Image-Based Lighting

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Based on Slides from Paul Debevec - SIGGRAPH 2003

Outlook

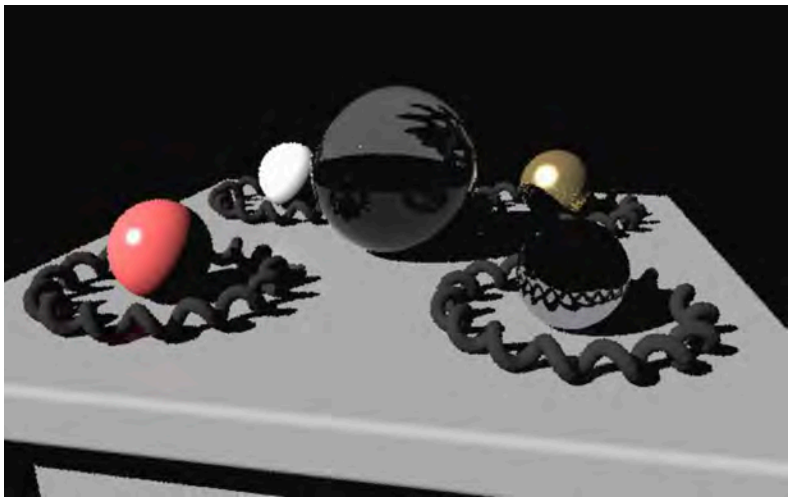
- Image-Based Lighting (IBL)
- Capturing Real-World Illumination
- Light Probes as Light Sources
- Illuminating Synthetic Objects with Real Light
- Rendering Synthetic Objects into Real Scenes
- Fiat Lux

What is IBL?

