

Advanced Computer Graphics Practical Session

Programming Assignment 2

1. Extend code to include objects represented by triangle meshes (reuse prior development)

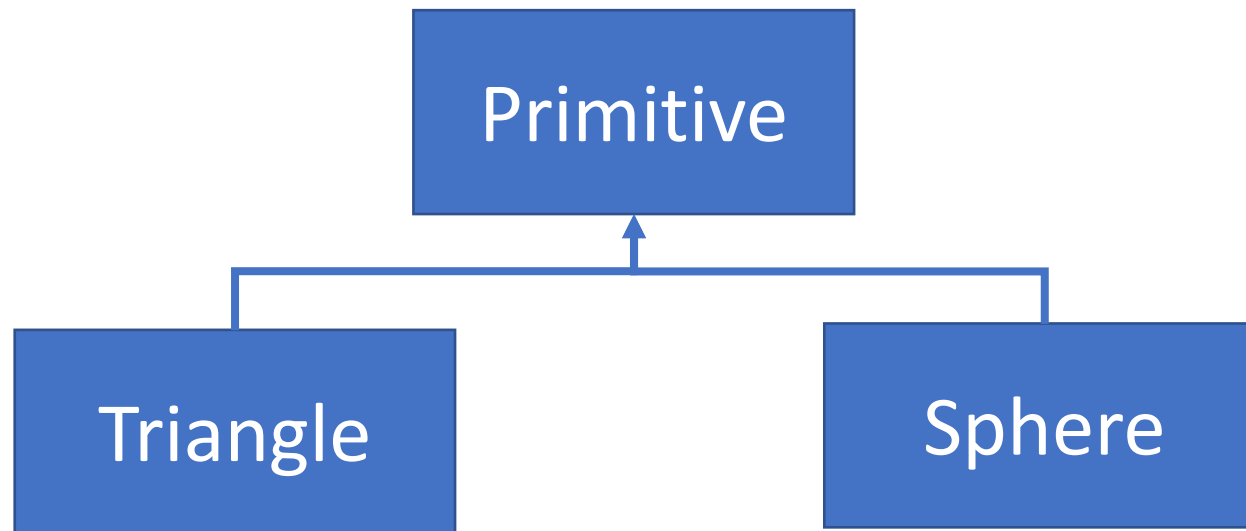
- Struct hierarchy

- Primitive

- Triangle (substruct)

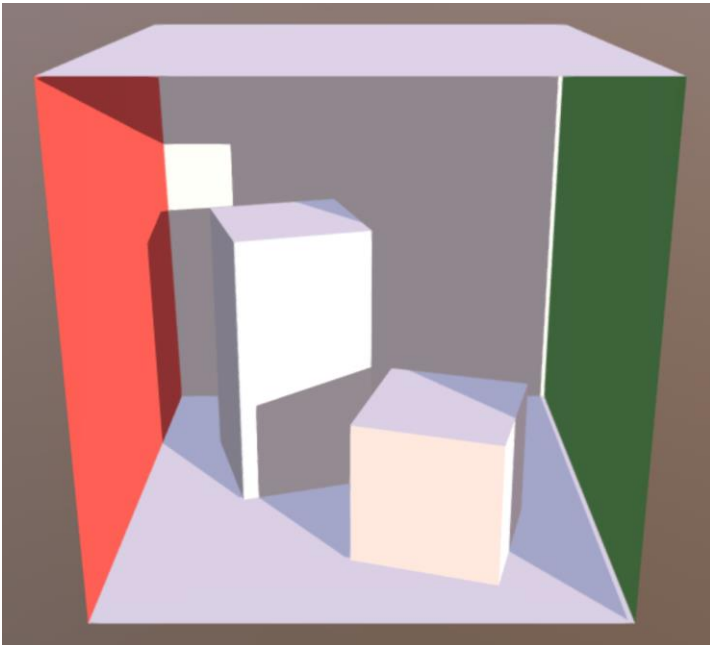
- Reused triangle intersection routine from previous assignment

- Sphere (substruct)



1. Extend code to include objects represented by triangle meshes (reuse prior development)

- Included TinyObjLoader for triangle mesh loading
- Included Cornell box mesh (and 2nd light source) for box-in-box theme

