The problem / Motivation

I present an algorithm for the real-time rendering of measured view-dependent materials.

Main application: interactive walkthroughs of static scenes featuring view-dependent effects → high-quality presentation of architectural scenes / illumination solutions

Initial input: a light-mapped scene, illuminated by an external global illumination renderer → the algorithm dynamically computes a specular overlay as the view changes during walkthroughs

Major challenges / research questions:
→ how to represent measured material properties for fast evaluation?
→ how to compute the view-dependent illumination at each pixel, at 30-60 fps?

Methodology - approximating the view-dependent local illumination integral

1) A scene point \( P \) is shaded as seen from the viewing direction \( v \)
2) Incident light from all directions might get reflected into viewing direction \( v \)
3) Thus, a representation of the local incident light is needed
4) Also, a material representation is needed that yields sample weights for each direction, as not all directions contribute equally

Performing the integration

**Contribution** - a deterministic uniform sampling scheme:
Sample only within the specular lobe → biased, but fast!

**Contribution** - mapping angular samples directly to sampling positions in planar mirror buffers

MIP-map filtering of the uniform samples to suppress aliasing - cheap alternative to taking more samples

Results / Conclusions

The method achieves real-time frame rates on consumer hardware, even at high (1680 x 1050) resolution. More than 19 illumination samples were not needed for any of the test-datasets

**thesis approach using \( n \) samples:**

converged reference (\( n \rightarrow \infty \)):

Low sampling of wide lobes requires strong filtering to produce smooth results → high-frequency details are blurred out (floor tiling)