

IMPERIAL COLLEGE LONDON
DEPARTMENT OF COMPUTING

Advanced Computing Coursework 2

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1 Introduction

The objective of this coursework is to study different sampling techniques on a latlong map and render a sphere with one of the sampling. Additionally a short study of the limit cases of the fresnel reflectance is presented for a start.

2 Fresnel reflectance

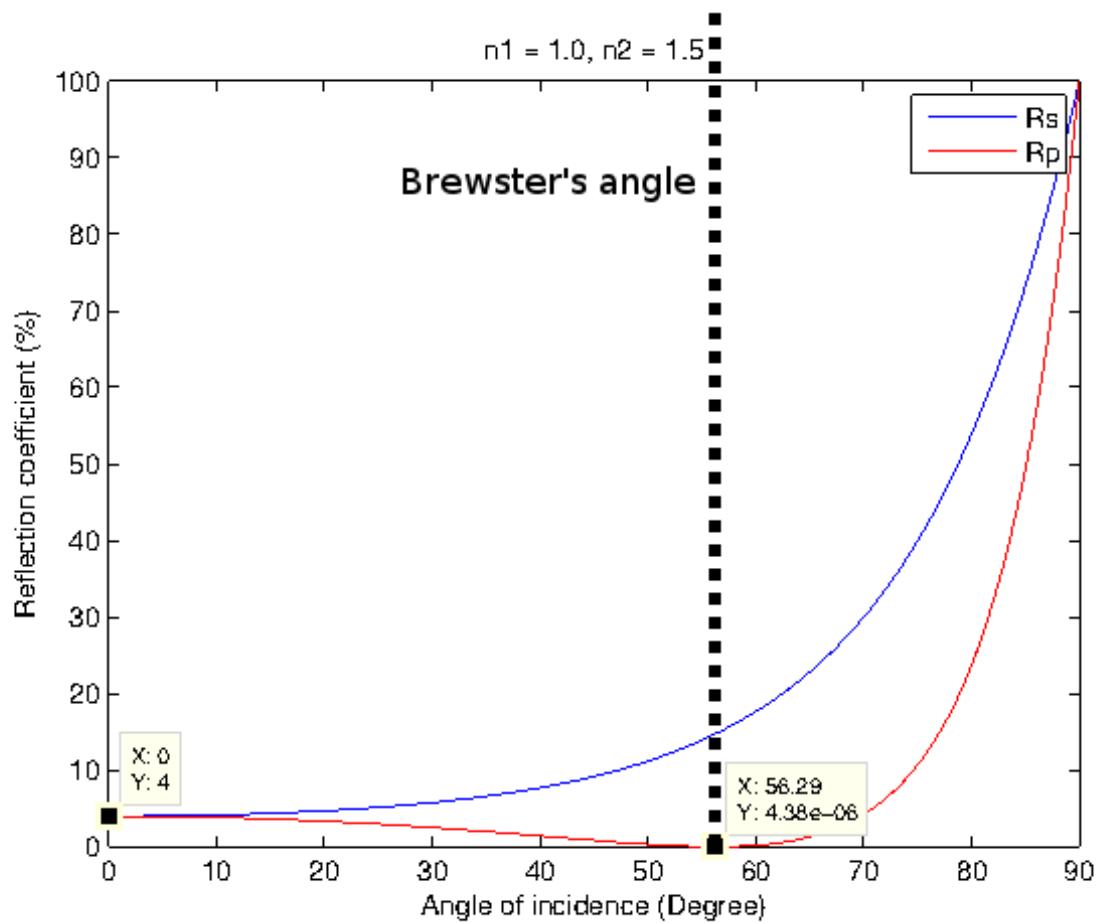


Figure 2.1: Fresnel brewster's angle.