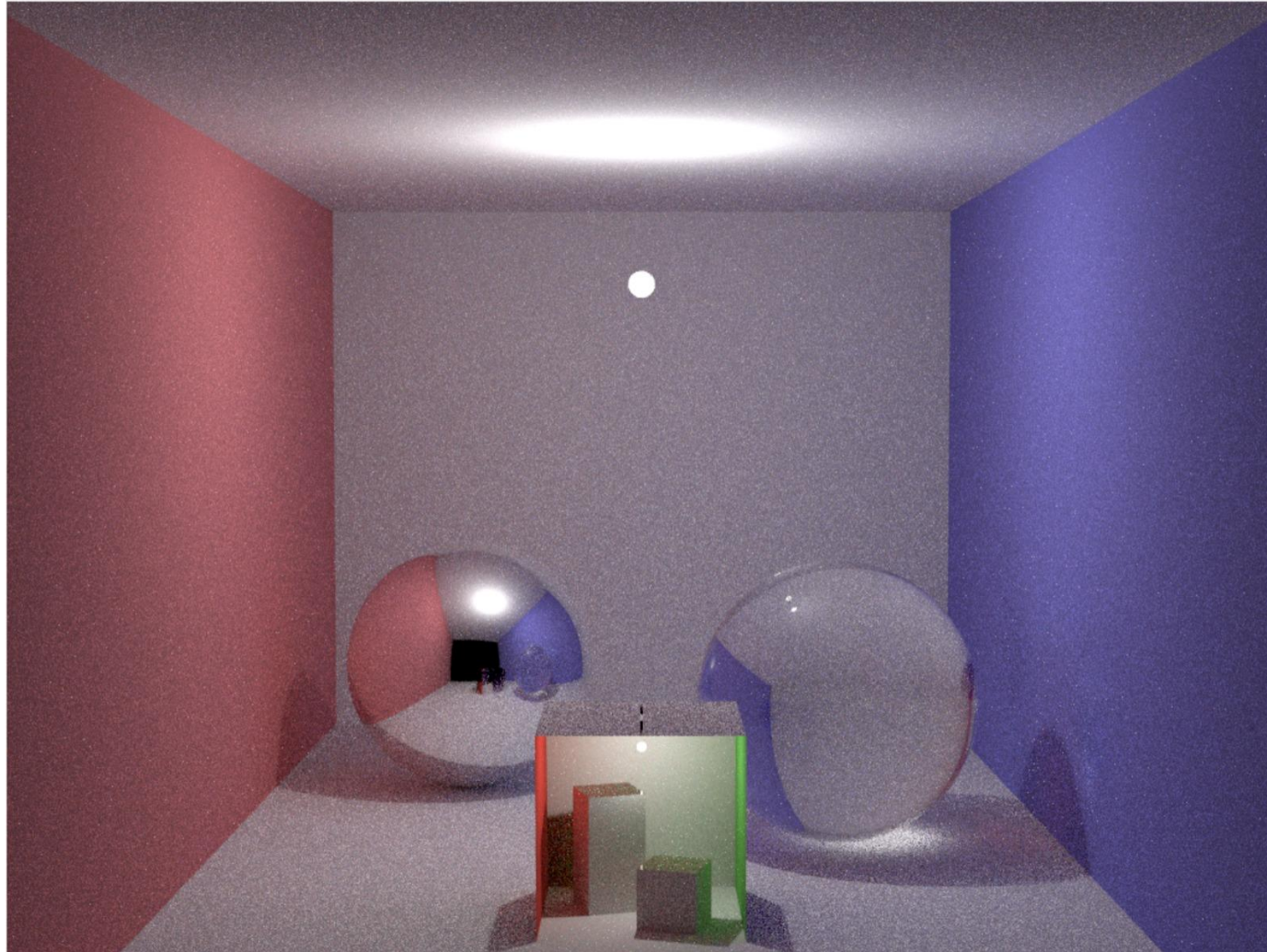


tinyobjloader/
tinyobjloader

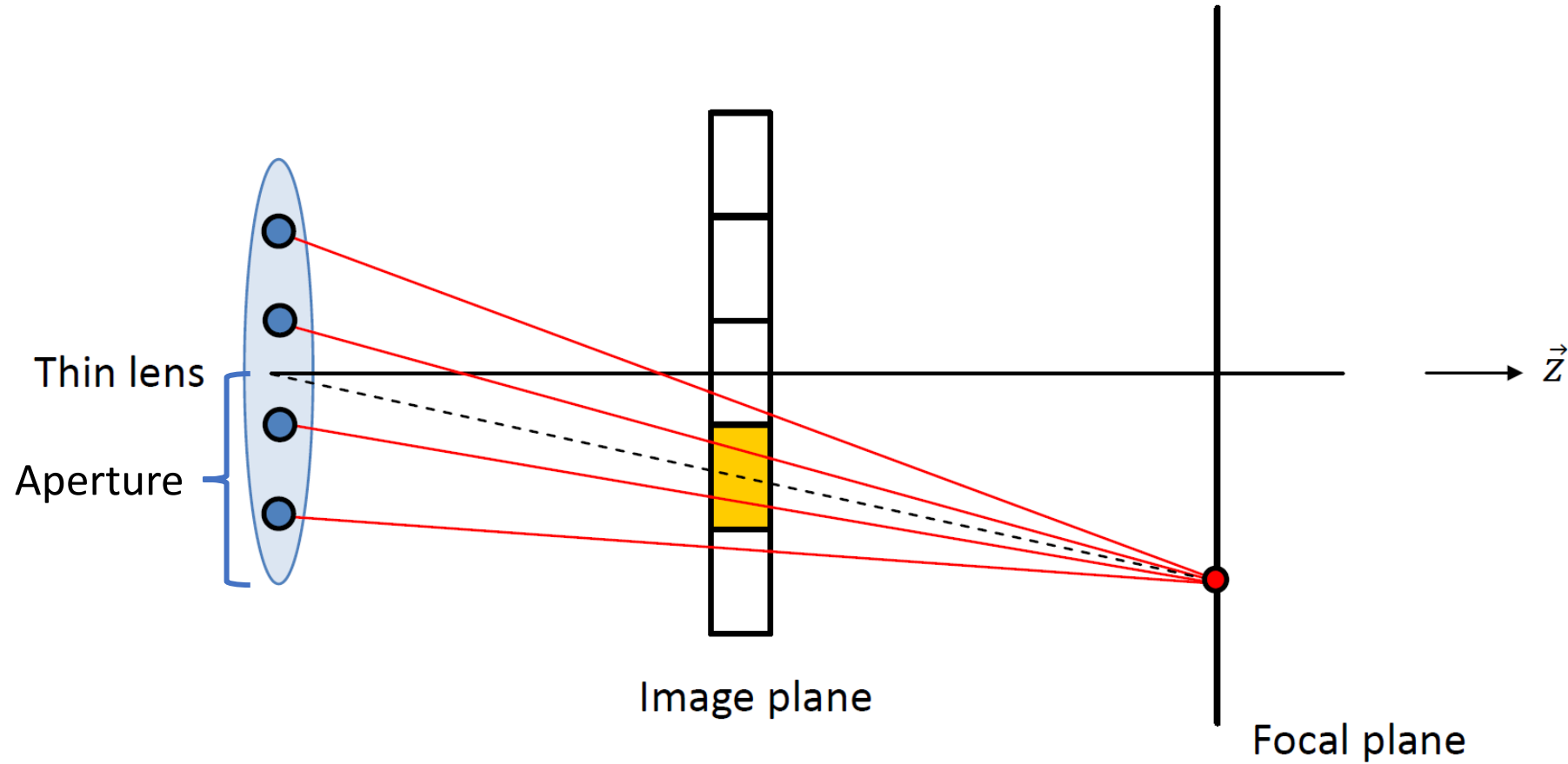
Tiny but powerful single file wavefront obj loader



