Rendering Algorithms

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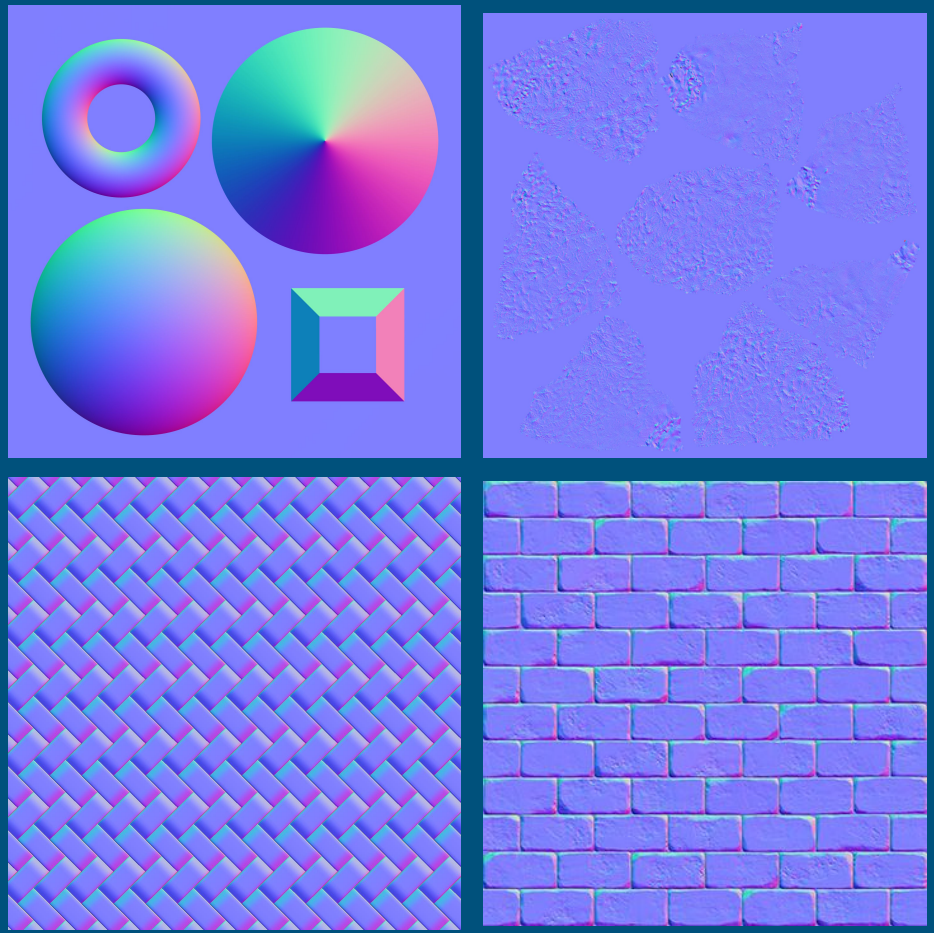
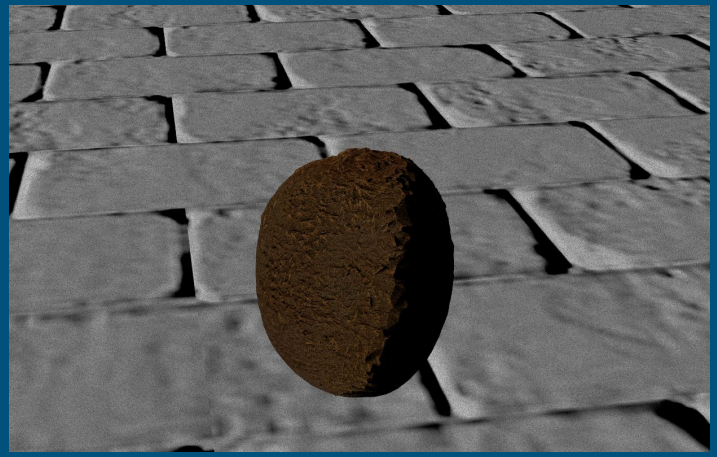
Implemented Features

