Image-based lighting

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SEVENTH FRAMEWORK PROGRAMME

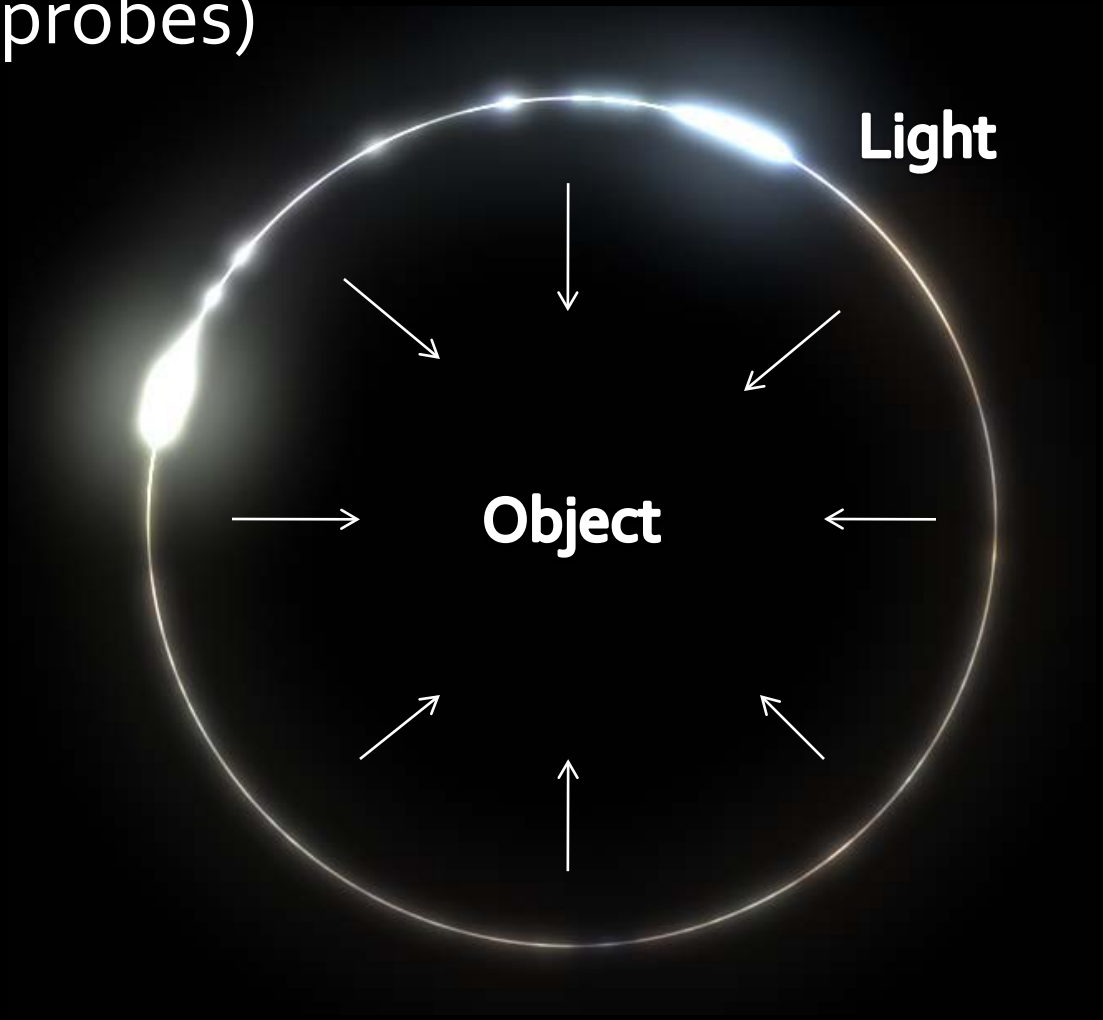
MARIE CURIE ACTIONS

Image-based lighting

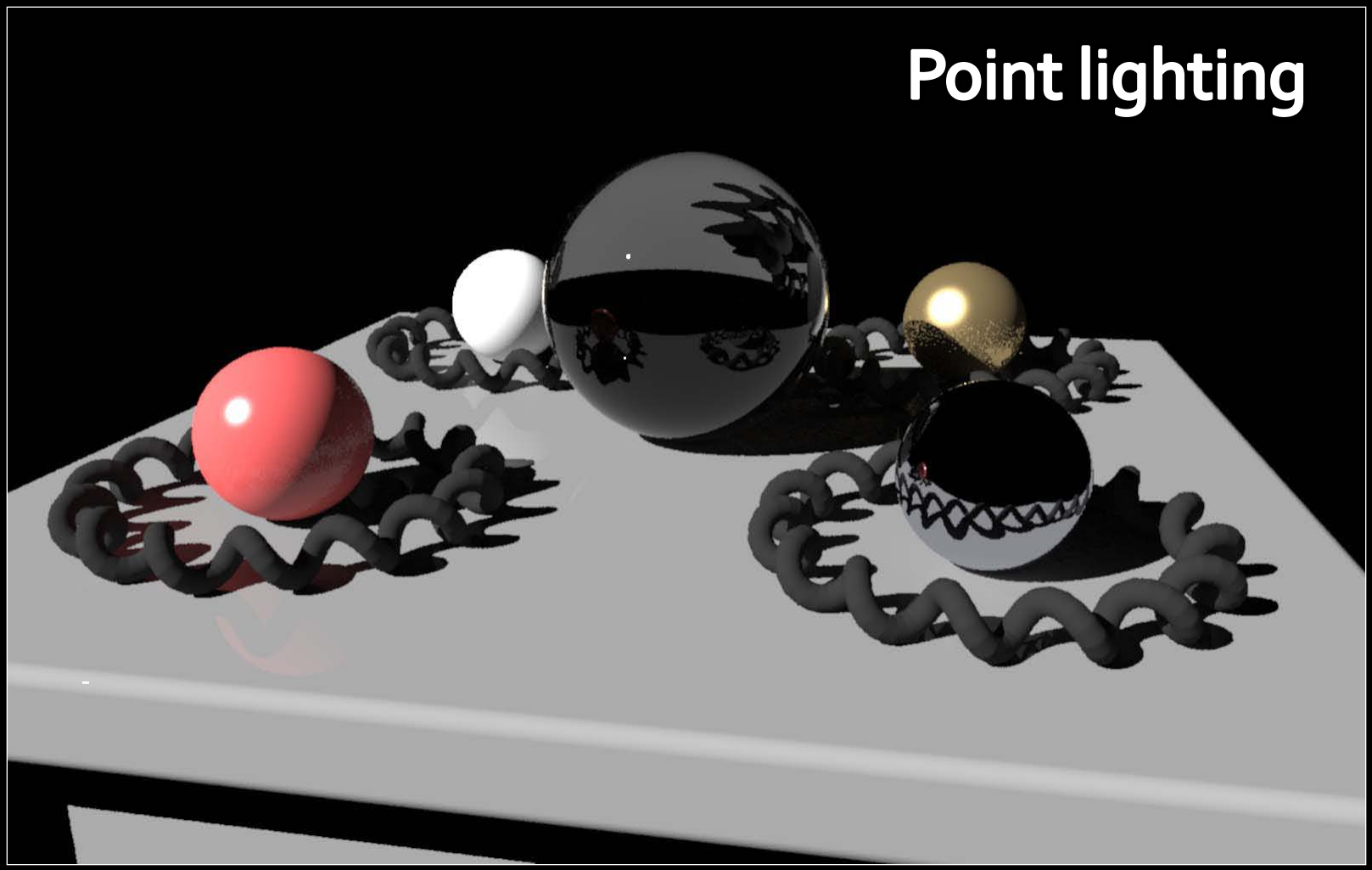
- Introduced by Paul Debevec (Siggraph 98)
- Routinely used for special effects in films & games

Image-based lighting

- Illuminating CG objects using measurements of real light (=light probes)



