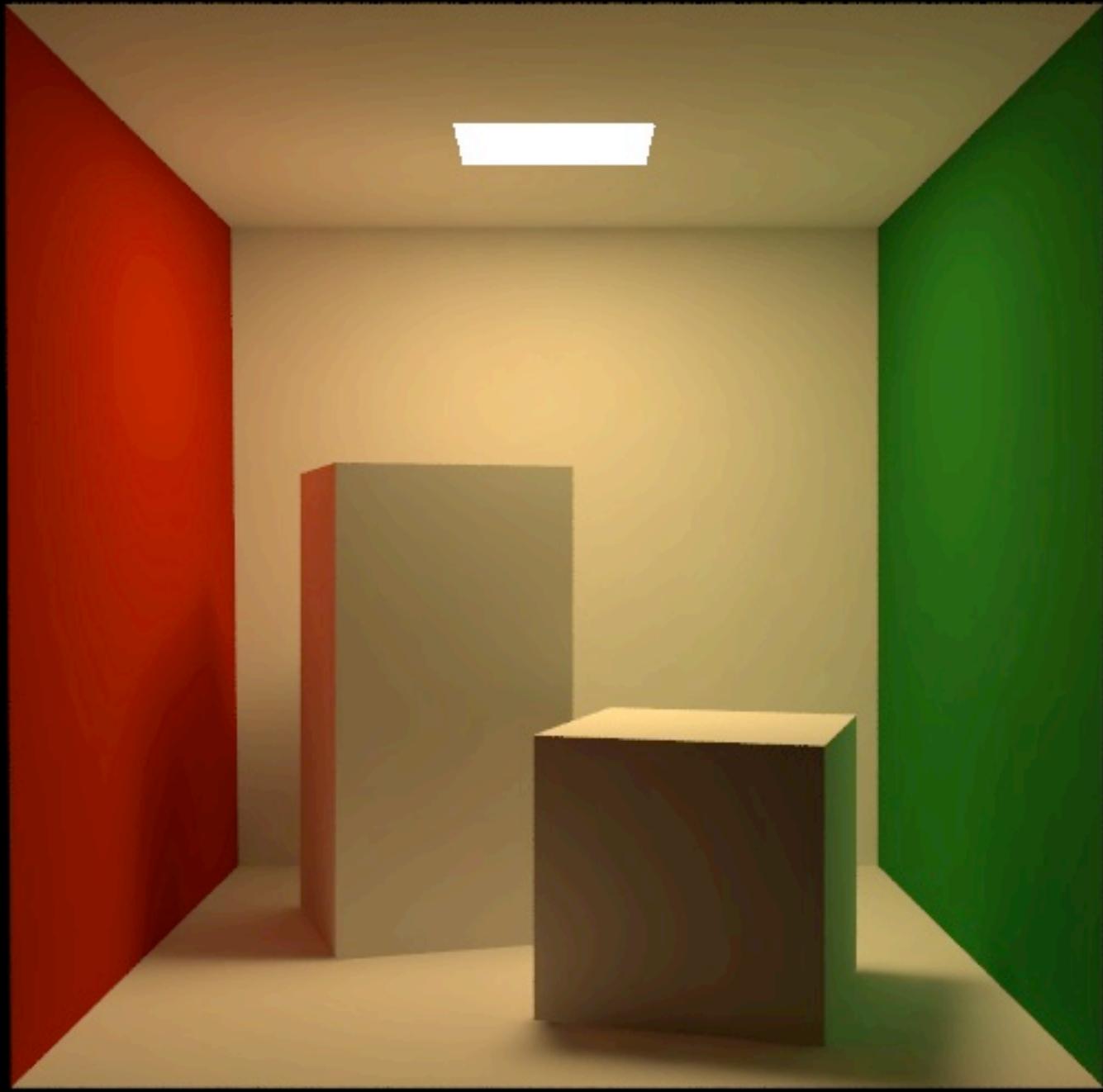
