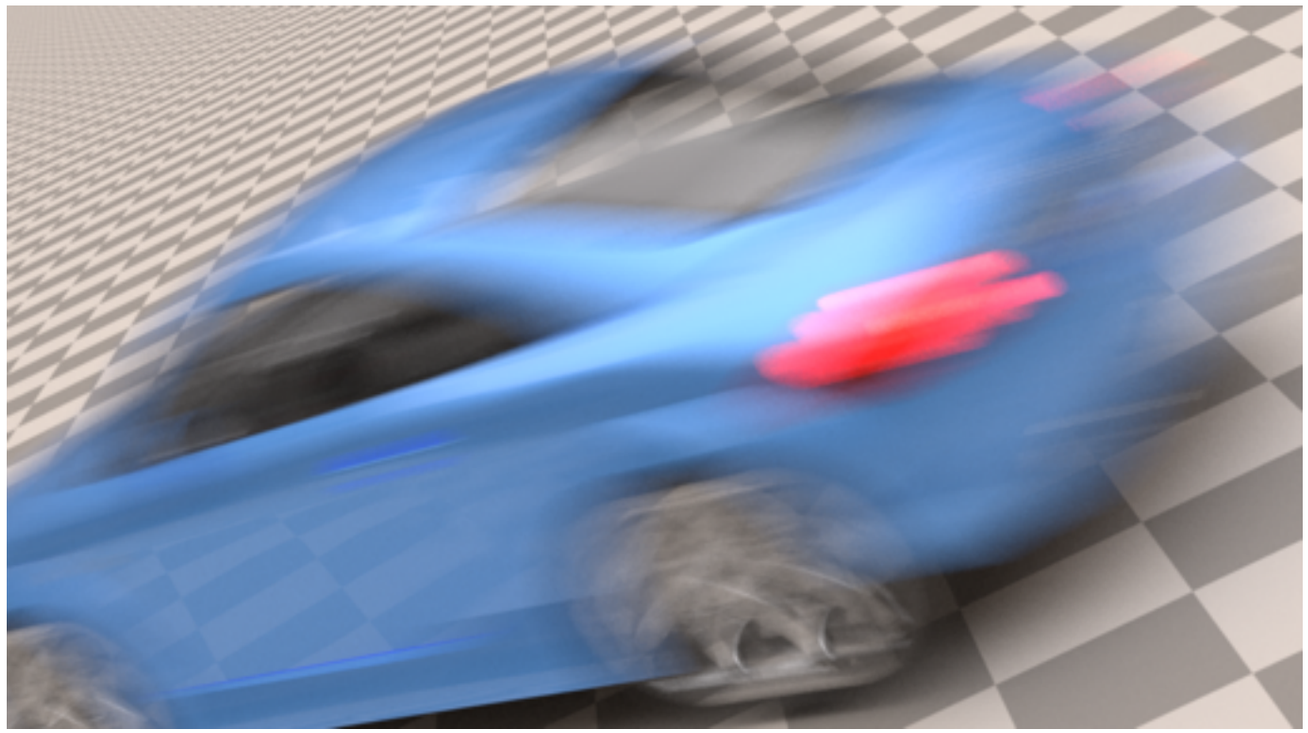
Advanced ray tracing

- Glossy reflections
- Motion blur
- Texturing
- Triangle Meshes
- Depth of field

Glossy reflection (Ch 13.4.4)

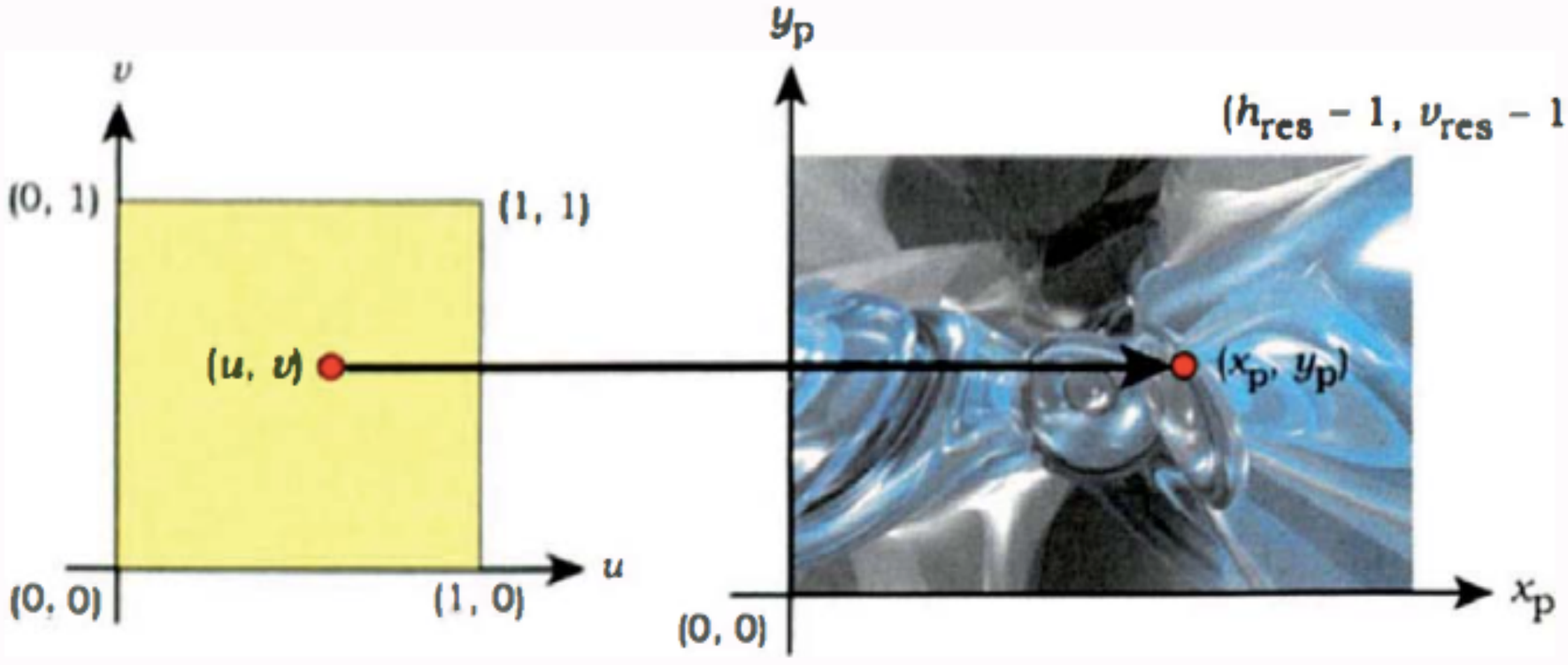
Motion Blur (Ch 13.4.5)