Real Light Illumination

3D Scene

- Objects on a Table



Real-World HDR Lighting Maps

- Environments from the Light Probe Image Gallery

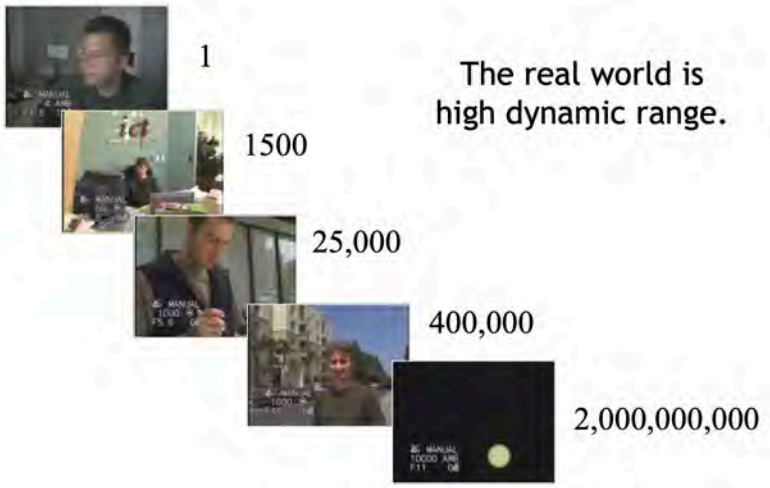
Setting the Illumination

- Rendering with Light Maps

Capturing Real-World Illumination

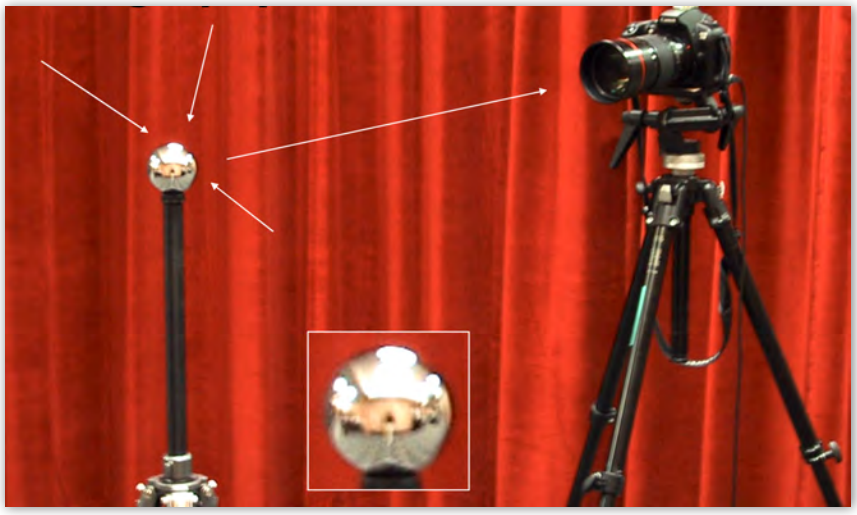
Dynamic Range in the Real World

- High Dynamic Range Imagery (HDRI)



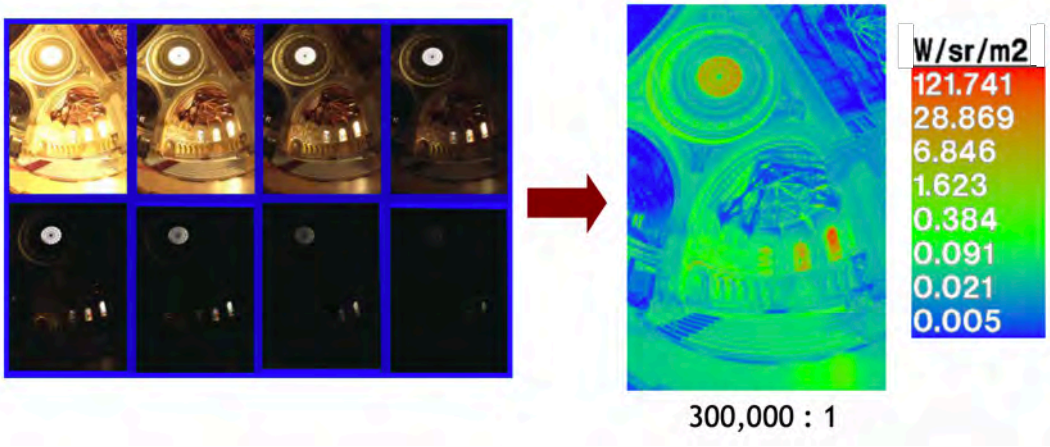
Panoramic (Omnidirectional) Photography

- Capturing HDR Light Maps



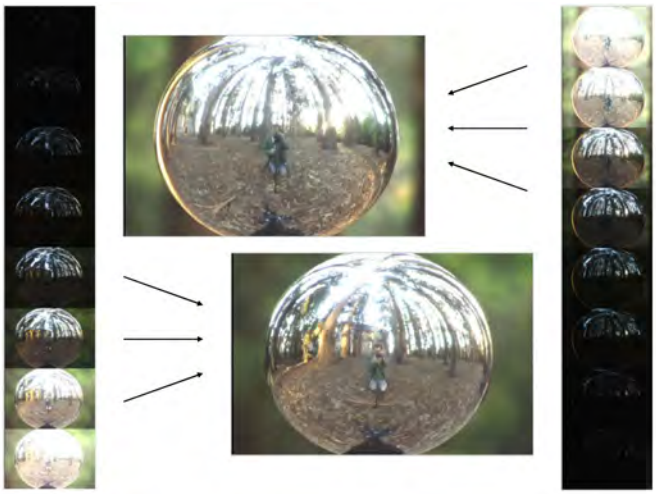
High-Dynamic Range Photography

- HDRI Generation by Varying Exposure (Bracketing)