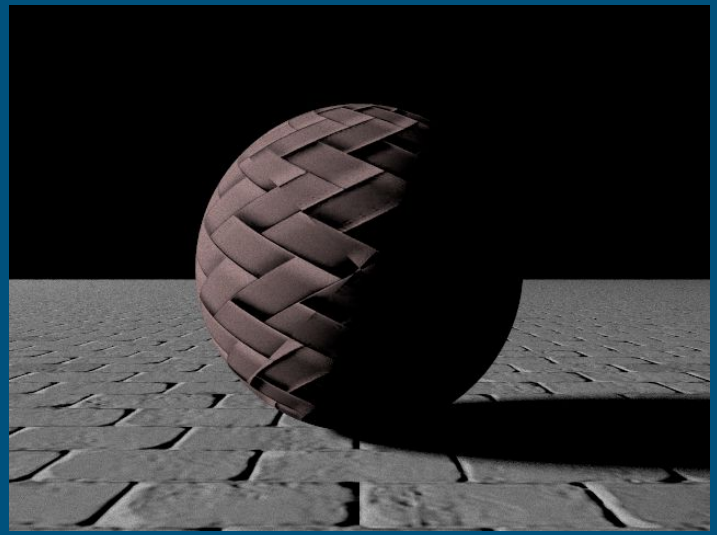
- Normal / Bump Mapping
- Volumetrics
  - Homogenous
  - Heterogeneous
- Emission Textures
- Metropolis Light Transport (PSSMLT)