1. Extend code to include objects represented by triangle meshes
(reuse prior development)

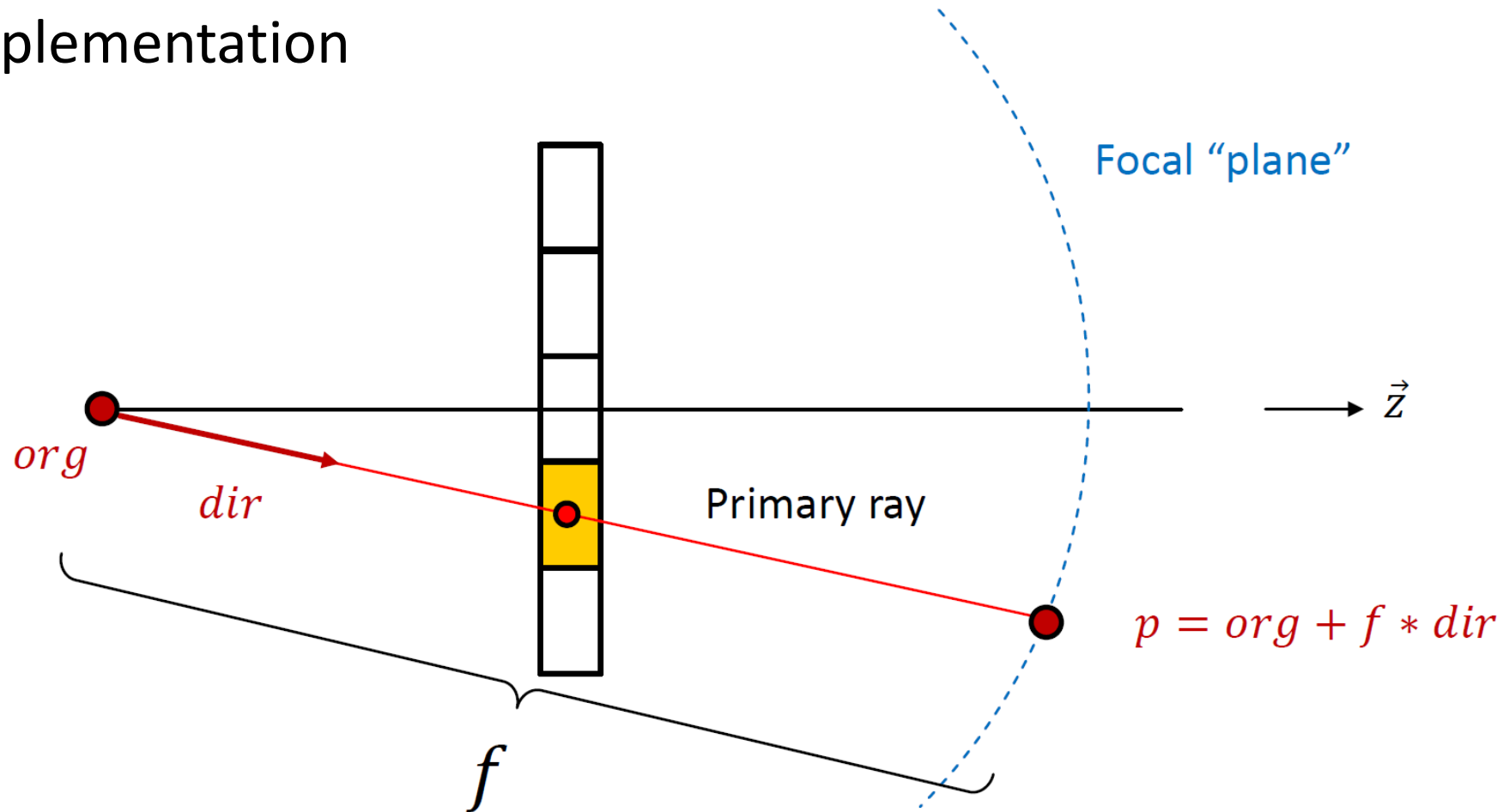


2. Simulate a thin lens, and thus depth of field effects



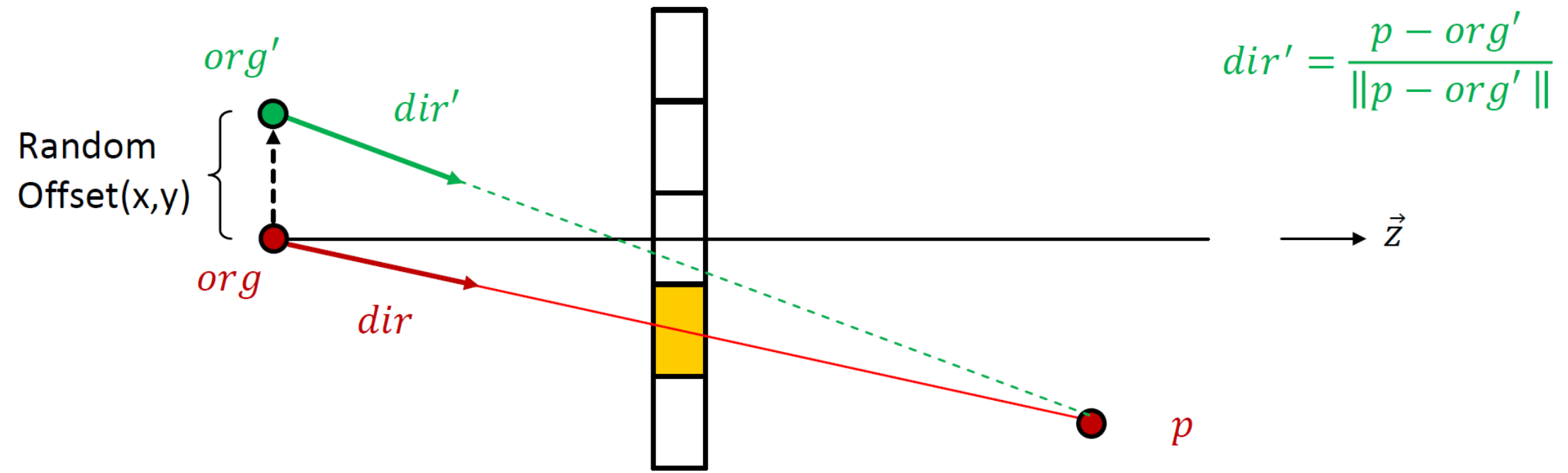
2. Simulate a thin lens, and thus depth of field effects

- Implementation



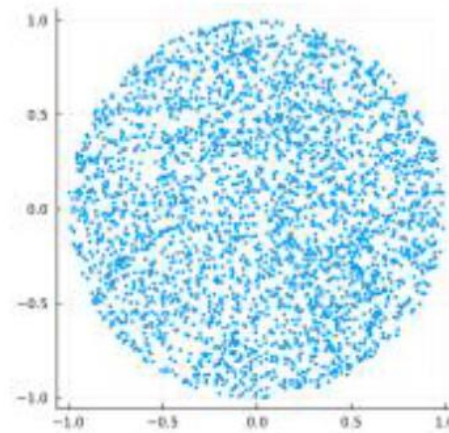
2. Simulate a thin lens, and thus depth of field effects