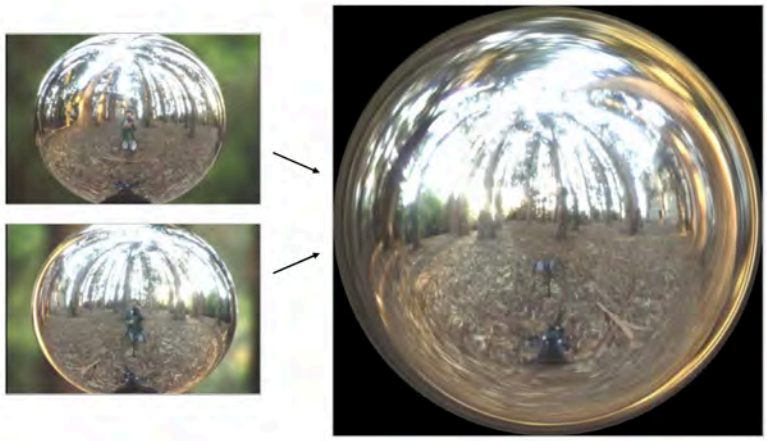
Acquiring the Light Probe

- Multiple Exposures with Mirrored Ball



Assembling the Light Map

- Integrating the HRD Light Maps



360 Image Representation

- Types of Omnidirectional Images

Mirrored Ball

Cube Map

Latitude/Longitude

Light Probes as Light Sources

From Probes to Lights

- Rendering Light Probes as Light Sources

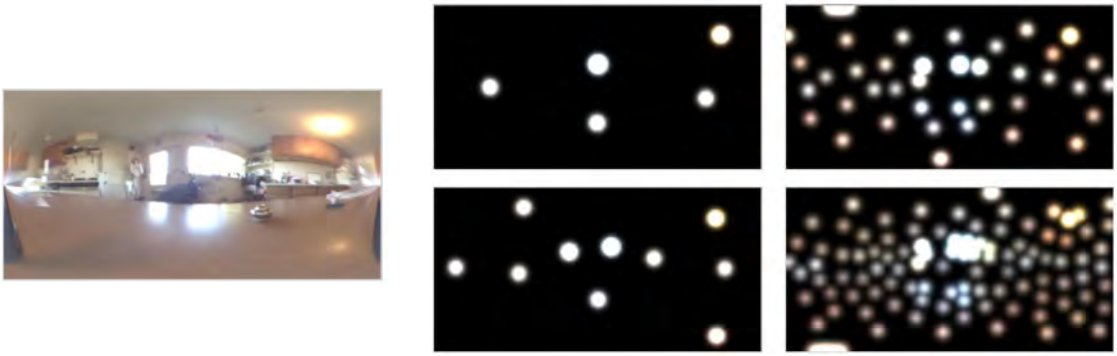
Light Map

Light Sources

Sampling Light Sources

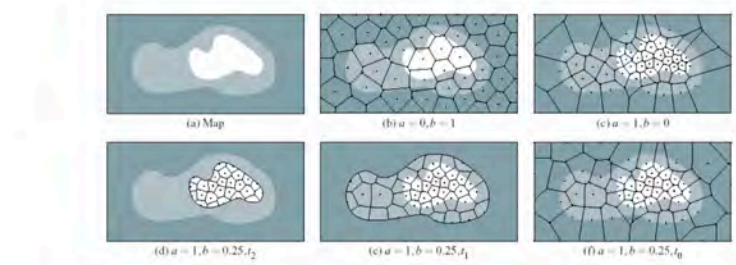
(Aldo Zang, MSc 2009)

- Converting a Light Map into Light Sources



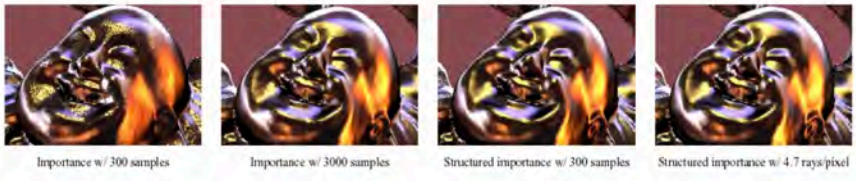
Sampling Light Rays

- Structured Importance Sampling of Environment Maps



(Agarwal, SIGGRAPH 2003)

(Zang, Sibgrapi 2009)