Fresnel reflectance

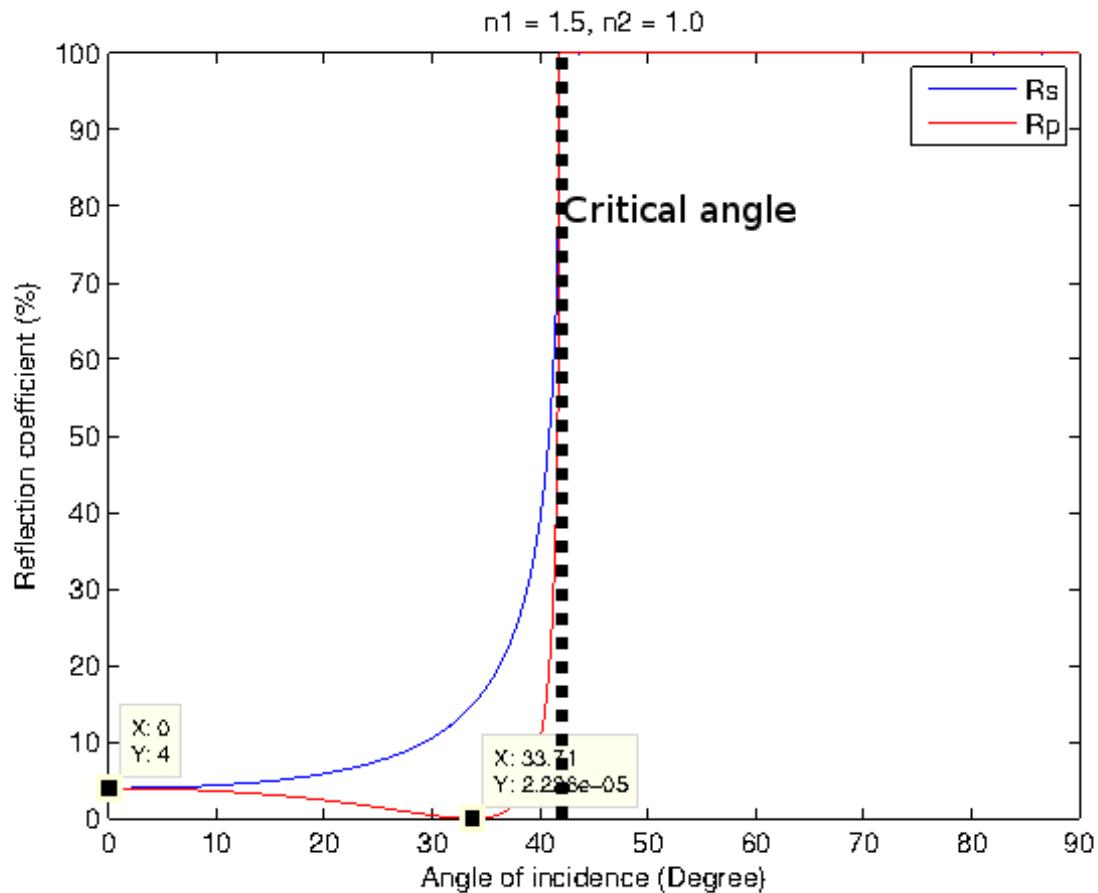


Figure 2.2: Fresnel critical angle.

3 Sampling from an Environment Map



Figure 3.1: 64 samples on the Environment Map.