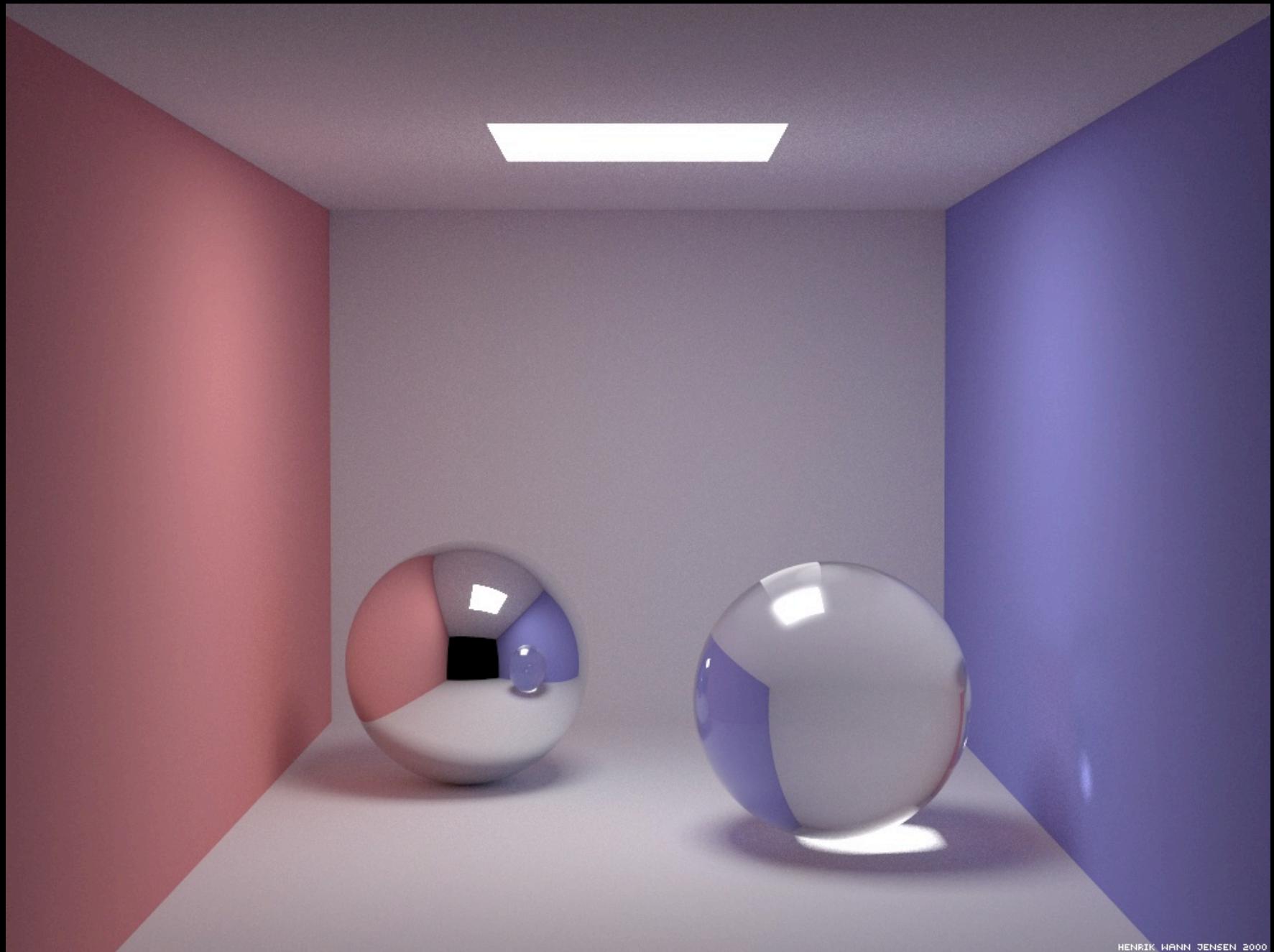