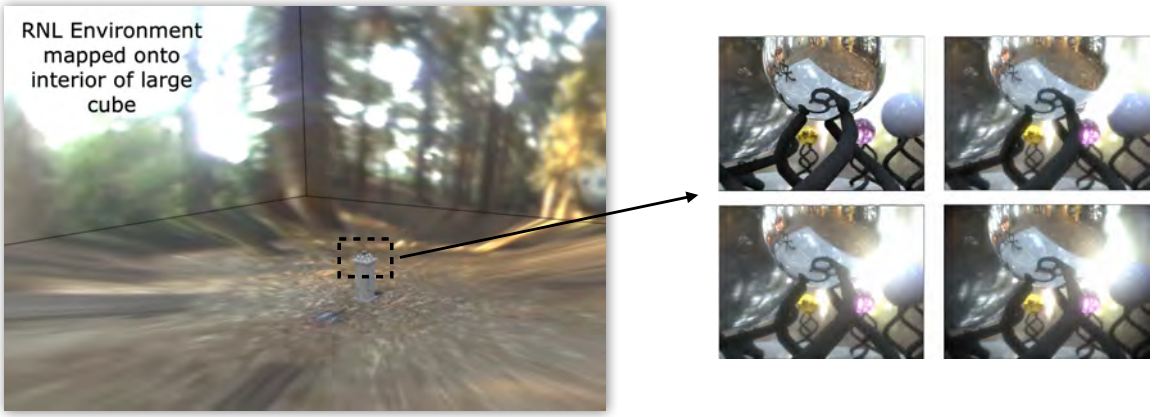


Illuminating Synthetic Objects with Real Light

Exposure Effects

Light Glow

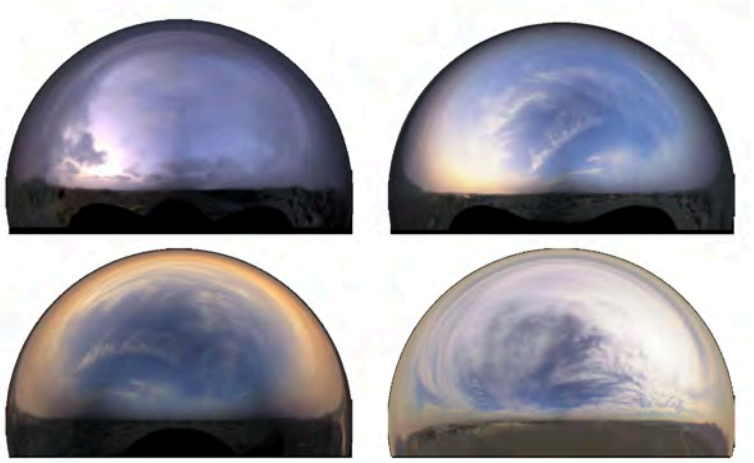
- Foreground Objects and Background



Skylight

Outdoor Light Probes

- Different Times of Day



Night

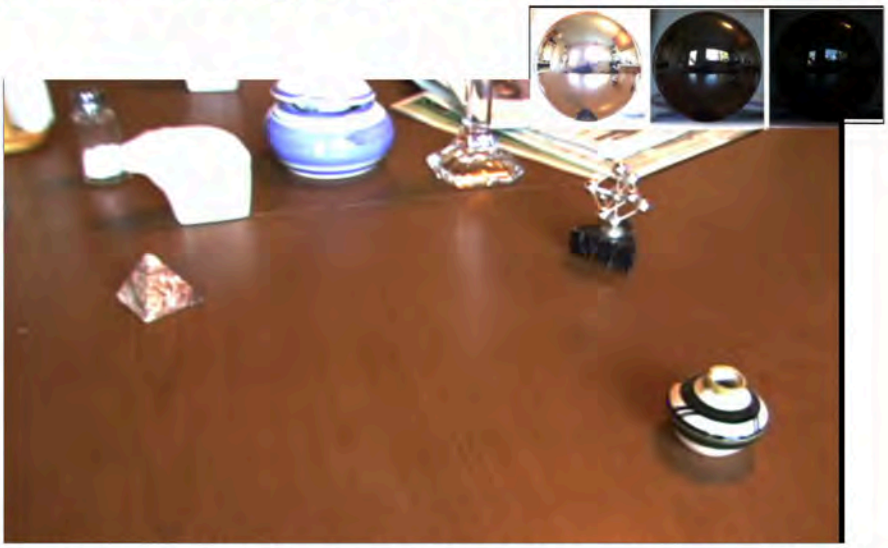
Twilight

Day

Dawn

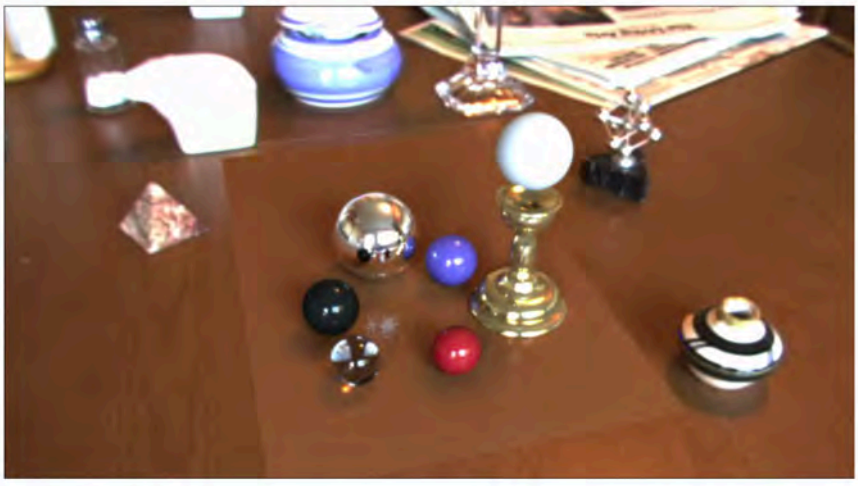
Rendering Synthetic Objects into Real Scenes