Sampling from an Environment Map

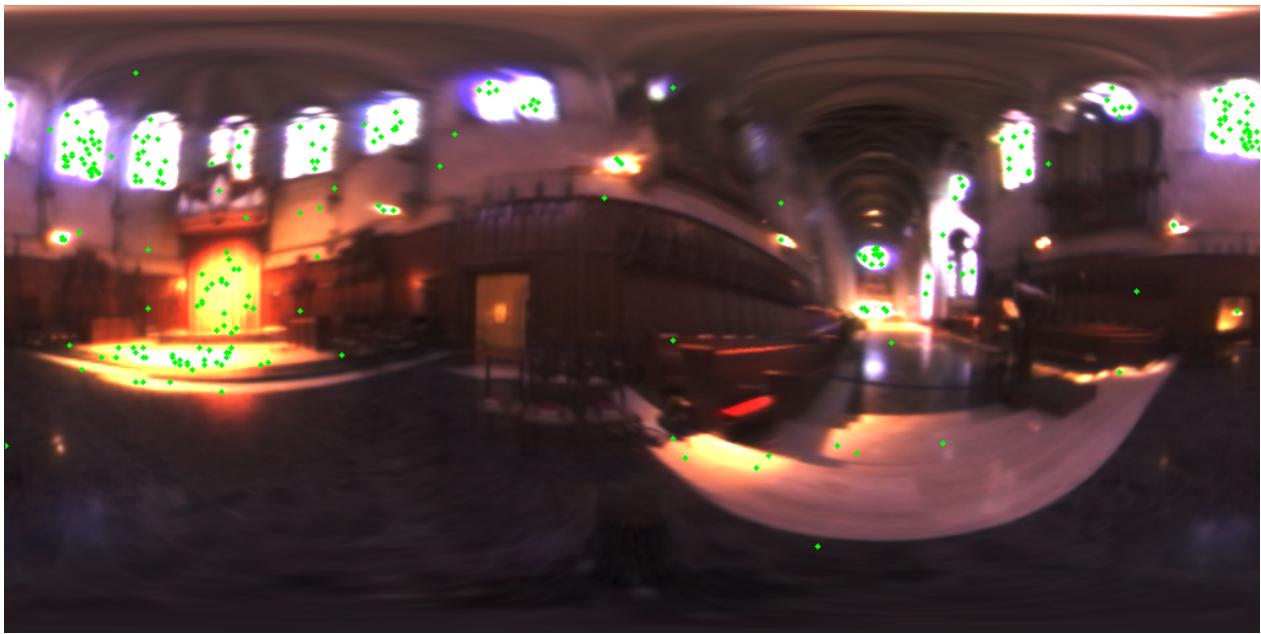


Figure 3.2: 256 samples on the Environment Map.