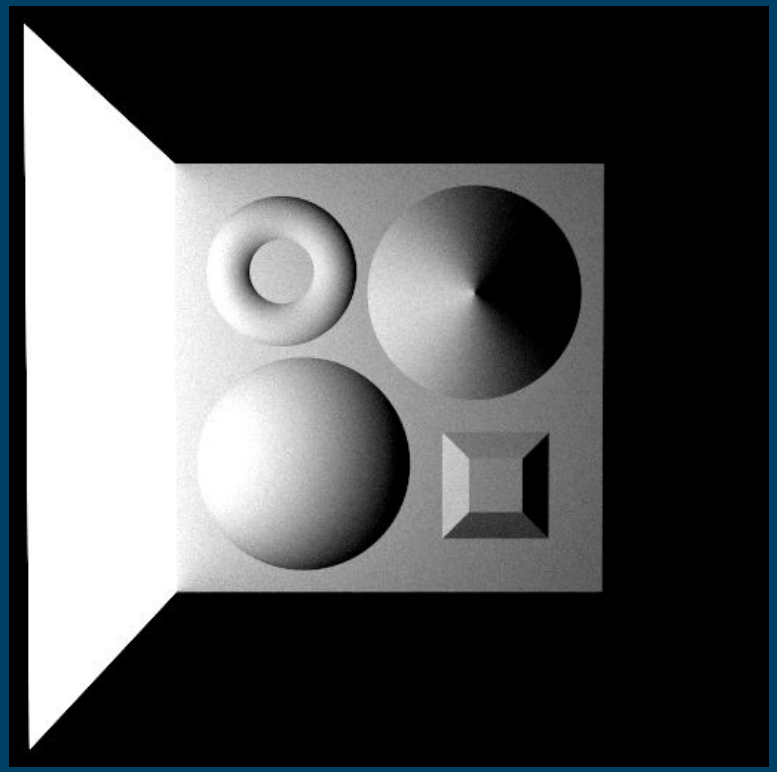
Normal Mapping

- ONB -> World transform
- Mapping .png to Vec3f



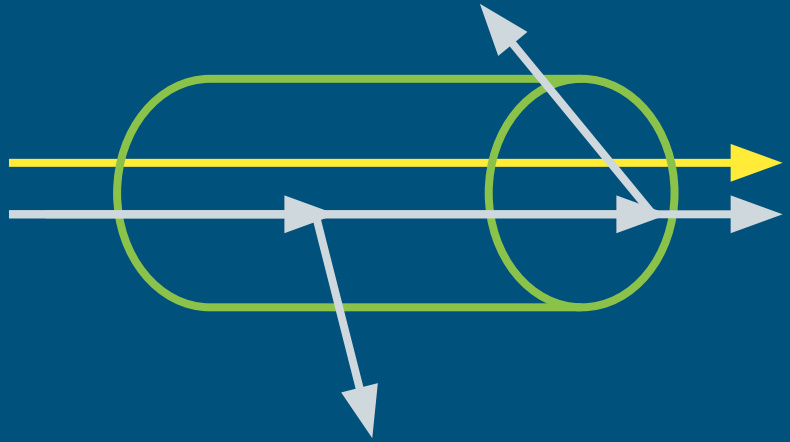




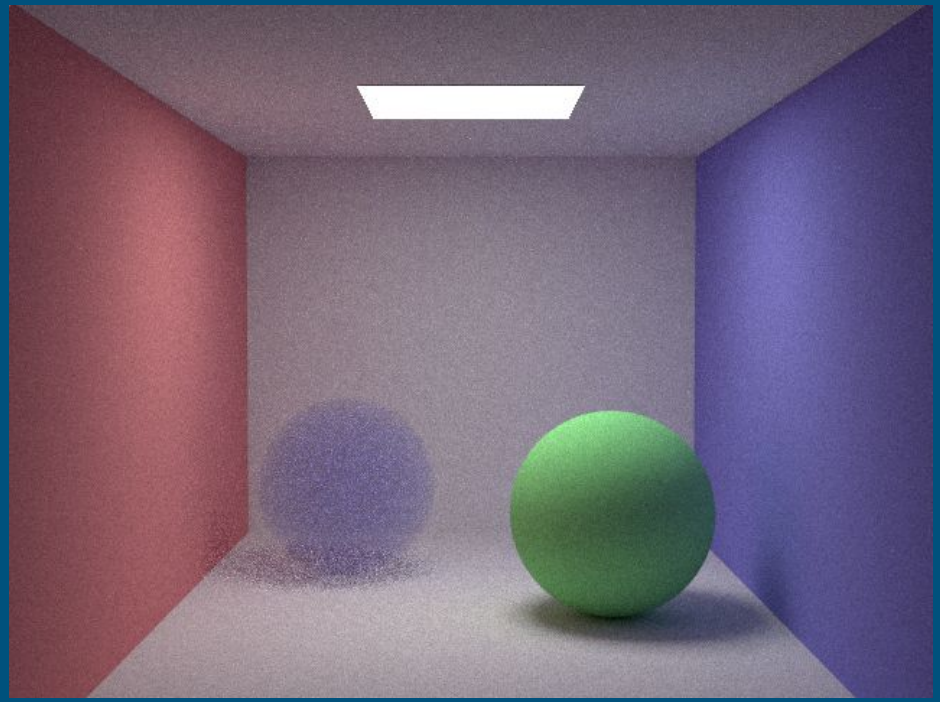