Point lighting



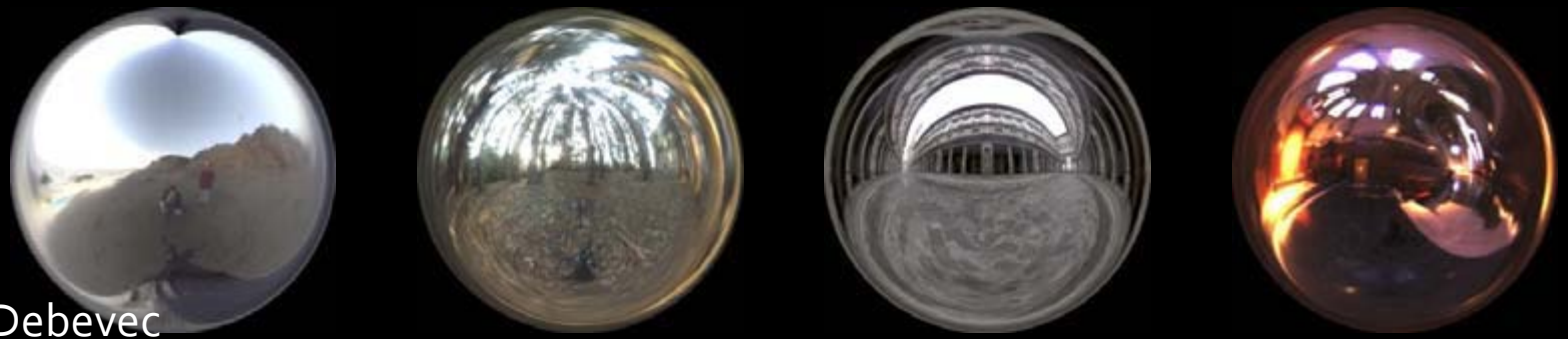


Image-based lighting

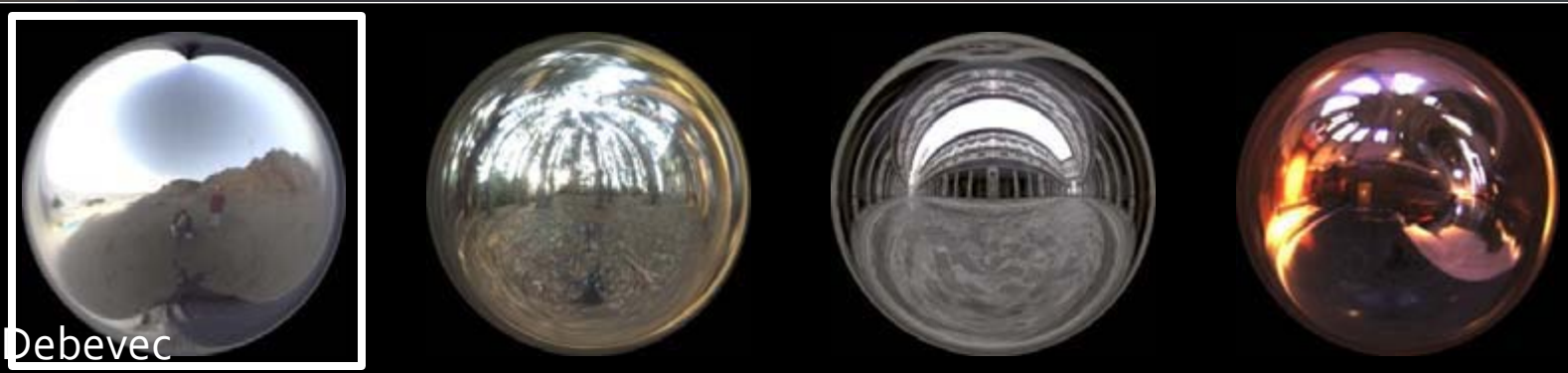


Image-based lighting

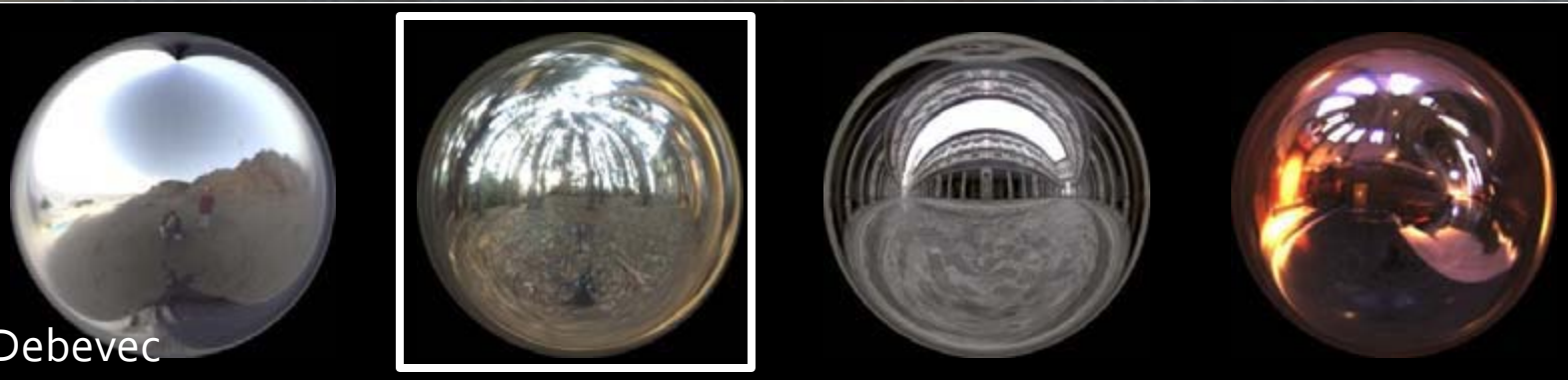


Image-based lighting

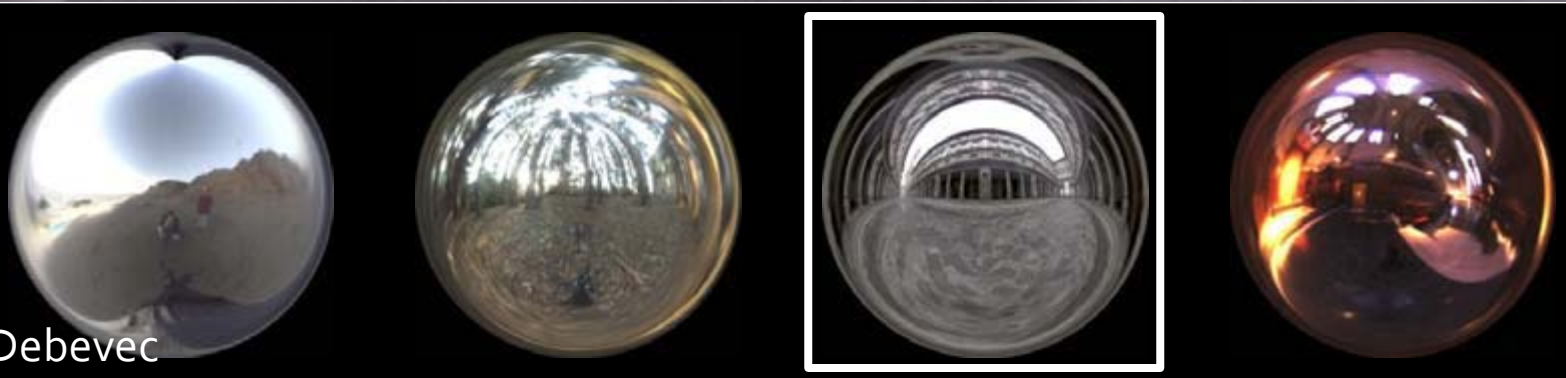
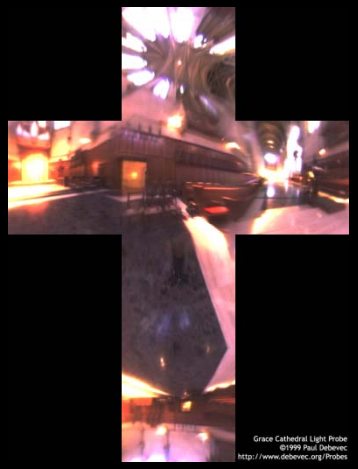


Image-based lighting

Mapping

Eucaliptus grove

Grace cathedral



Debevec's spherical

"Latitude – longitude" (spherical coordinates)

Cube map

Mapping

Uffizi gallery

St. Peter's Cathedral

Debevec's spherical

"Latitude – longitude" (spherical coordinates)

Cube map

Mapping

- Mapping from direction in Cartesian coordinates to image UV.

```
float d = sqrt(dir.x*dir.x + dir.y*dir.y);
float r = d>0 ? 0.159154943*acos(dir.z)/d : 0.0;
u = 0.5 + dir.x * r;
v = 0.5 + dir.y * r;
```

Quote from "http://ict.debevec.org/~debevec/Probes/"

The following light probe images were created by taking two pictures of a mirrored ball at ninety degrees of separation and assembling the two radiance maps into this registered dataset. The coordinate mapping of these images is such that the center of the image is straight forward, the circumference of the image is straight backwards, and the horizontal line through the center linearly maps azimuthal angle to pixel coordinate.

Thus, if we consider the images to be normalized to have coordinates ***u=[-1,1]****,* ***v=[-1,1]****, we have* ***theta=atan2(v,u)****,* ***phi=pi*sqrt(u*u+v*v)****. The unit vector pointing in the corresponding direction is obtained by rotating* ***(0,0,-1)*** *by* ***phi*** *degrees around the* ***y*** *(up) axis and then* ***theta*** *degrees around the* ***-z*** *(forward) axis. If for a direction vector in the world* ***(Dx, Dy, Dz)****, the corresponding* ***(u,v)*** *coordinate in the light probe image is* ***(Dx*r,Dy*r)*** *where* ***r=(1/pi)*acos(Dz)/sqrt(Dx^2 + Dy^2)****.*

Sampling strategies