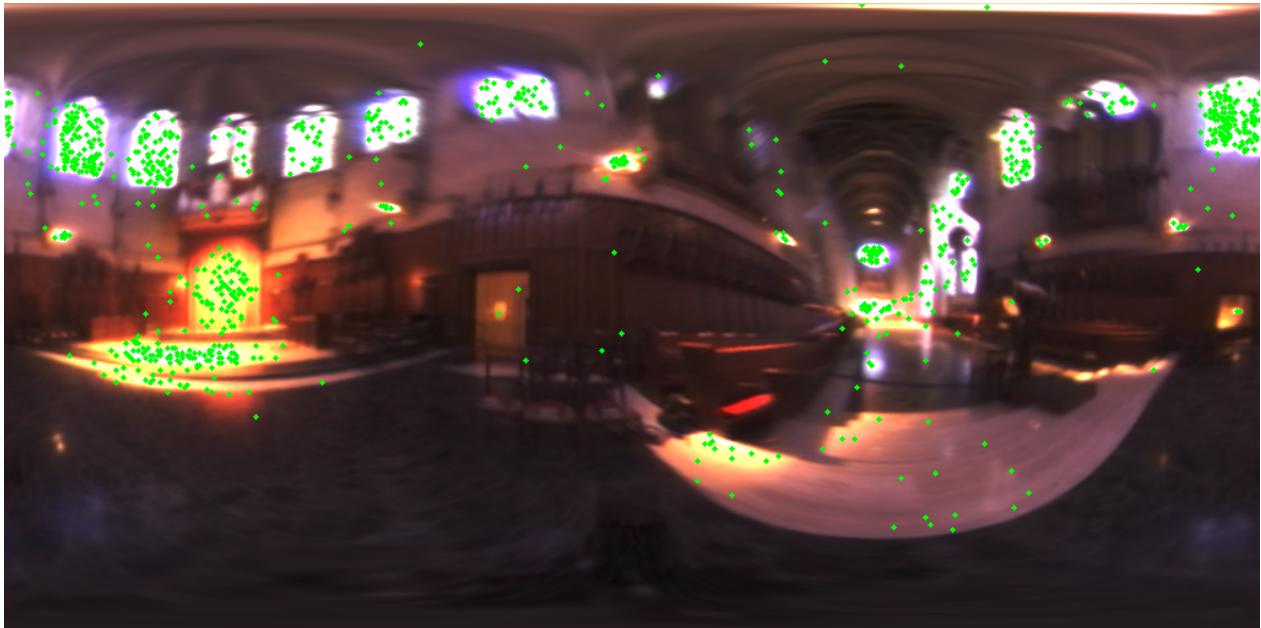


Figure 3.3: 1024 samples on the Environment Map.

Sampling from an Environment Map

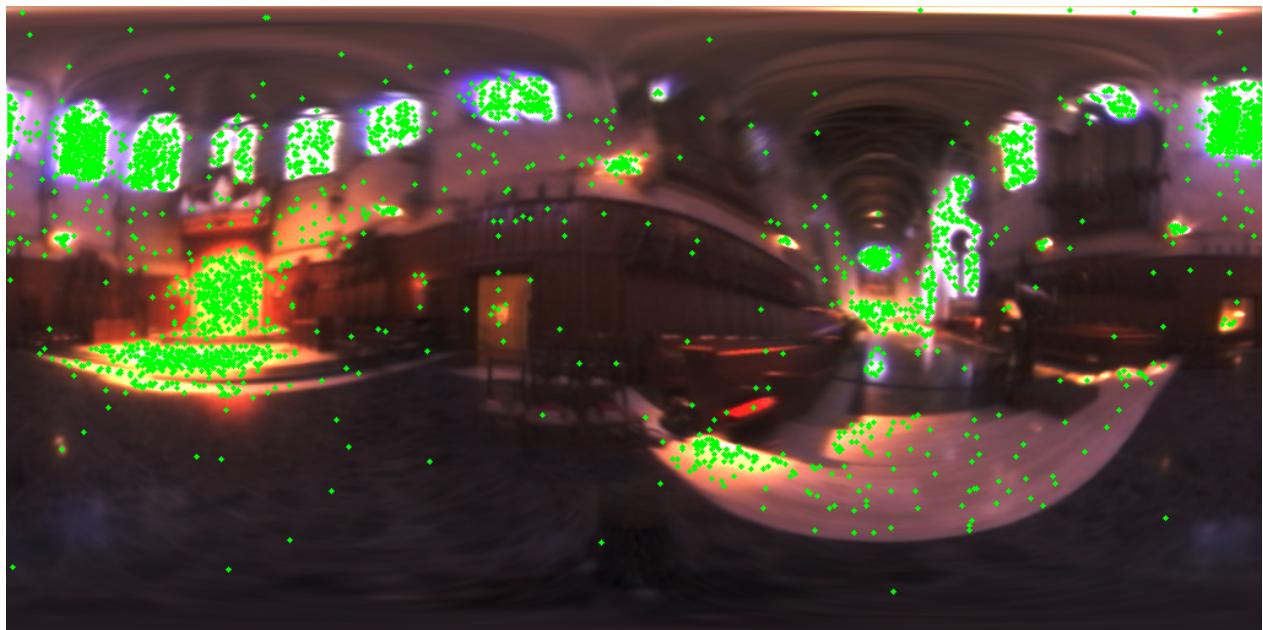


Figure 3.4: 4096 samples on the Environment Map.

4 Sampling from Phong BRDF

We used the results proposed by Lafourche, Eric P and Yves D. [1] to implement our own Phong sampling. We obtained the following results:

1 Pure specular



Figure 4.1: 256 specular Phong samples on the Environment Map ($s = 1$).