Volumetrics: Homogeneous

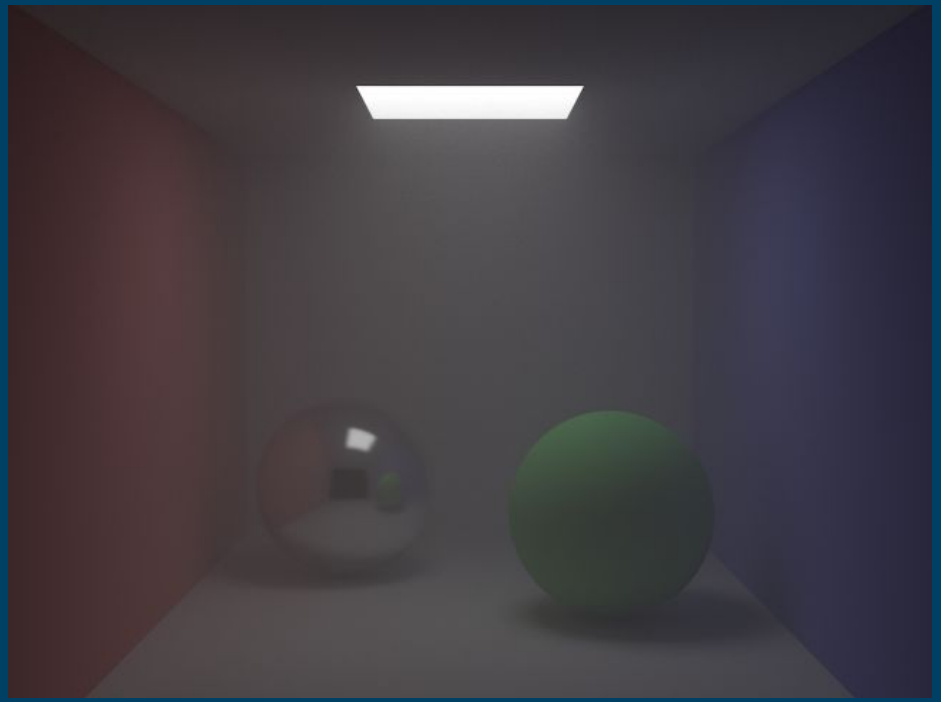
- Probabilistic Medium Interactions
- Media on Rays, not volumes
- Atmospheric or bounded
- Using Material interface