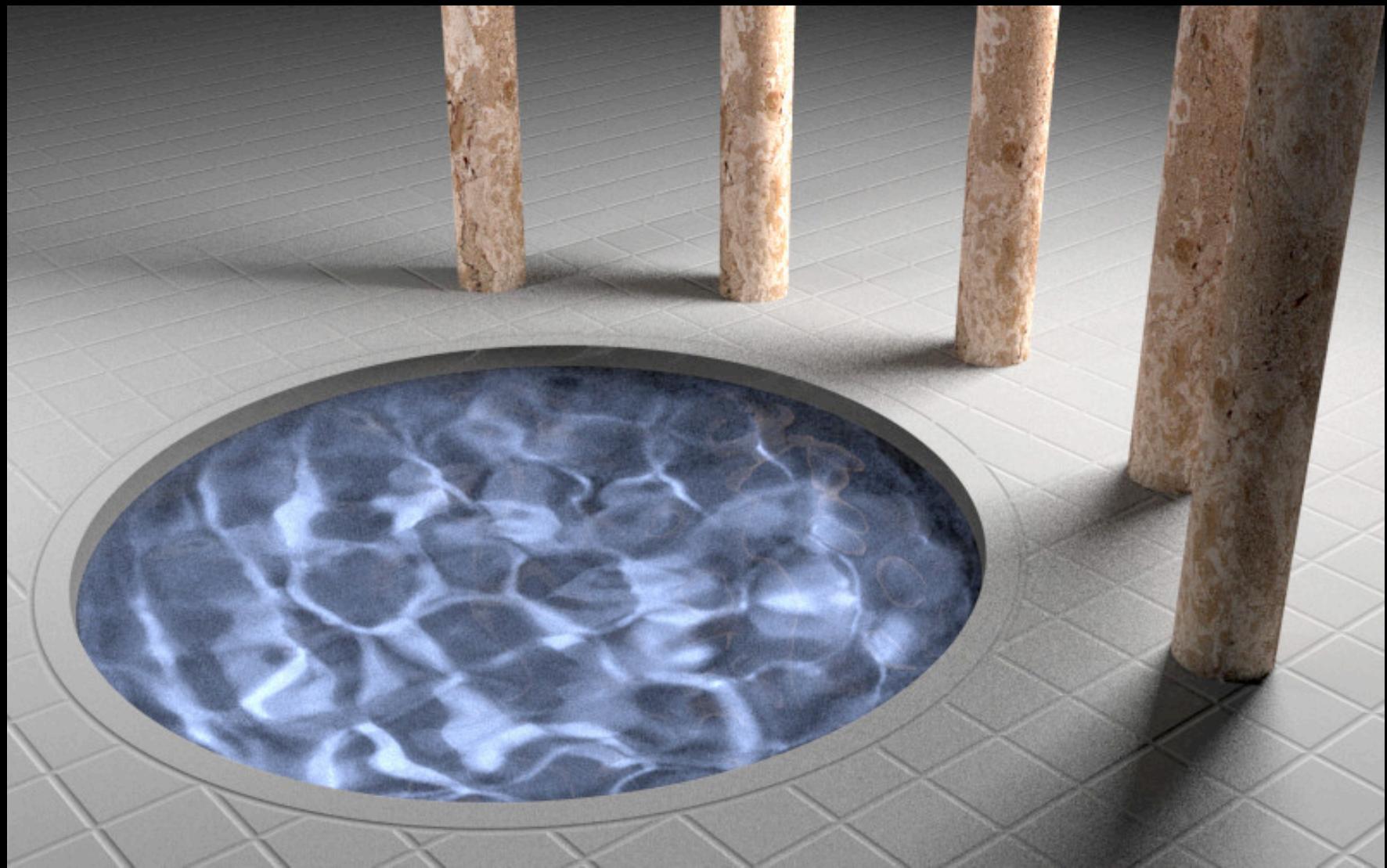
Path Tracing

Images for CS6630 lecture











Kajiya-style path tracing, version 0:

rayRadianceEst(x, ω):

```
y = traceRay( $x, \omega$ )
return emittedRadiance(y,  $-\omega$ ) + reflectedRadianceEst(y,  $-\omega$ )
```

reflectedRadianceEst(x, ω_r):

```
 $\omega_i$  = uniformRandomPSA( $n(x)$ )
return  $\pi * brdf(x, \omega_i, \omega_r) * rayRadianceEst(x, \omega_i)$ 
```