1 Pure specular



Figure 4.2: 256 specular Phong samples on the Environment Map ($s = 10$).



Figure 4.3: 256 specular Phong samples on the Environment Map ($s = 50$).

1 Pure specular



Figure 4.4: 256 specular Phong samples on the Environment Map ($s = 200$).

2 Pure diffuse

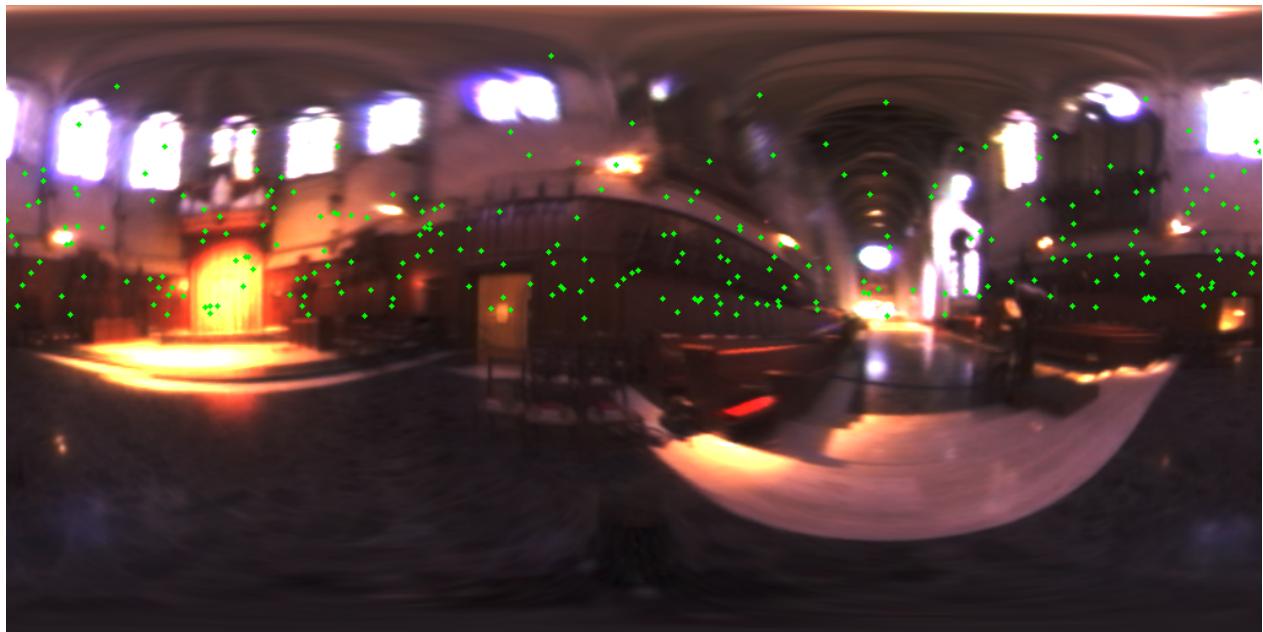


Figure 4.5: 256 diffuse Phong samples on the Environment Map ($s = 1$).

Figure 4.5 and 4.6 show that the diffuse part of the Phong sampling does not depend on the parameter s . This result was predictable since in the Phong's formula, the parameter s is only present in the specular part.