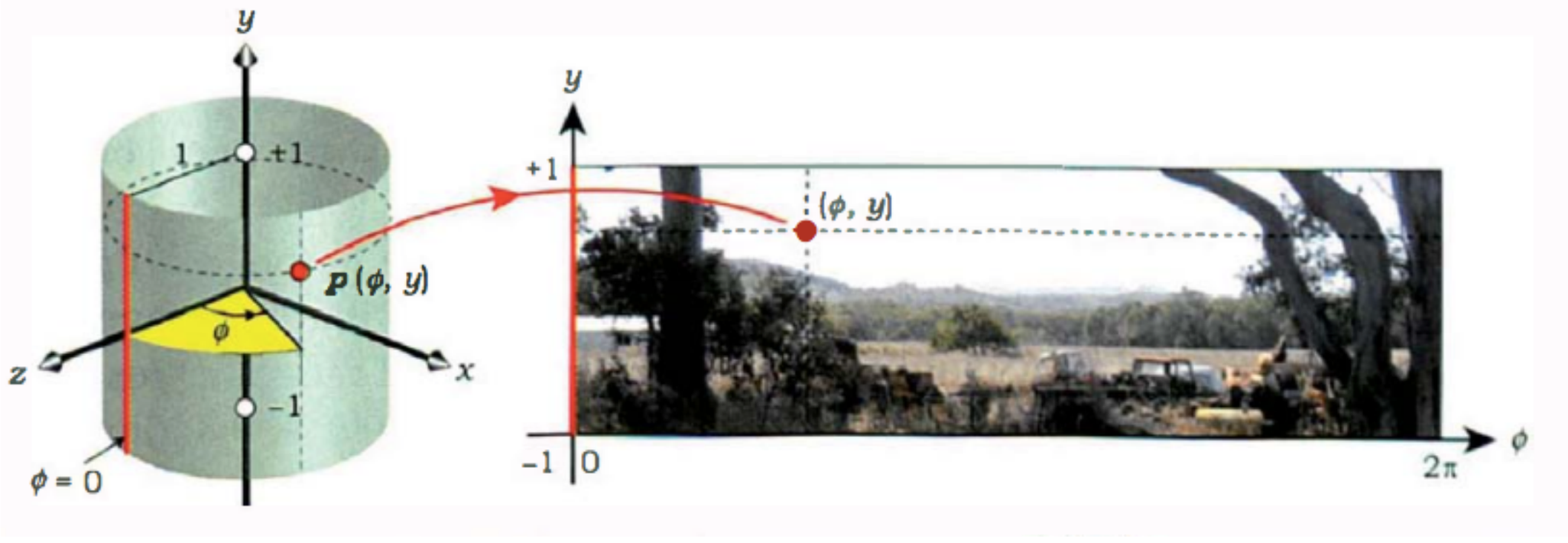
Texturing

- Map 2D images on 3D surfaces
- Mapping process is different for each surface and involves mapping the ray-object hit point to a pixel in the 2D image.

