Pipeline Outline:

Summary: Wavelength dependent phenomena historically have been restricted to offline rendering techniques. Traditional real-time rendering pipelines favor a trichromatic color representation even when rendering wavelength dependent effects. I present a pipeline that employs existing real-time rendering pipelines for interactively rendering wavelength dependent phenomena.

Introduction:
- Historically wavelength-dependent rendering offline
- Real-time pipeline tend to omit wavelength color in lieu of trichromatic colors.
- We rendering wavelength dependent effects with a SPD and employ existing real-time pipeline technologies.

Exposition:

Motivation
- To render wavelength dependent phenomena like interference, diffraction, dispersive refraction and scattering in real-time to advance photorealistic image generation in real-time
- New pipeline is necessary because in order to render these effects with physical accuracy we need compact representations of SPD and lighting and BRDF.

Precomputation

Preprocess Existing Lighting
- Color Conversion (RGB -> Composite Model)
- Reparameterization (spherical -> cubemap, etc.)
- Sampling
- SH Projection

Preprocess BRDF
- Sampling
- SH Projection
- Mapping (Scale and Bias)

Rendering
- Rotating Projected Lighting Coefficients
- BRDF Texture Lookup (lookup, unscale and unbias)
- Lighting Integral (dot product)
- Color Conversion (to RGB from lambda)
- Tone mapping

Conclusion:
- Demonstrated the feasibility of creating a wavelength-dependent pipeline using existing real-time organization and technology.
- We incorporate new color models not yet employed in real-time rendering in conjunction with lighting and BRDF function approximations.
- We also demonstrate that our pipeline can produce physically accurate models of wavelength dependent phenomena for real-time rendering.

Timeline:
- Produce outline and Initial pipeline diagram (April 27th)
- Finish rough draft of abstract using latex. Rough draft to include finished diagram, text, current renderings, and reference(s). (April 28th)
- Upload to Professor Agu for critique via underdog3d.com (Midnight, Friday April 28th)
- Discuss modifications w/ Professor Agu (if possible, May 1st??)
- Final draft finished by Monday, May 8th
- Make final check/preparations and upload (Wednesday, May 10th)