3 diffuse and specular

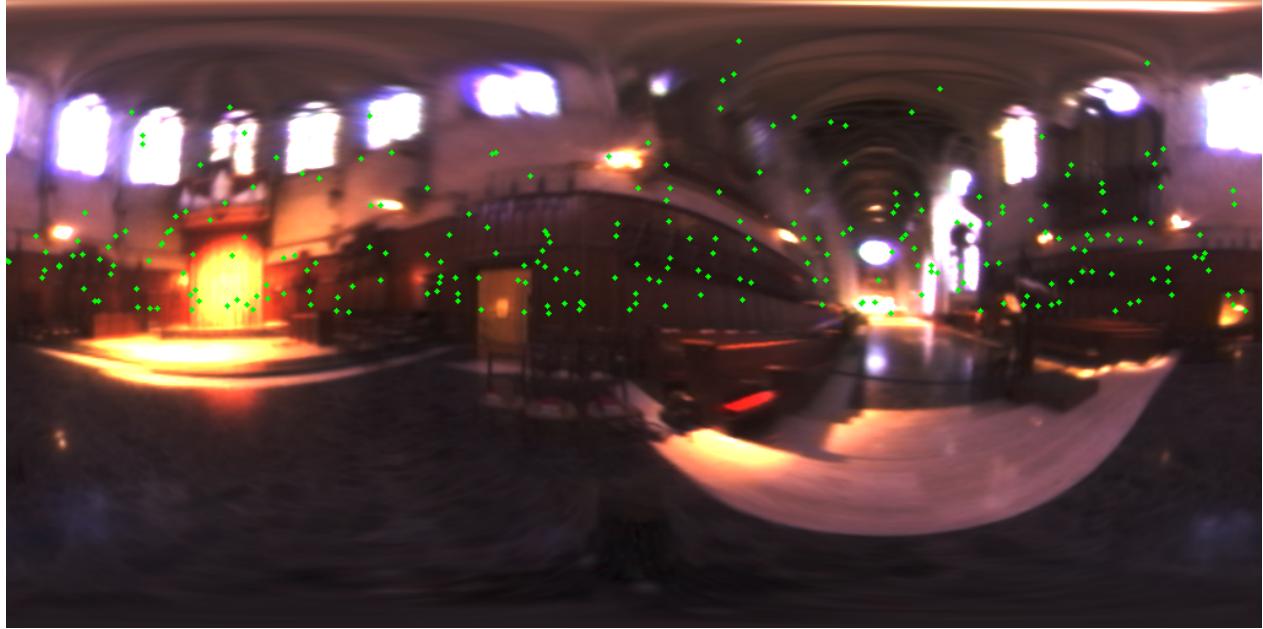


Figure 4.6: 256 diffuse Phong samples on the Environment Map ($s = 200$).