Texturing Planes

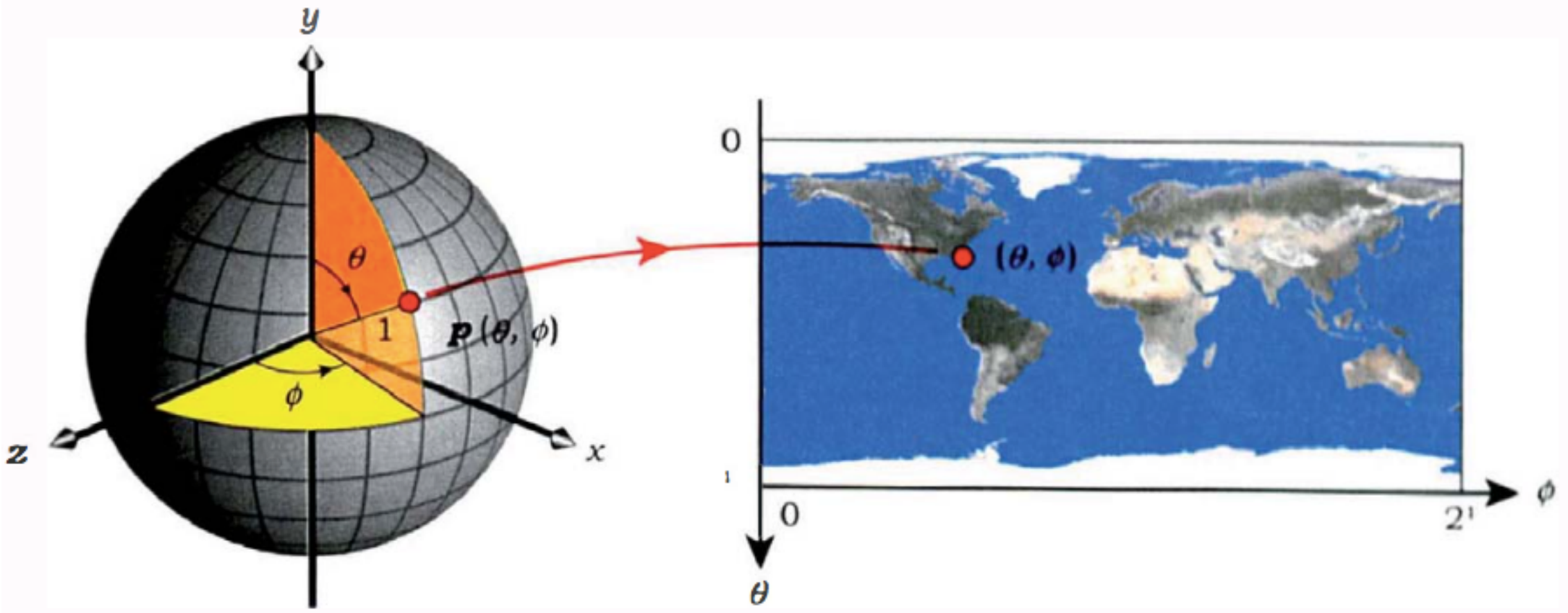


Texturing Cylinder

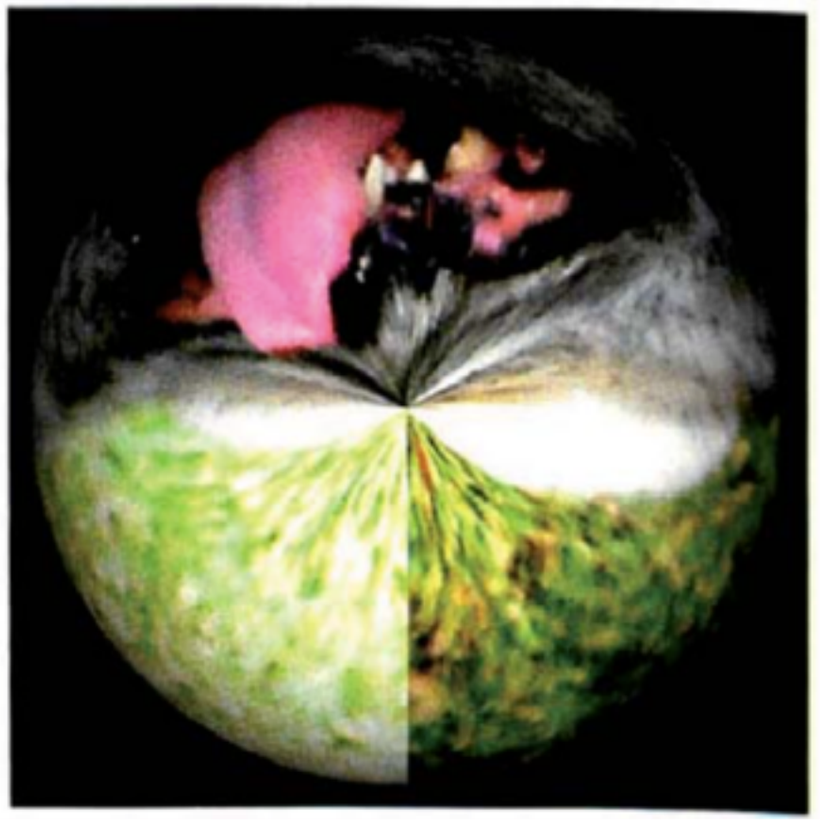


cylinder(r, a, t) = (x,y,z) = (r*sin(a), t, r*cos(a))

Texturing Sphere



sphere(r, a, b) = (x,y,z) =