- Implementation

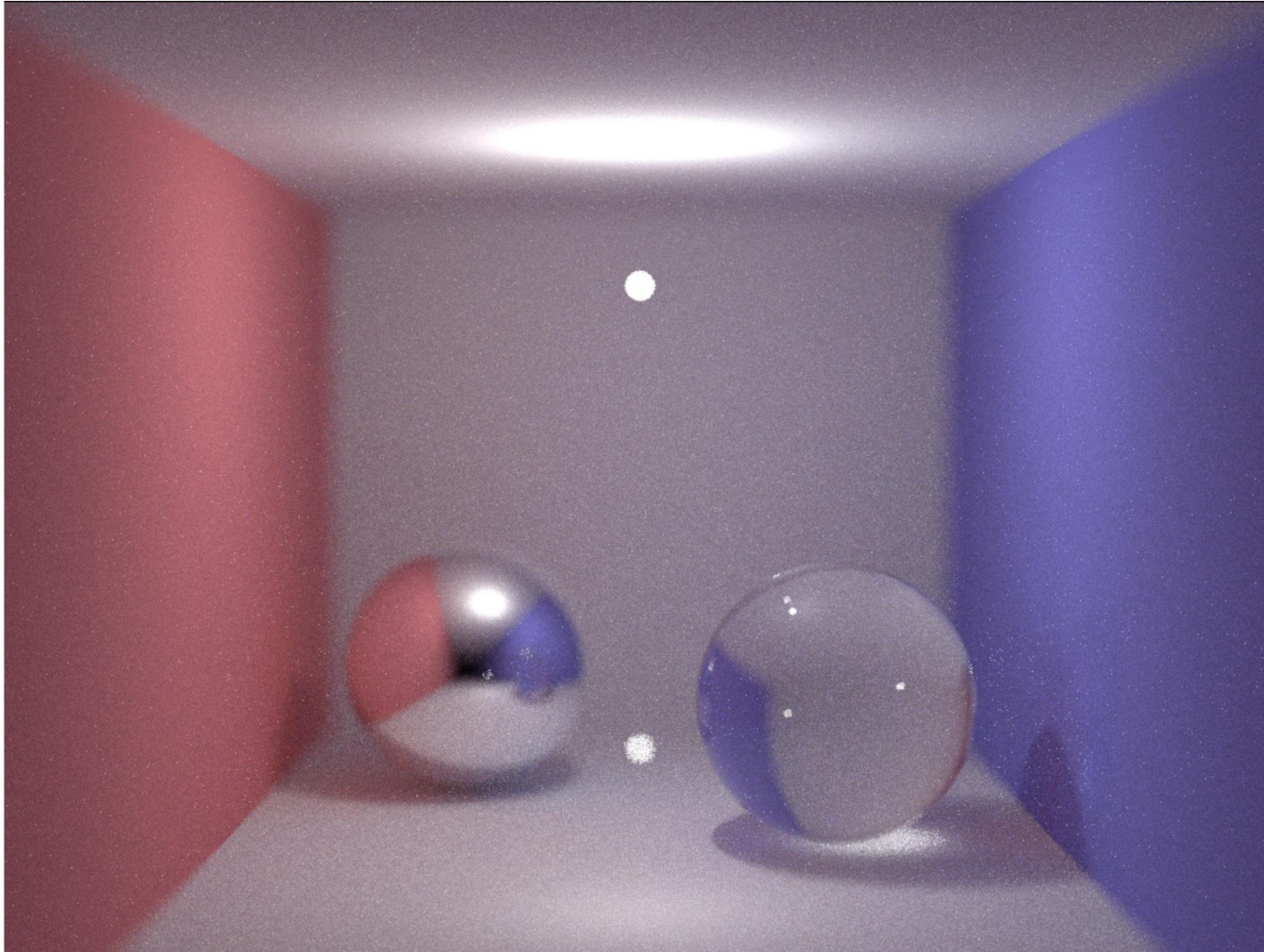


2. Simulate a thin lens, and thus depth of field effects

- Sampling strategy: 2D disk
- Points uniformly distributed across the lense/disk

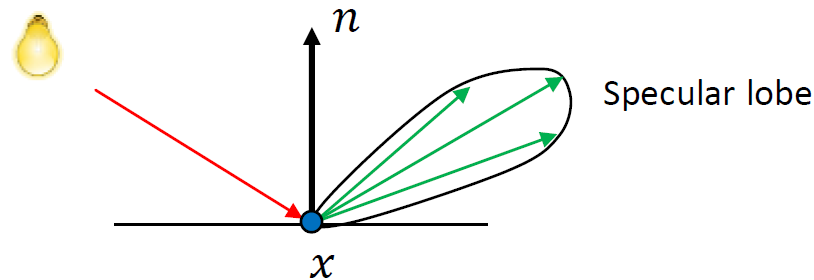


2. Simulate a thin lens, and thus depth of field effects



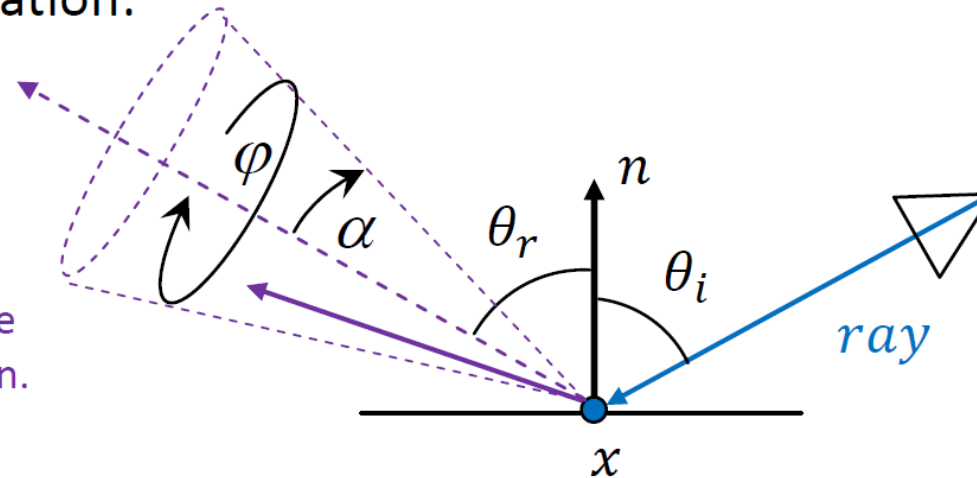
3. Include glossy and translucent materials (i.e. beyond perfect specular reflection/transmission)

Glossy material (specular)



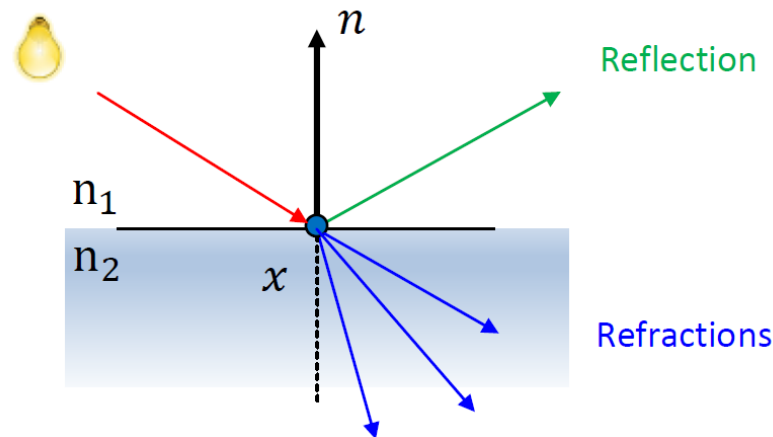
Ray bounce implementation:

Reflected ray:
Random vector in a cone
around perfect reflection.
Define by (φ, α)
Or fraction Hemisphere

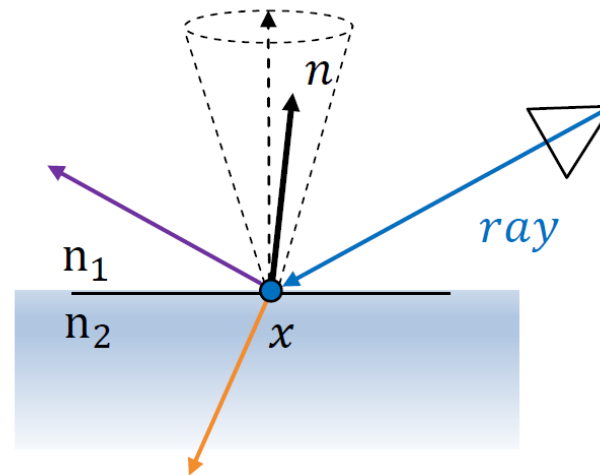


3. Include glossy and translucent materials (i.e. beyond perfect specular reflection/transmission)

Translucent material



Ray bounce implementation:



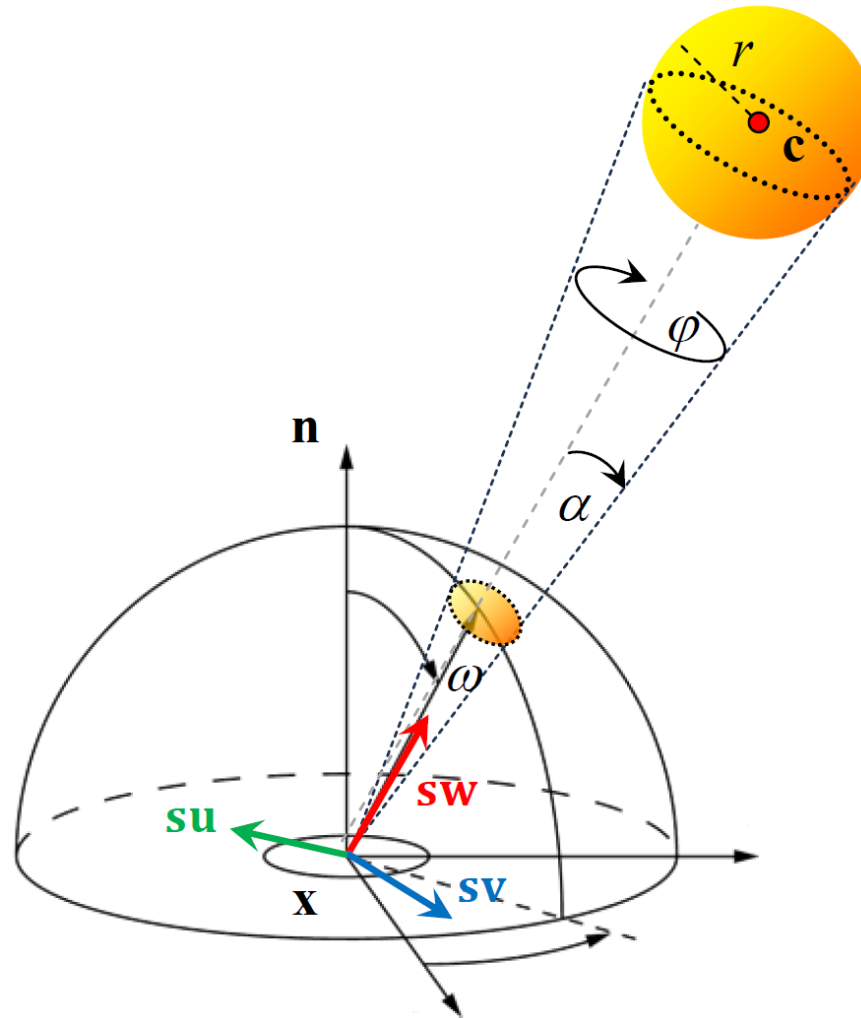
Option 2: use a random normal vector in a cone around real normal