Compositing Objects into a Scene



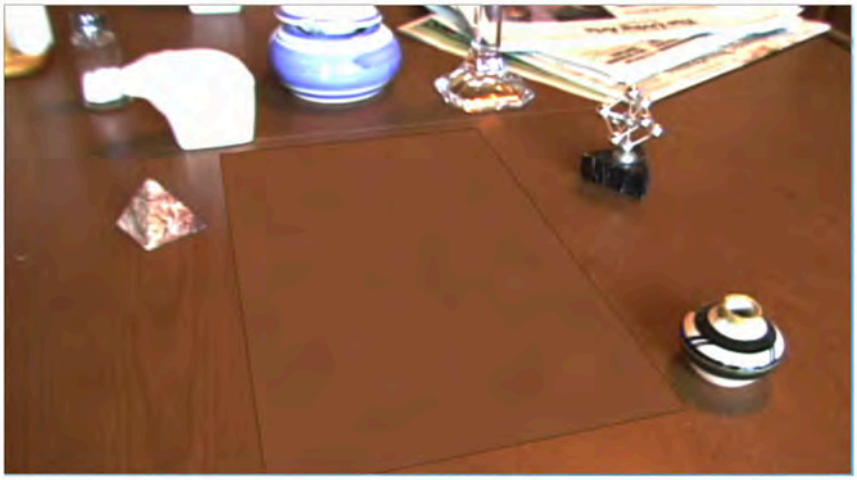
Paul Debevec. *Rendering Synthetic Objects into Real Scenes: Bridging Traditional and Image-Based Graphics with Global Illumination and High Dynamic Range Photography*. *SIGGRAPH 98.*

Rendering into the Scene



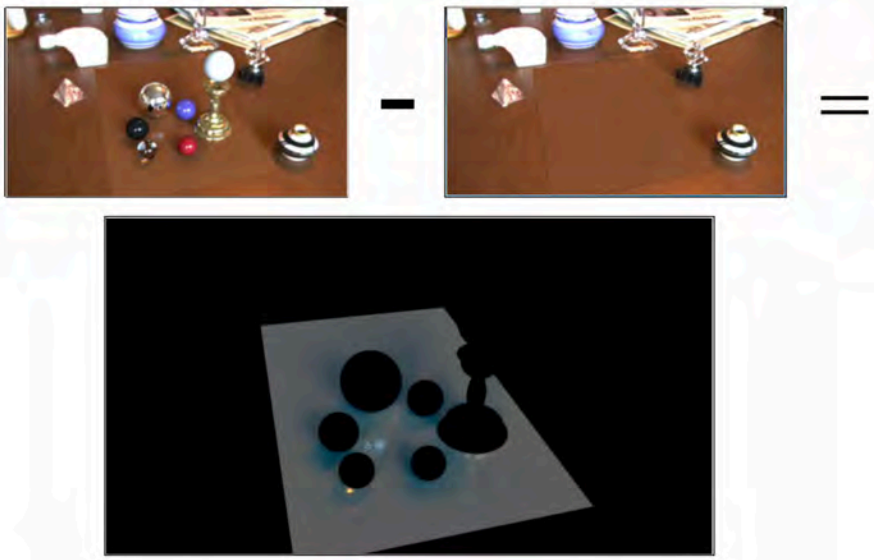
Objects and Local Scene matched to Scene