(r*cos(a)*cos(b), r*cos(b), r*sin(a)*sin(b))



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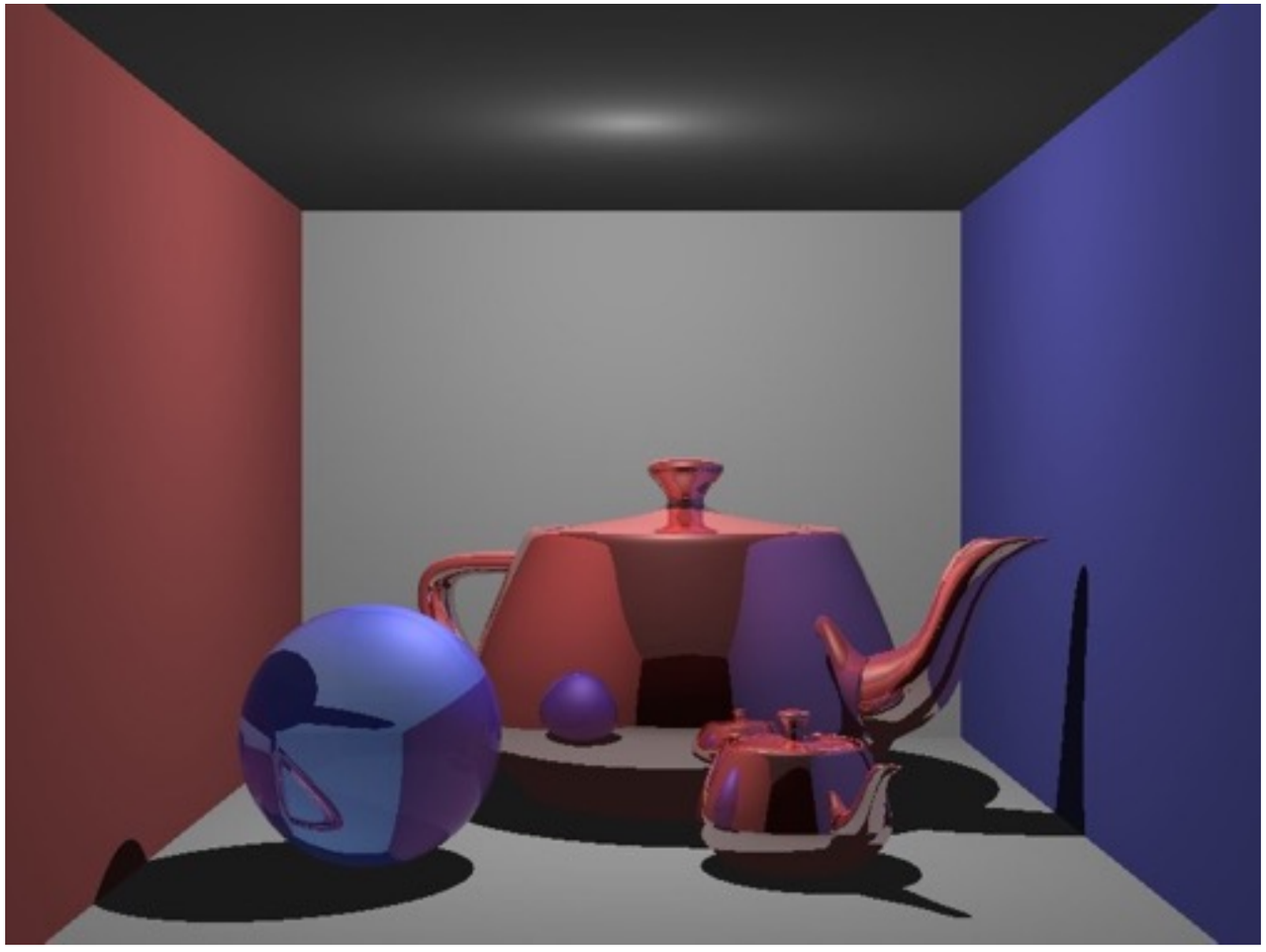
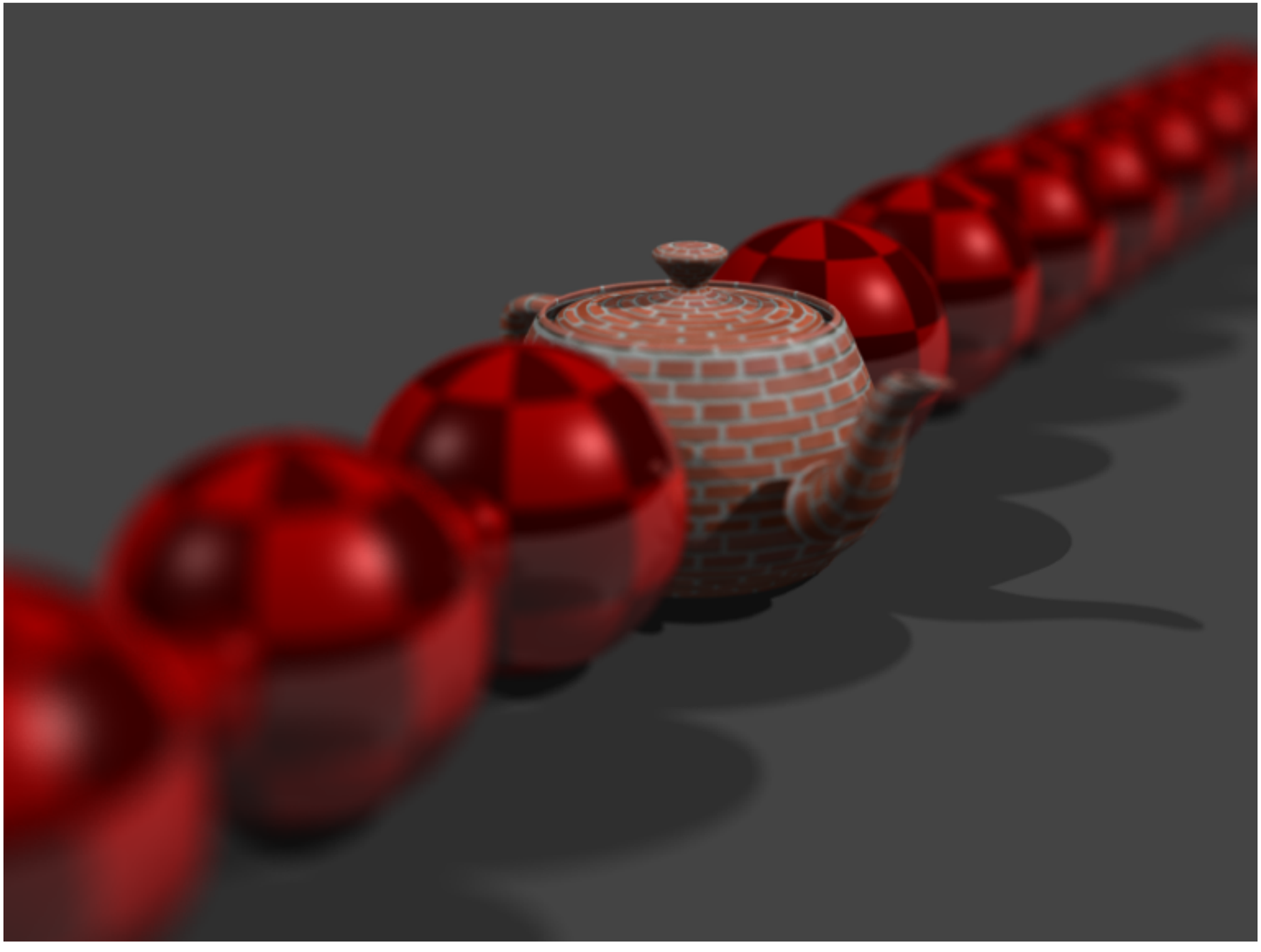
Raytracing Triangle Meshes