Boundary



Atmospheric

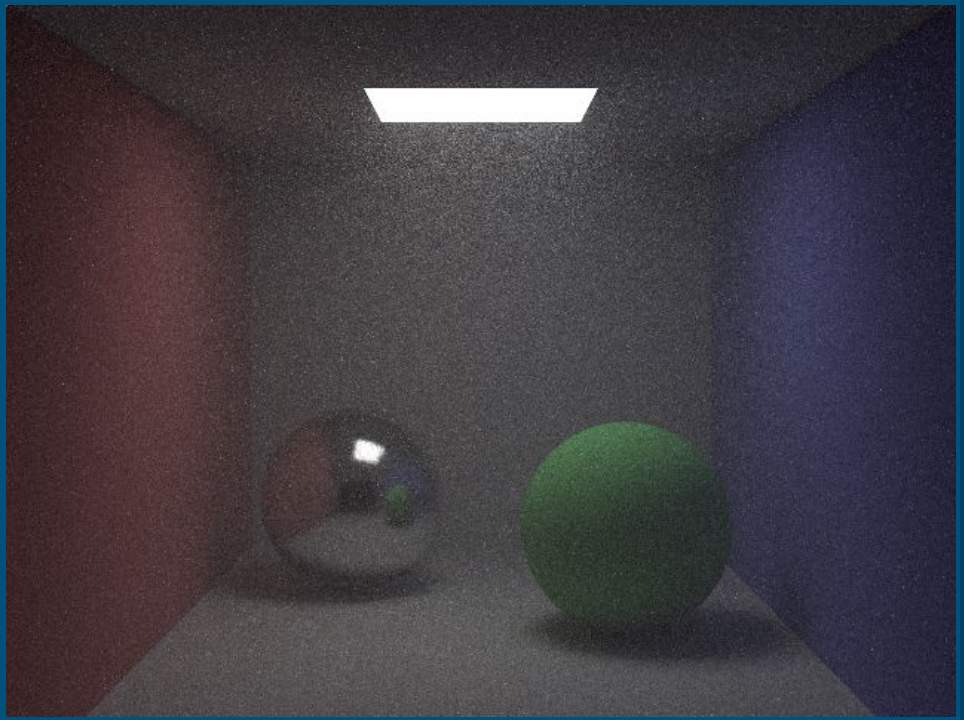


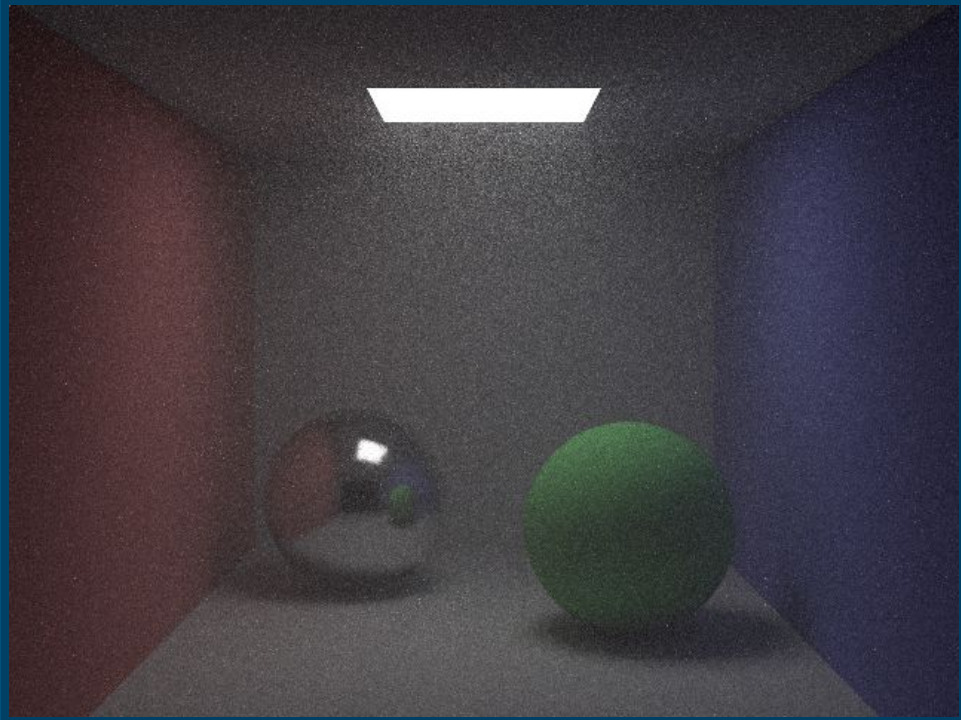
Volumetrics: Heterogeneous

- Uses tiled 3d precomputed values from texture
- Allows for use of procedural fog with lower cost