Differential Rendering 1

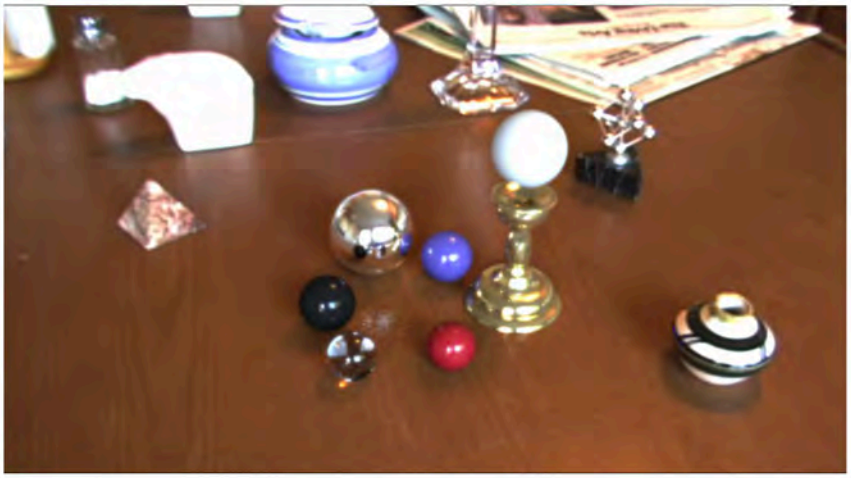


Local scene w/o objects, illuminated by model

Differential Rendering 2



Differential Rendering 3



Final Result

Fiat Lux

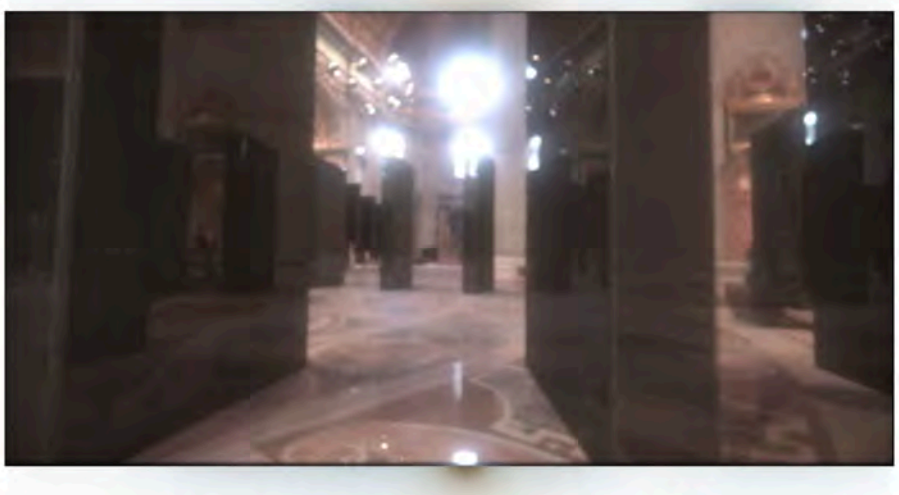


IMAGE-BASED LIGHTING IN *FIAT LUX*

Paul Debevec, Tim Hawkins, Westley Sarokin, H. P. Duiker, Christine Cheng, Tal Garfinkel, Jenny Huang

SIGGRAPH 99 Electronic Theater

IBL @ CVPR 2021