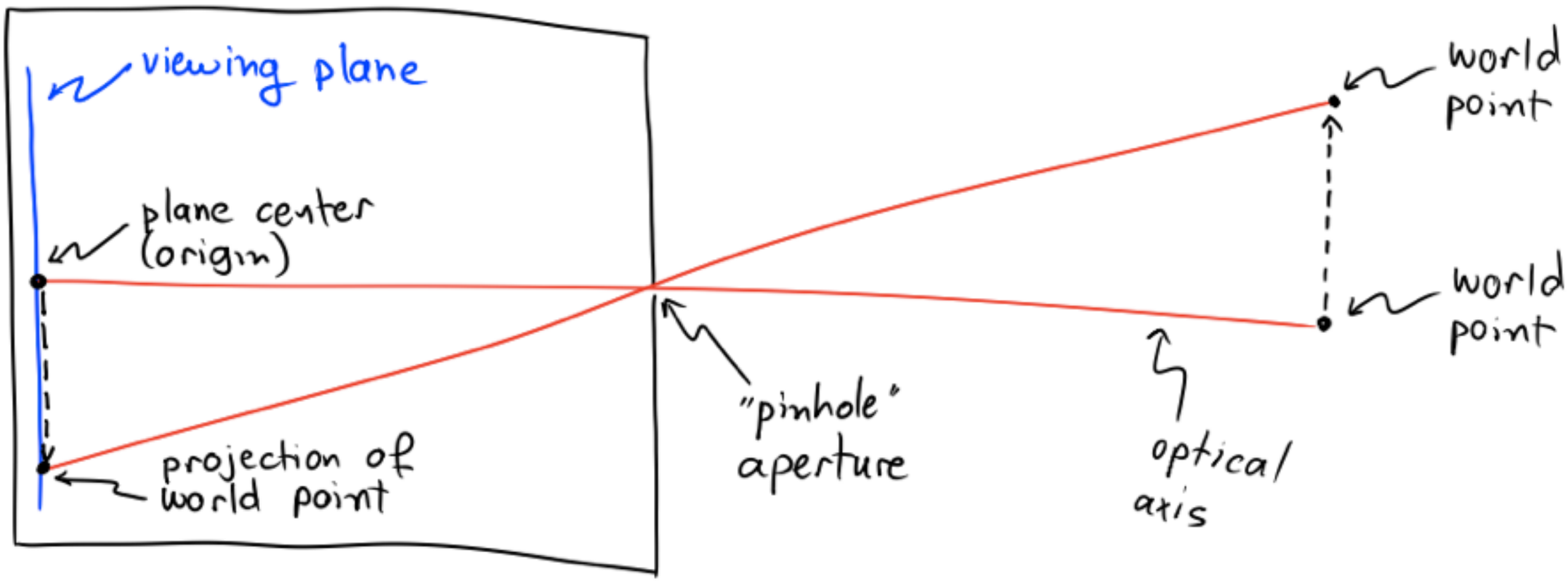
- Ray trace each triangle individually.
- Store per vertex normals for each triangle.
- Interpolate normals to get a normal at intersection.
- **Will need to implement loading of OBJ or PLY files**



