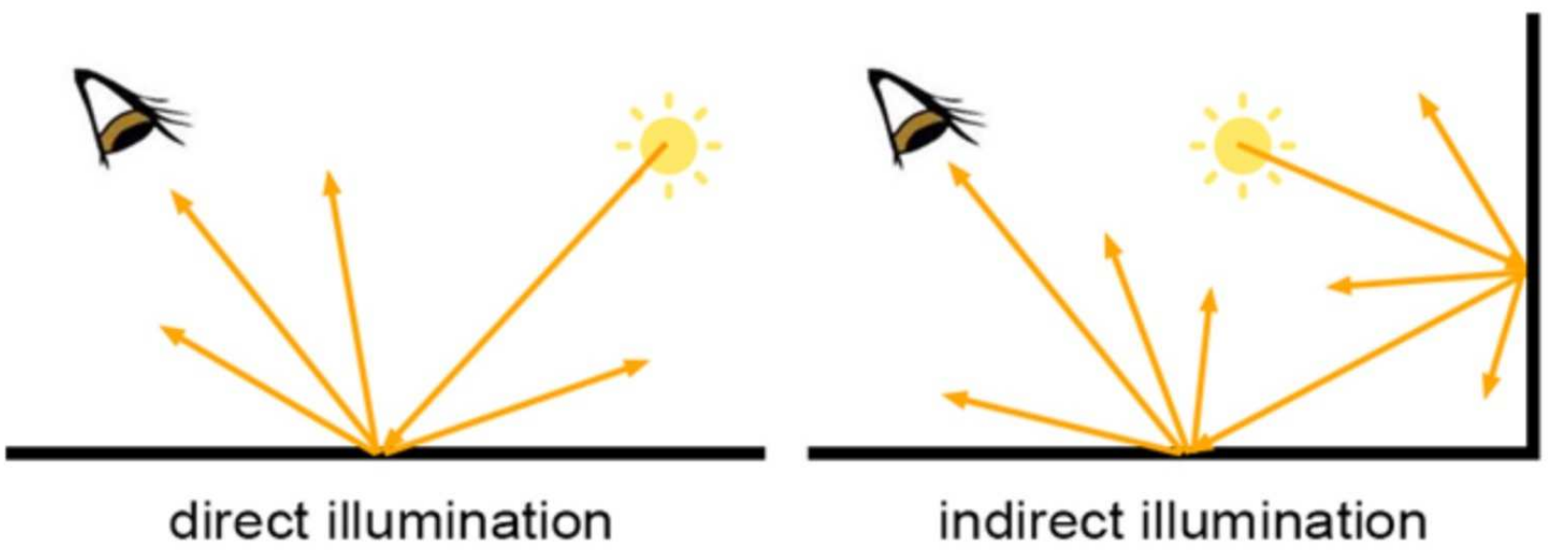
Indirect Illumination

A more realistic alternative to ambient lighting

Rays bounce multiple times before reaching camera

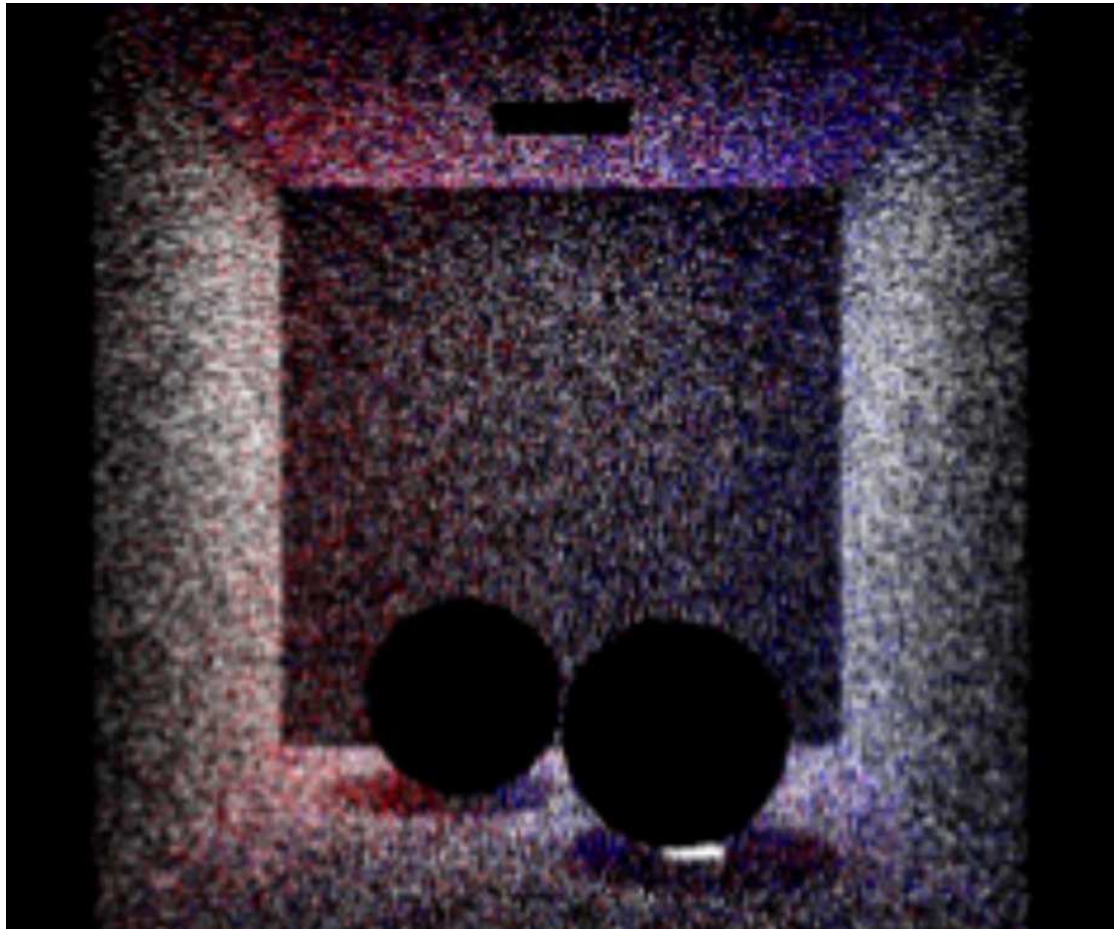
But when do you stop ? How many bounces ?

Each bounce requires additional computation !



Photon Maps

A "map" that captures indirect lighting within a scene



Using Photon Maps

"Photons" are emitted in all directions from a light

These either bounce off surfaces, or are absorbed

(Depending on the nature of the material)

Photon maps record the pattern of this dispersal

These maps can then be used to:

- Improve realism of ambient lighting
- Add special lighting effects such as "caustics"...

Calculating Photon Maps

Photon maps are costly to calculate, however...

They can be pre-computed for a particular scene
(Provided that artefacts & light don't move !)

Then used over again to help render the scene
(Even if the camera is moving)

Photon maps are NOT a flat image
They must be stored in a 3D data structure...

3D KD Tree