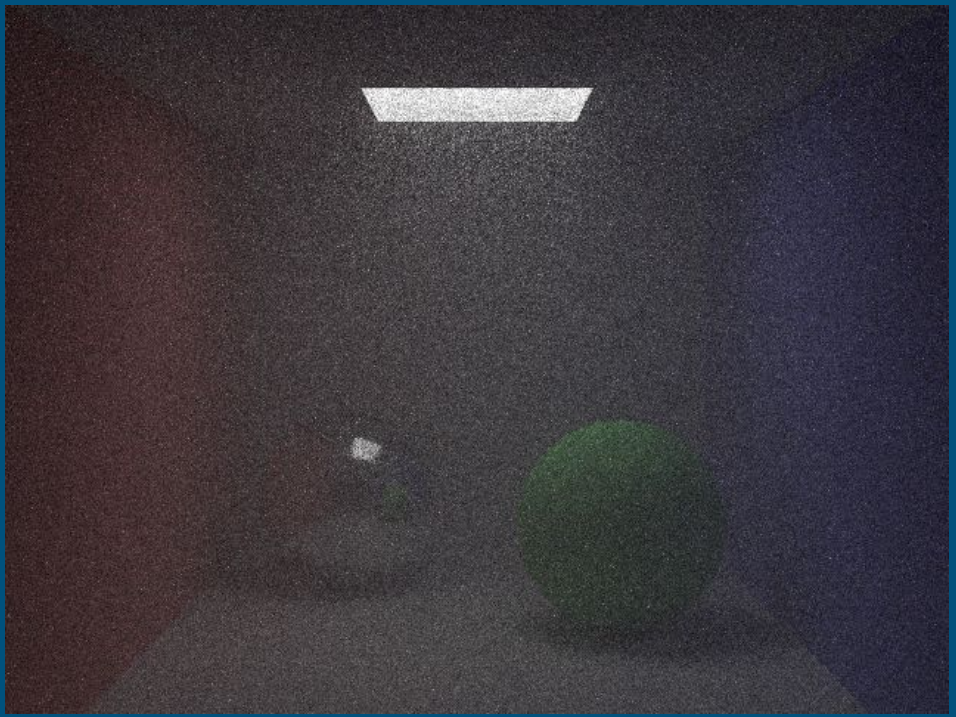
0.789	0.039	0.475	0.107
0.605	0.719	0.875	0.906
0.765	0.348	0.715	0.342
0.228	0.660	0.913	0.852