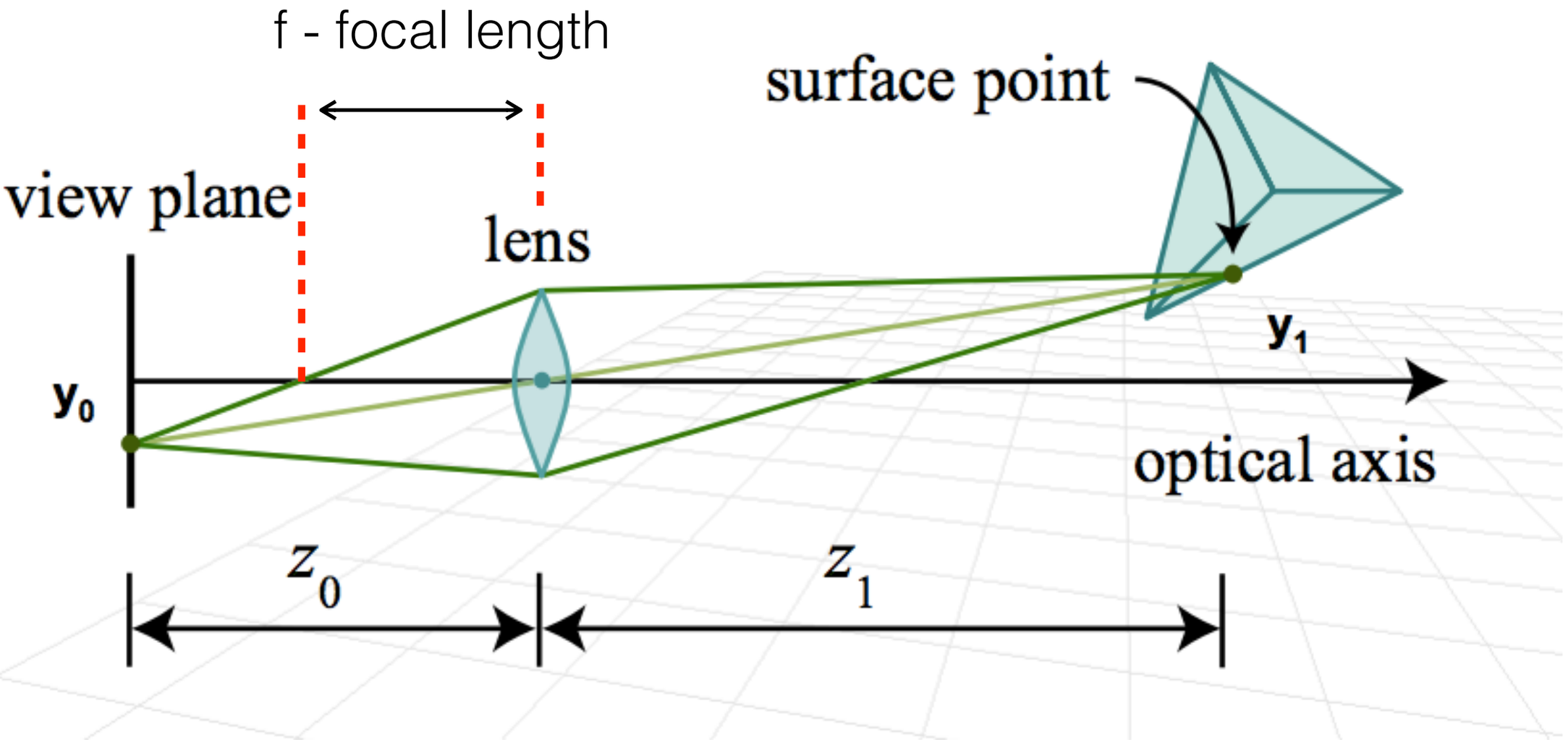
Depth of field



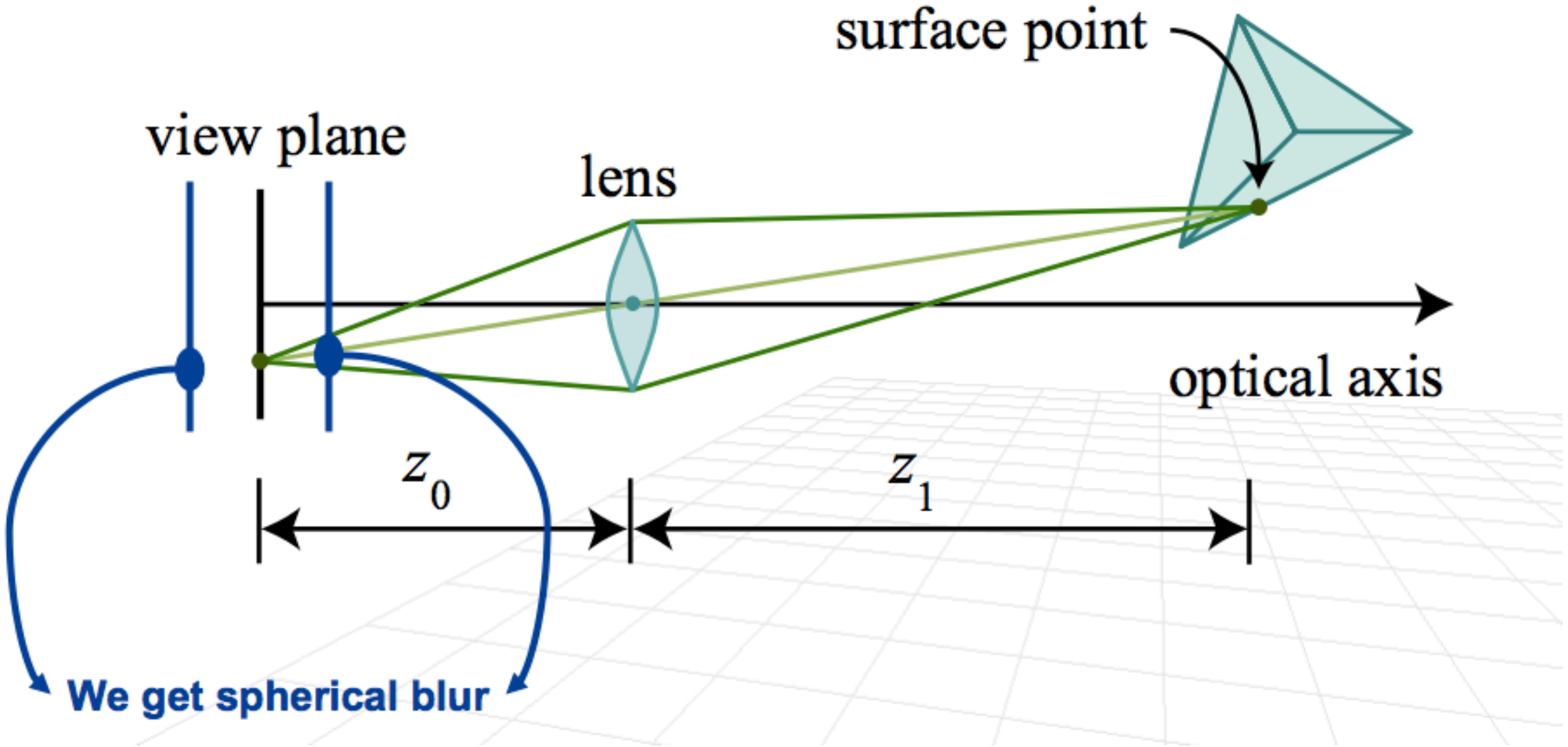
Pin hole camera



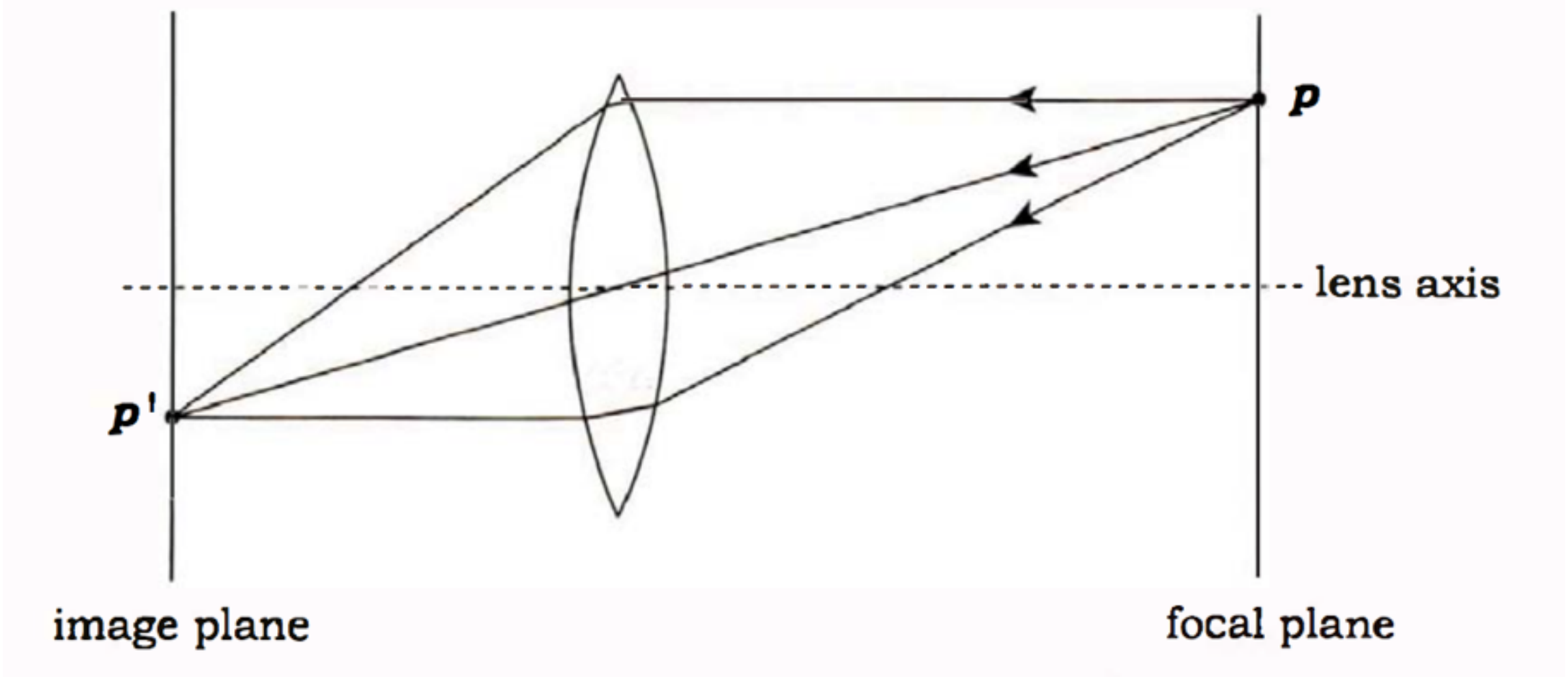
Thin lens camera



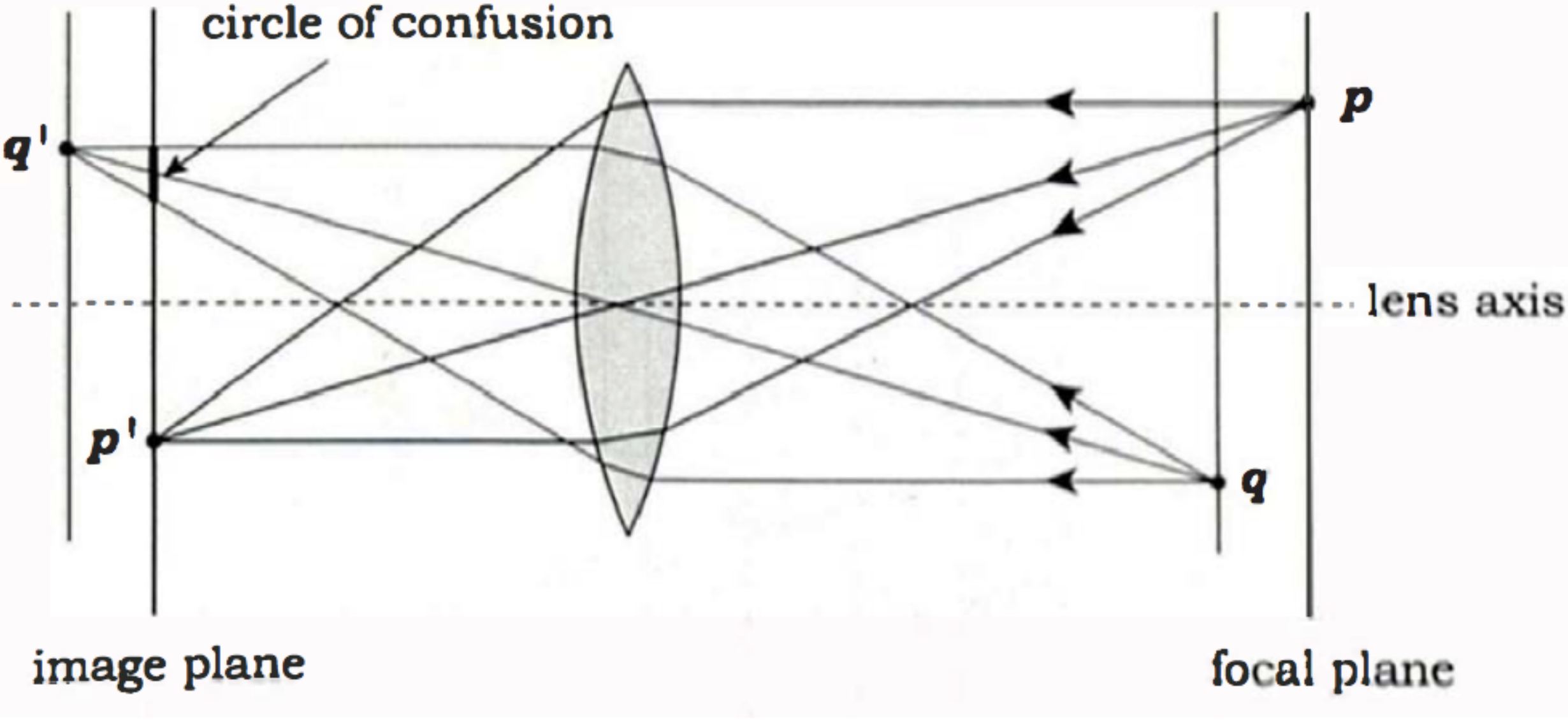
Thin lens camera



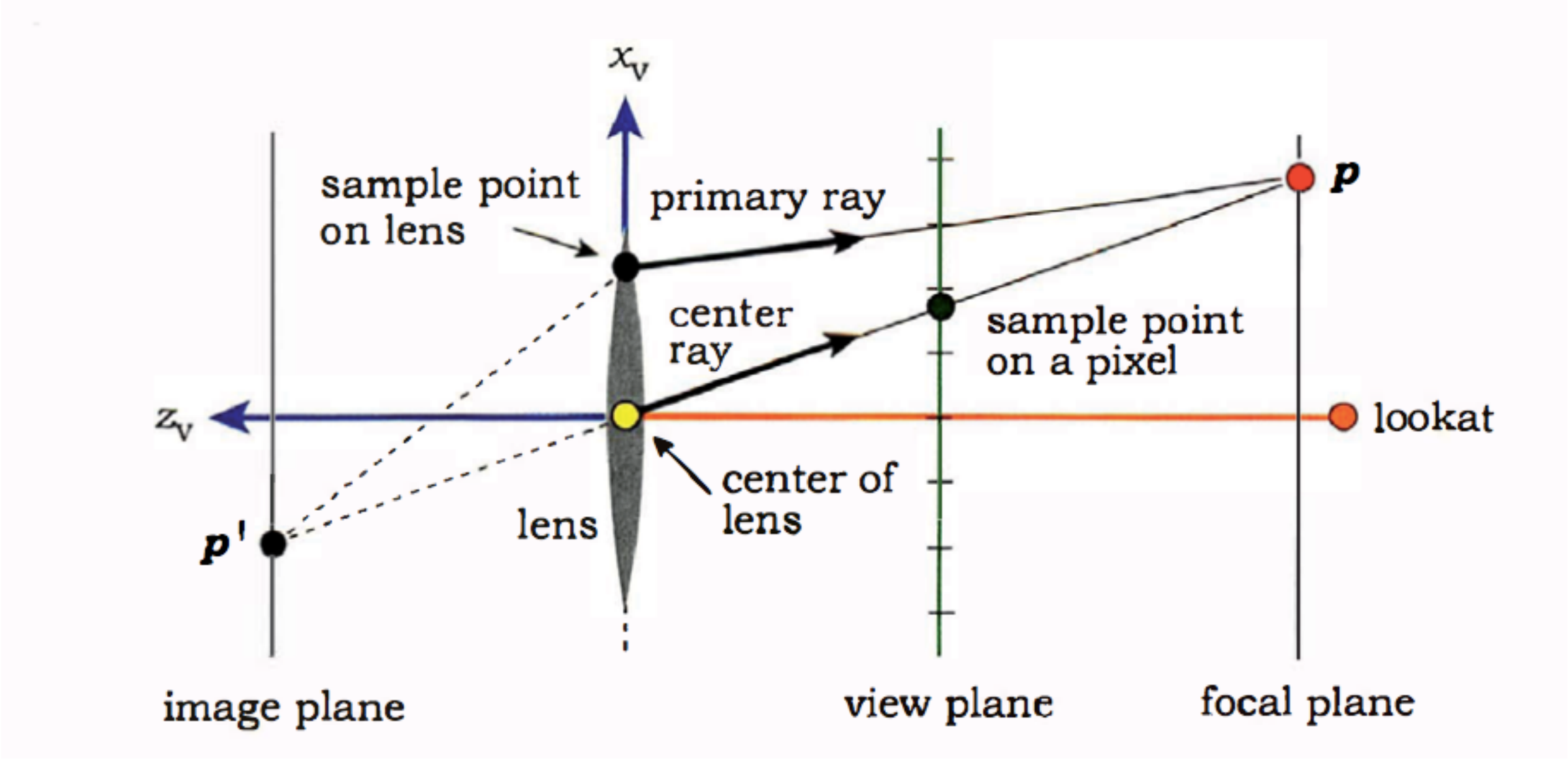
