# Homework 2 – Foundation of Computer Graphics

*Edoardo Papa – 1962169*

- **Refraction extra credit:**

To do this point I added particular code lines for each following function:

- `eval_bsdfcos`

```
  // Evaluate refractive
  if (material.type == material_type::refractive) {
    return eval_refractive(material.color, material.ior,
                                material.roughness,
        normal, outgoing, incoming);
  }
```

- `eval_delta`

```
  if (material.type == material_type::refractive) {
    return eval_refractive(
        material.color, material.ior, normal, outgoing, incoming);
  }
```

- `sample_bsdfcos`

```
  // Evaluate refractive
  if (material.type == material_type::refractive) {
    return sample_refractive(material.color, material.ior,
material.roughness,
        normal, outgoing, rnl, rn);
  }
```

- `sample_delta`

```
    if (material.type == material_type::refractive) {
      return sample_refractive(
          material.color, material.ior, normal, outgoing, rnl);
    }
```

- `sample_bsdfcos_pdf`

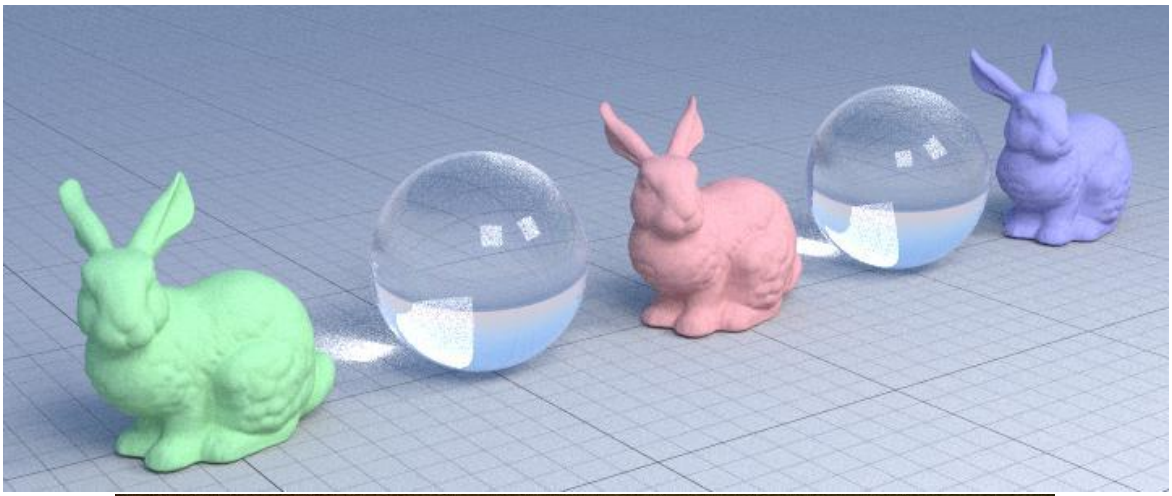
```
  if (material.type == material_type::refractive) {
    return sample_refractive_pdf(
        material.color, material.roughness, material.ior, normal,
outgoing, incoming);
  }
```