Kajiya-style path tracing, version 0.5:

rayRadianceEst(x, ω):

```
y = traceRay( $x, \omega$ )
return emittedRadiance(y,  $-\omega$ ) + reflectedRadianceEst(y,  $-\omega$ )
```

reflectedRadianceEst(x, ω_r):

```
if random() < survivalProbability:
     $\omega_i$  = uniformRandomPSA( $n(x)$ )
    return  $\pi * \text{brdf}(x, \omega_i, \omega_r) * \text{rayRadianceEst}(x, \omega_i) / \text{survivalProbability}$ 
else
    return 0
```

Kajiya-style path tracing, version 0.75:

rayRadianceEst(x, ω):

```
y = traceRay( $x, \omega$ )
return emittedRadiance(y,  $-\omega$ ) + reflectedRadianceEst(y,  $-\omega$ )
```

reflectedRadianceEst(x, ω_r):

```
if random() < survivalProbability:
     $\omega_i, pdf = brdfSample(x, n(x))$ 
    return brdf( $x, \omega_i, \omega_r$ ) * rayRadianceEst( $x, \omega_i$ ) / (pdf * survivalProbability)
else
    return 0
```

Kajiya-style path tracing, version 1.0:

rayRadianceEst(x, ω):

```
y = traceRay(x, ω)
return emittedRadiance(y, -ω)
+ reflectedRadianceEst(y, -ω)
```

directRadianceEst(x, ω_r):

```
ω_i, pdf = luminaireSample(x, n(x))
y = traceRay(x, ω_i)
return brdf(x, ω_i, ω_r)
* emittedRadiance(y, -ω_i) / pdf
```

reflectedRadianceEst(x, ω_r):

```
return directRadianceEst(x, ω_r)
+ indirectRadianceEst(x, ω_r)
```

indirectRadianceEst(x, ω_r):

```
if random() < survivalProbability:
    ω_i, pdf = brdfSample(x, n(x))
    y = traceRay(x, ω_i)
    return brdf(x, ω_i, ω_r)
    * reflectedRadianceEst(y, -ω_i)
    / (pdf * survivalProbability)
else:
    return 0
```

Kajiya-style path tracing, version 1.0m:

directRadianceEst(x, wr):

```
ωl, pll = luminaireSample(x, n(x))
pbl = brdfPDF(ωl)
ωb, pbb = brdfSample(x, n(x))
plb = luminairePDF(ωb)
yl = traceRay(x, ωl)
yb = traceRay(x, ωb)
fl = brdf(x, ωl, wr)
    * emittedRadiance(yl, -ωi)
fb = brdf(x, ωb, wr)
    * emittedRadiance(yb, -ωi)
return fl / (pll + pbl) + fb / (plb + pbb)
```

reflectedRadianceEst(x, wr):

```
return directRadianceEst(x, wr)
    + indirectRadianceEst(x, wr)
```

indirectRadianceEst(x, wr):

```
if random() < survivalProbability:
    ωi, pdf = brdfSample(x, n(x))
    y = traceRay(x, ωi)
    return brdf(x, ωi, wr)
        * reflectedRadianceEst(y, -ωi)
        / (pdf * survivalProbability)
else:
    return 0
```

Kajiya-style path tracing, version 1.1:

reflectedRadianceEst(x, ω_r):

```
     $\omega_l, p_{ll} = \text{luminaireSample}(x, n(x))$ 
     $p_{bl} = \text{brdfPDF}(\omega_l)$ 
     $\omega_b, p_{bb} = \text{brdfSample}(x, n(x))$ 
     $p_{lb} = \text{luminairePDF}(\omega_b)$ 
     $y_l = \text{traceRay}(x, \omega_l)$ 
     $y_b = \text{traceRay}(x, \omega_b)$ 
     $f_l = \text{brdf}(x, \omega_l, \omega_r)$ 
        *  $\text{emittedRadiance}(y_l, -\omega_l)$ 
     $f_b = \text{brdf}(x, \omega_b, \omega_r)$ 
        *  $\text{emittedRadiance}(y_b, -\omega_b)$ 
     $\text{reflRad} = f_l / (p_{ll} + p_{bl}) + f_b / (p_{lb} + p_{bb})$ 
    if random() < survivalProbability:
         $\text{reflRad} += \text{brdf}(x, \omega_b, \omega_r) / p_{bb}$ 
            *  $\text{reflectedRadianceEst}(y_b, -\omega_b)$ 
            / survivalProbability
    return reflRad
```