Thin lens camera



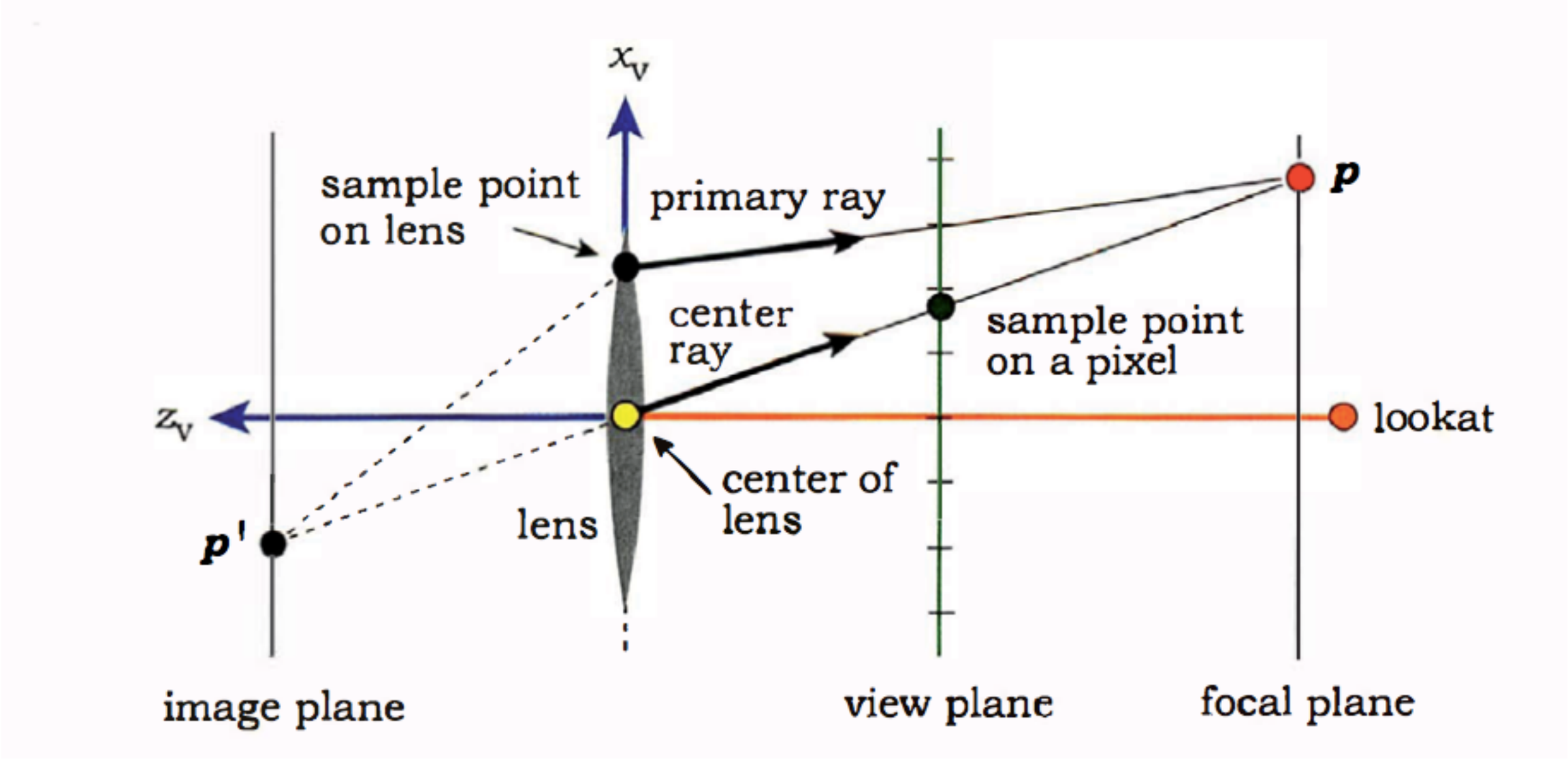
Thin lens camera



Simulate Depth of Field



Simulate Depth of Field



Simulate Depth of Field

- Compute the point **P** where centre ray hits the focal plane