Proof of equality

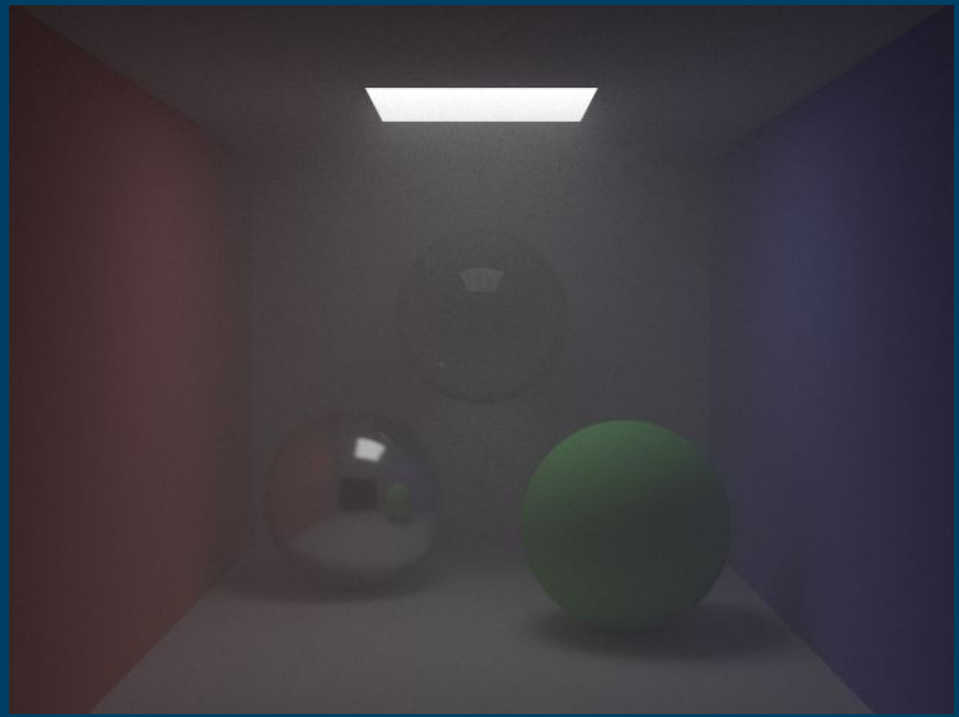




Heterogeneous



Volumetric Caustic

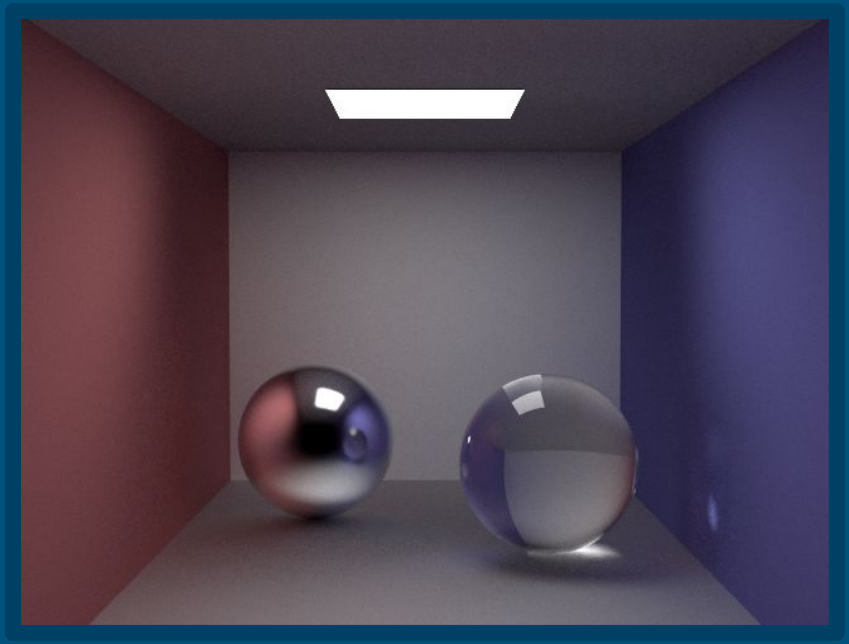


Emission Textures

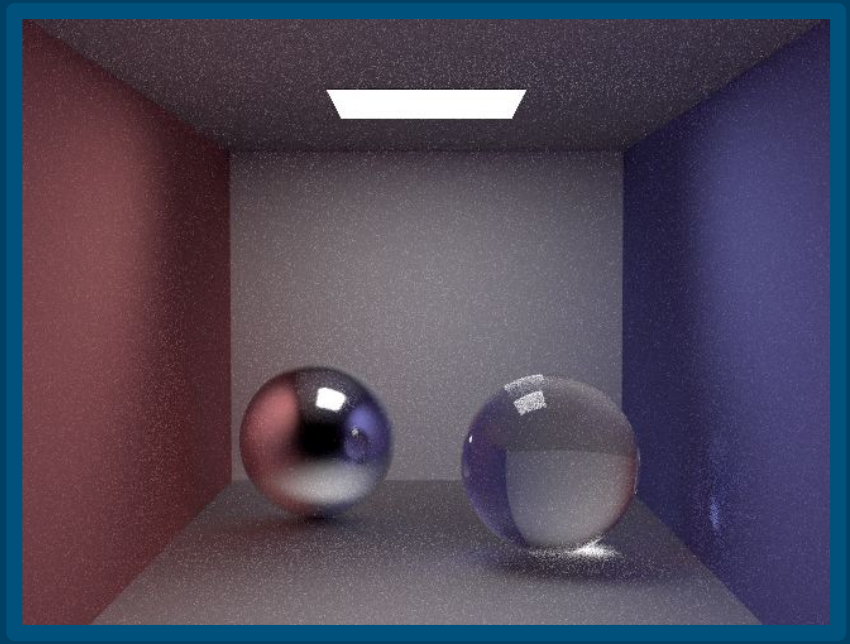
- Mapping Albedo to Emission

Metropolis Light Transport

- Implemented PSSMLT (Primary Sample Space)
  - Kelemen et al., “A Simple and Robust Mutation Strategy for the Metropolis Light Transport Algorithm”
  - Metropolis Sampler using PBRT implementation
    - Metropolis sampling generates sampling according to a distribution
  - PSSMLT treats scene as a black box, differs from Veach’s
- Built on uni-directional MIS



3000 mpp, 7 bounces



100 spp, 64 bounces

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