3. Include glossy and translucent materials (i.e. beyond perfect specular reflection/transmission)

Uniformly sample

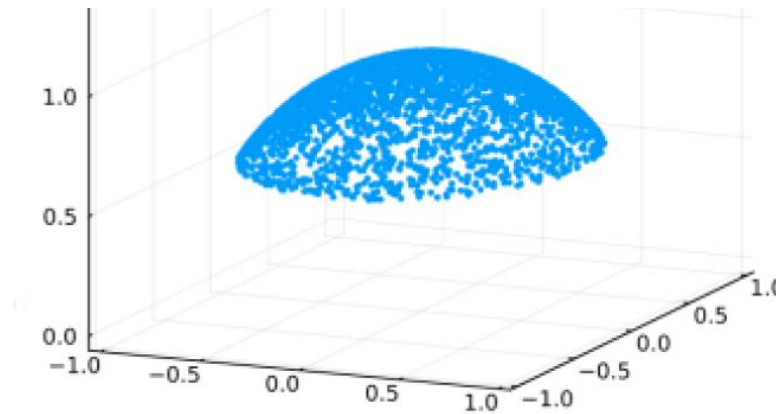
$\varphi \in [0, 2\pi]$ and

$\alpha \in [0, \alpha_{\max}]$

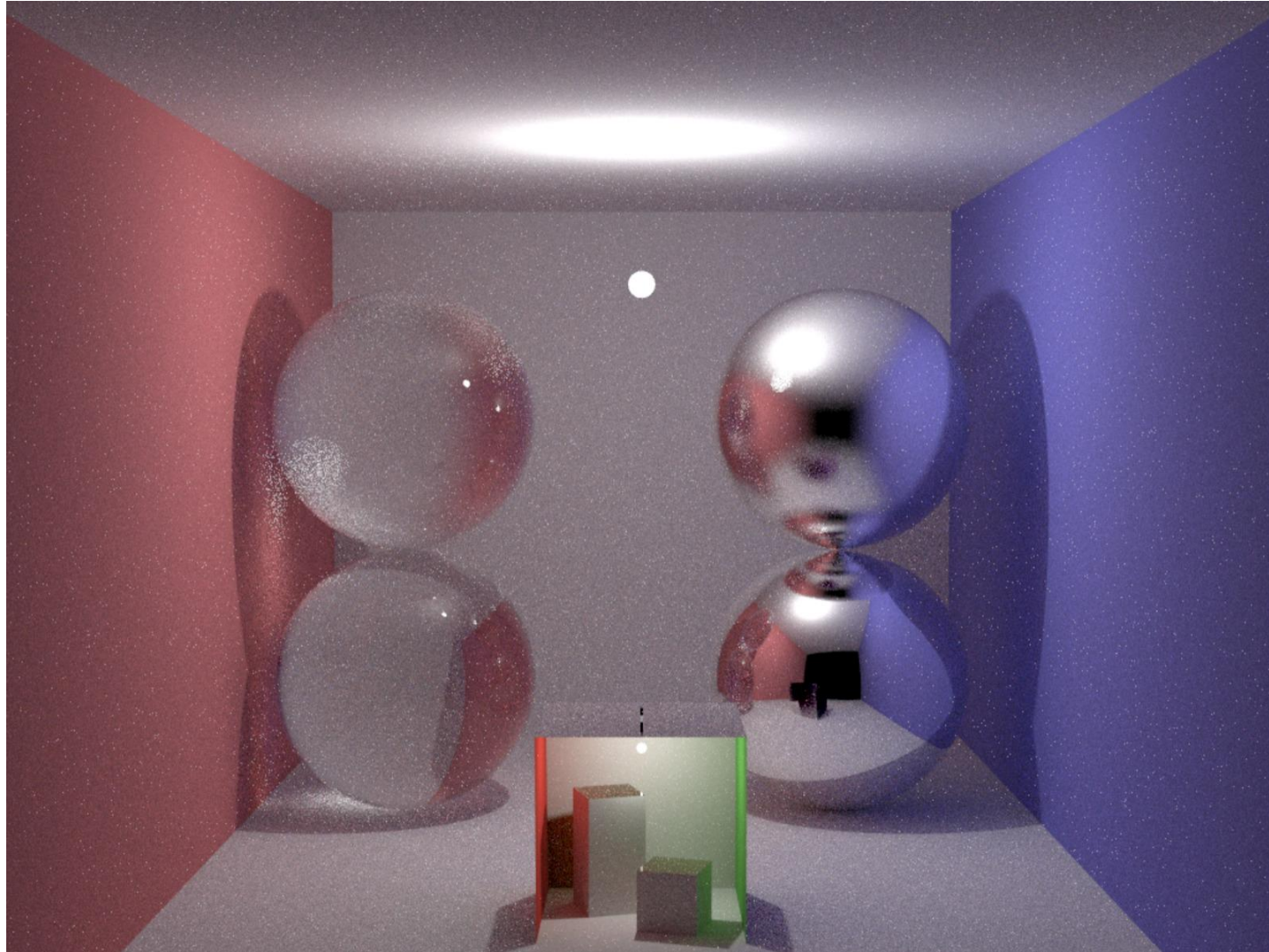


3. Include glossy and translucent materials (i.e. beyond perfect specular reflection/transmission)

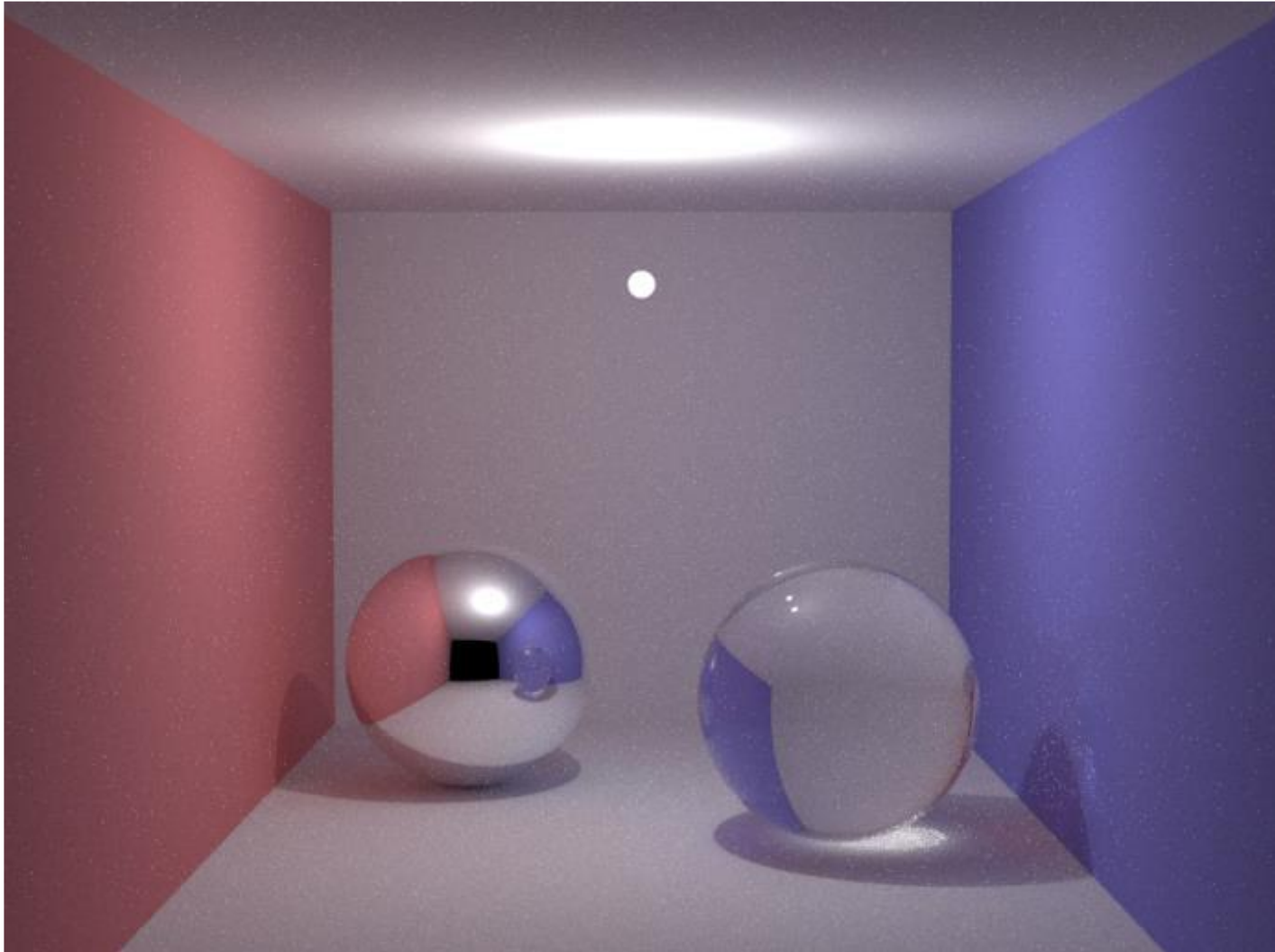
- Sampling strategy: Angular limited, cosine weighted hemisphere