- Use **P** and the sample point on the lens to compute the direction of the primary ray so that this ray also goes through **P**

- Ray trace the primary ray into the scene

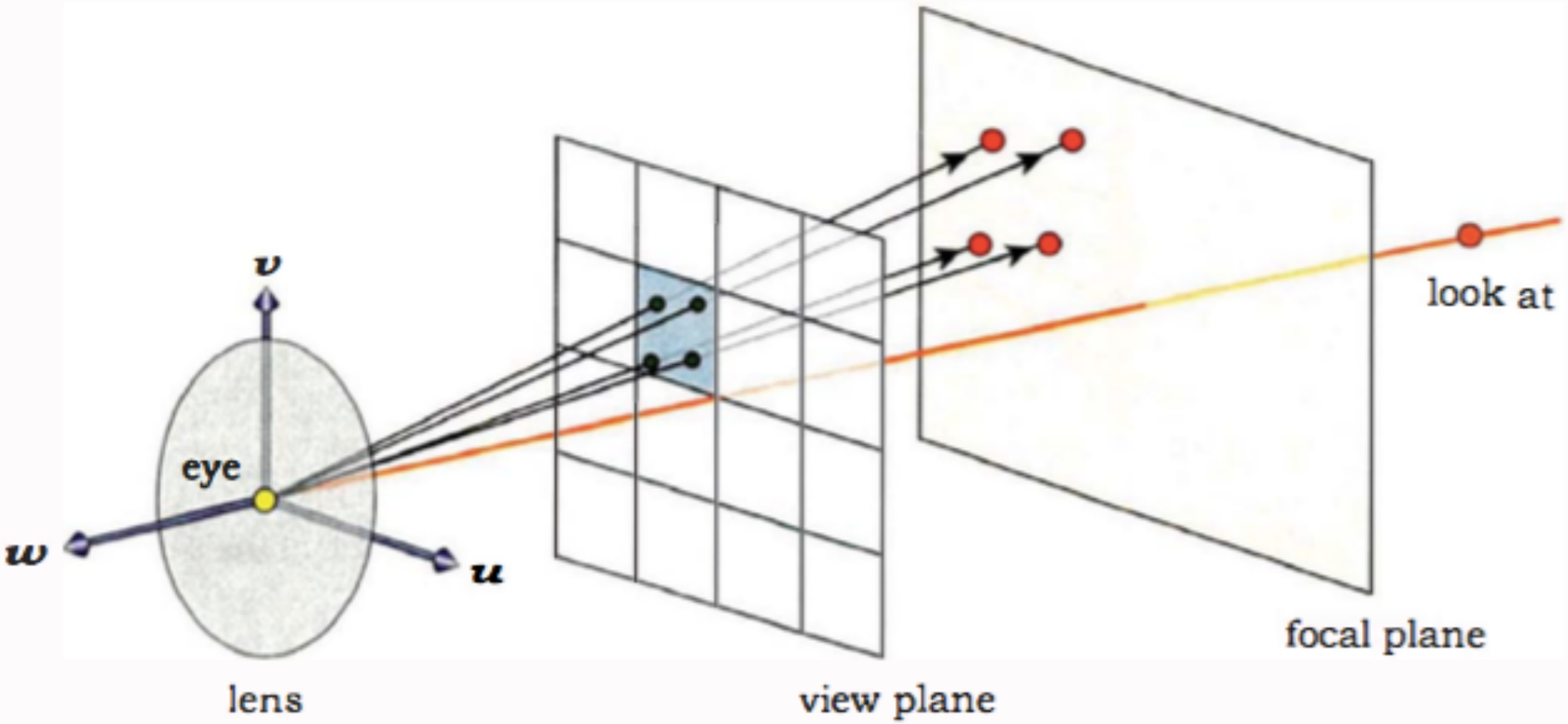


Figure 10.6. Four center rays go through different sample points on a pixel.