Real World Usages

- V-Ray
- Pixar's RenderMan
- LuxRender

Images include scenes from different projects, showcasing the use of physically based rendering.
Five Open Problems

- How many photons do I need?
- Reducing # parameters
- Highly glossy-glossy transport
- Recognize similarities within rendering
- Recognize similarities across other research fields
Five Open Problems - #1

How many photons do I need?

- The error estimation framework is only one step toward this goal
- Given the computational budget, what is the best image we can get?
Reducing # parameters

- The fewer, the better
  - Radius (adaptive PPM is one good step)
  - Number of photons per pass
  - Ratio of eye rays and photon rays
  - ...

Five Open Problems - #2
Highly glossy-glossy transport

- Fundamentally difficult to find such paths
  - Regularization and manifold exploration [Jakob and Marschner 2012] can help
- All the existing methods are equally bad
Five Open Problems - #4

- Recognize similarities within rendering
  - Recognize similarities between different algorithms
    - VPL = a special case of BPT = a special case of UPS/VCM
    - UPS/VCM is only one step
  - Application of one concept to another
    - Progressive EM for surfaces
    - Photon relaxation for beams
Five Open Problems - #5

- Recognize similarities across other research fields
  - Recognize similarities between problems in rendering and other areas
    - Machine learning
    - Data mining
    - Computational statistics
    - Neutron transport
http://cs.au.dk/~toshiya/starpm2013a
(updated course notes and slides)
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- Ben Spencer
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