3. Include glossy and translucent materials (i.e. beyond perfect specular reflection/transmission)

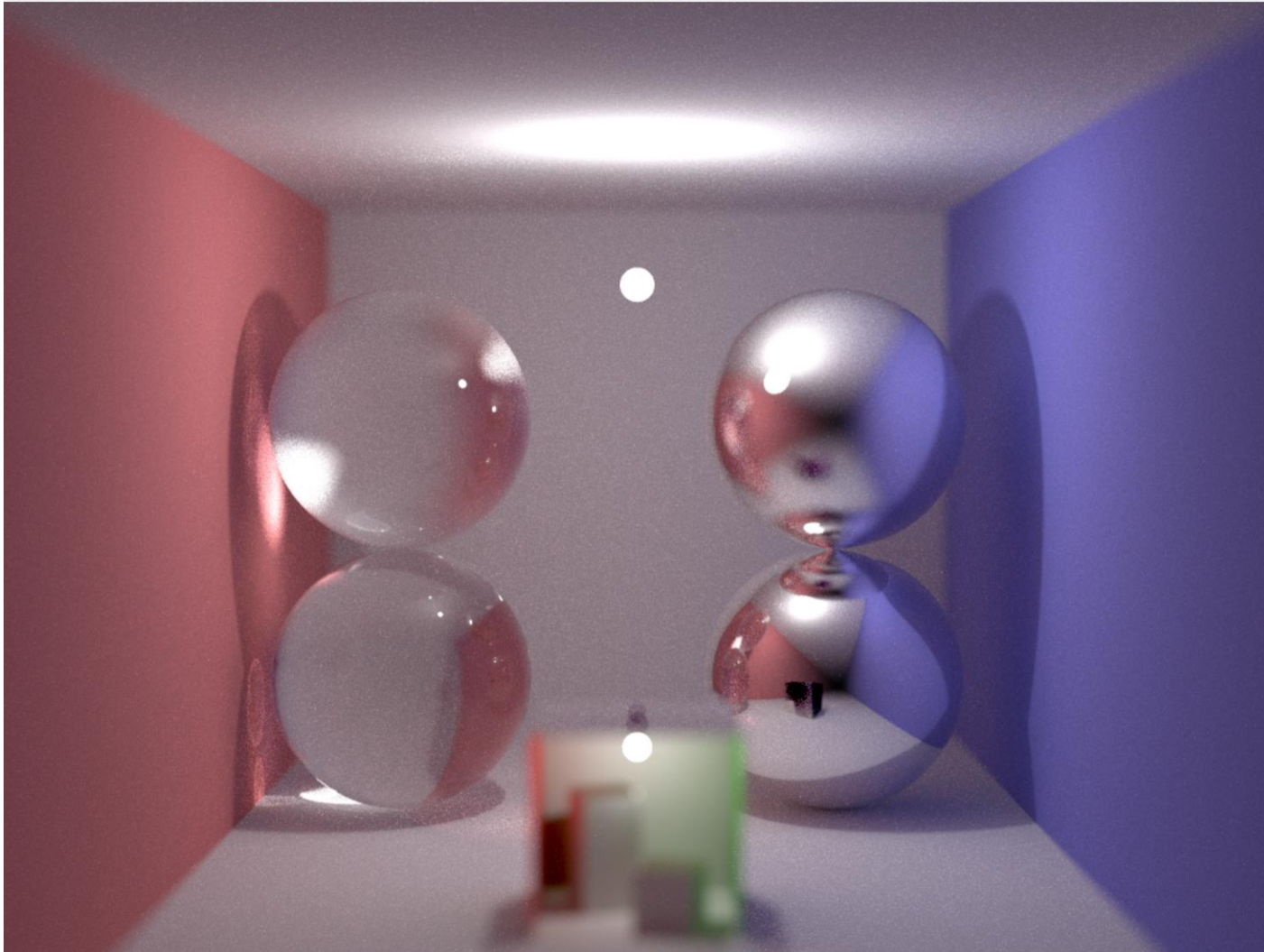


Results



- Given Code

Results



- Our final code with:
 - 12,800 spp
 - ~ 3 days of rendering
- Visible **artifacts** of unknown origin



A short look through our code