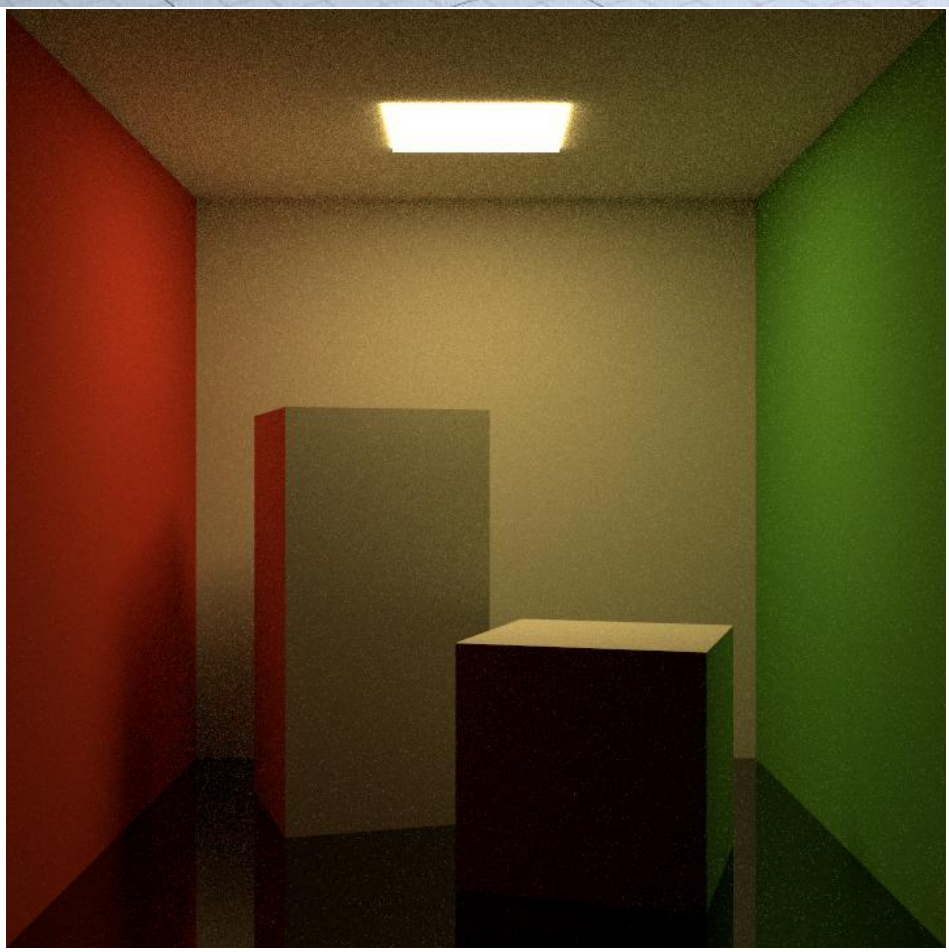
- `sample_delta_pdf`

```
  if (material.type == material_type::refractive) {
    return sample_refractive_pdf(
        material.color, material.ior, normal, outgoing, incoming);
  }
```

All the information for doing it was on the slides given by the professor and on the yocto documentation.

**RESULT:**





**SCRIPT FOR TEST IT:**

*./bin/ypathtrace --scene tests/05_glass_refractive/glass.json --output out/path/05_glass_refractive_720_256.jpg --shader pathtrace --samples 256 --resolution 720 --bounces 8*

*./bin/ypathtrace --scene tests/01_cornellbox_refractive/cornellbox.json --output out/path/01_cornellbox_refractive_s512_r1024.jpg --shader pathtrace --samples 512 --resolution 1024 --bounces 8*

- **Large Scenes extra credit:**

To done this point I download the large scenes provided by Professor and put them inside the tests/ folder.

After that I've execute the following script:

*./bin/ypathtrace --scene tests/sanmiguel/sanmiguel.json --output out/path/sanmiguel_s1024_r1280.jpg --shader pathtrace --samples 1024 --resolution 1280 --bounces 8*

*./bin/ypathtrace --scene tests/bistroexterior/bistroexterior.json --output out/path/bistroexterior_s1024_r1280.jpg --shader pathtrace --samples 1024 --resolution 1280 --bounces 8*

*./bin/ypathtrace --scene tests/bistrointerior/bistrointerior.json --output out/path/bistrointerior_s1024_r1280.jpg --shader pathtrace --samples 1024 --resolution 1280 --bounces 8*

*./bin/ypathtrace --scene tests/classroom/classroom.json --output out/path/classroom_s1024_r1280.jpg --shader pathtrace --samples 1024 --resolution 1280 --bounces 8*

*./bin/ypathtrace --scene tests/landscape/landscape.json --output out/path/landscape_s1024_r1280.jpg --shader pathtrace --samples 1024 --resolution 1280 --bounces 8*

All the images generated have a resolution as 1280 with 1024 samples.

**RESULT**:


12345
678910
Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz

- **MYOS extra credit:**

To done this point I've searched and downloaded 3d models from these sites:

- sketchfab.com
- cgtrader.com
- free3d.com

All the models downloaded were of the .gltf format. Subsequently through the use of the Blender software I converted these files from .gltf to .ply. After that I've searched online an image for the texture of the floor.

At this point, I made a json manually adding the texture, the .ply files and the position of the objects. I've use an additional software for make a rotation of the objects: [https://www.redcrab-software.com/en/Calculator/3x3/Matrix/Rotation-XYZ](https://www.redcrab-software.com/en/Calculator/3x3/Matrix/Rotation-XYZ)

**SCRIPT FOR TEST IT:**

*./bin/ypathtrace --scene tests/MYOS/myos.json --output out/path/myos.jpg --shader pathtrace --samples 1024 --resolution 1024 --bounces 8*

**RESULT:**