1. Many Lights Sampling Problem

- Need to select lights with high contribution
- Visibility+BRDF is expensive to evaluate
- **ReGIR** (Reservoir Grid-Based Importance Resampling) is our algorithm for fast selection, based on ReSTIR [1], working in world-space

2. ReGIR Algorithm

- **Build a 3D grid structure**
- Cells store relevant light samples (selected stochastically)
- Shade using samples from closest grid cells

3. Creating the Grid

- Grid cells stores light samples/probabilities, not lights!
- Resampling [2] selects samples based on their contribution to the cell volume
- Rebuilt every frame

4. Shading with the Grid

- Find the nearest grid cell
- Jitter position to remove discretization artifacts
- Use resampling again to select final light sample

5. Results

- Fast parallel implementation
  - Grid build 0.3 ms
  - Sampling 1.2 ms (at 1920x1080)
  - Sampling for arbitrary points in world-space
  - Quality depends on parameters and scene

References


New and improved version of ReGIR is in RTXDI SDK https://developer.nvidia.com/rtxdi