3 diffuse and specular

3 diffuse and specular

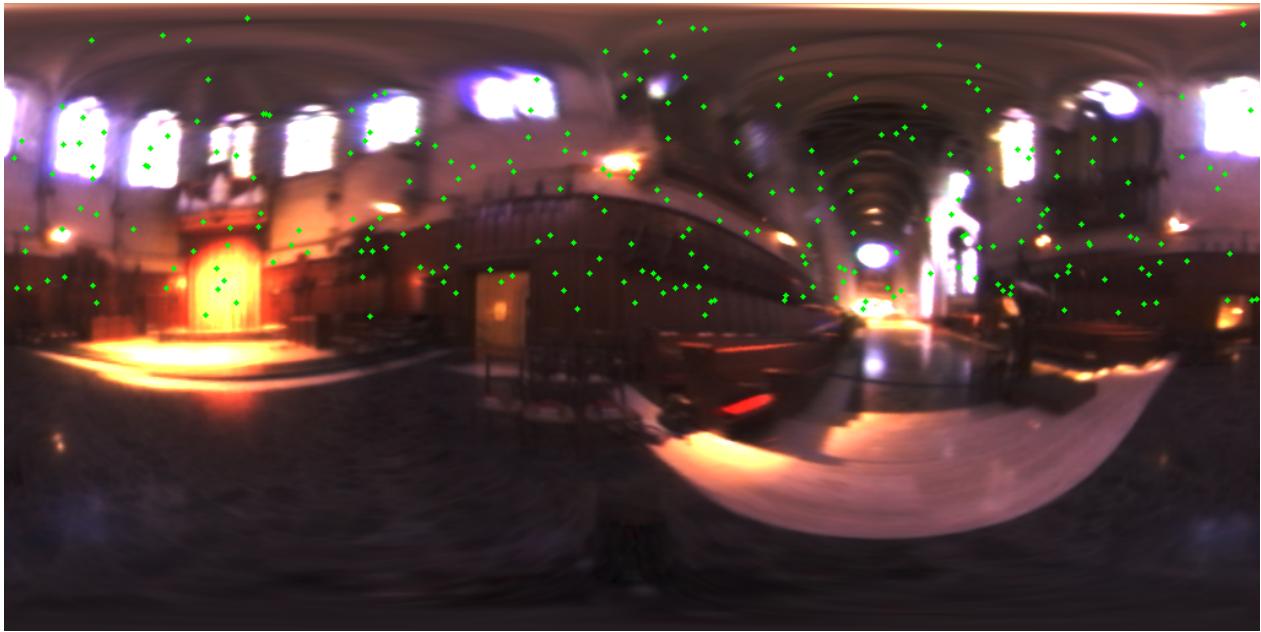


Figure 4.7: 256 diffuse and specular Phong samples on the Environment Map ($s = 1$).



Figure 4.8: 256 diffuse and specular Phong samples on the Environment Map ($s = 10$).

3 diffuse and specular

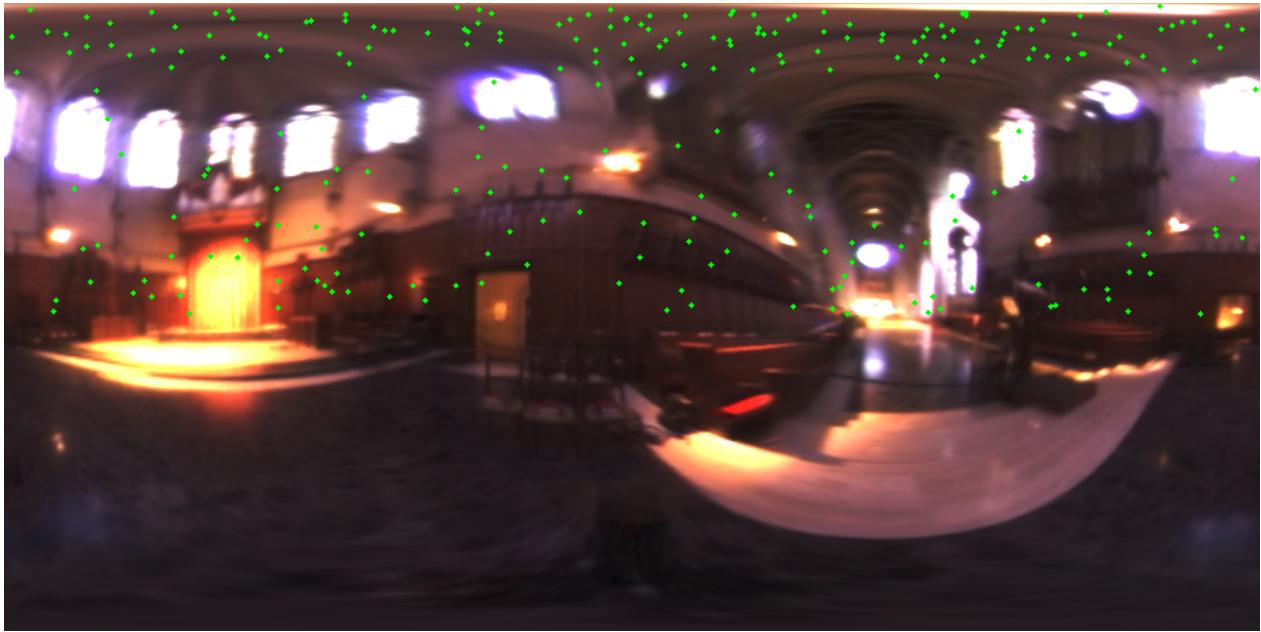


Figure 4.9: 256 diffuse and specular Phong samples on the Environment Map ($s = 50$).

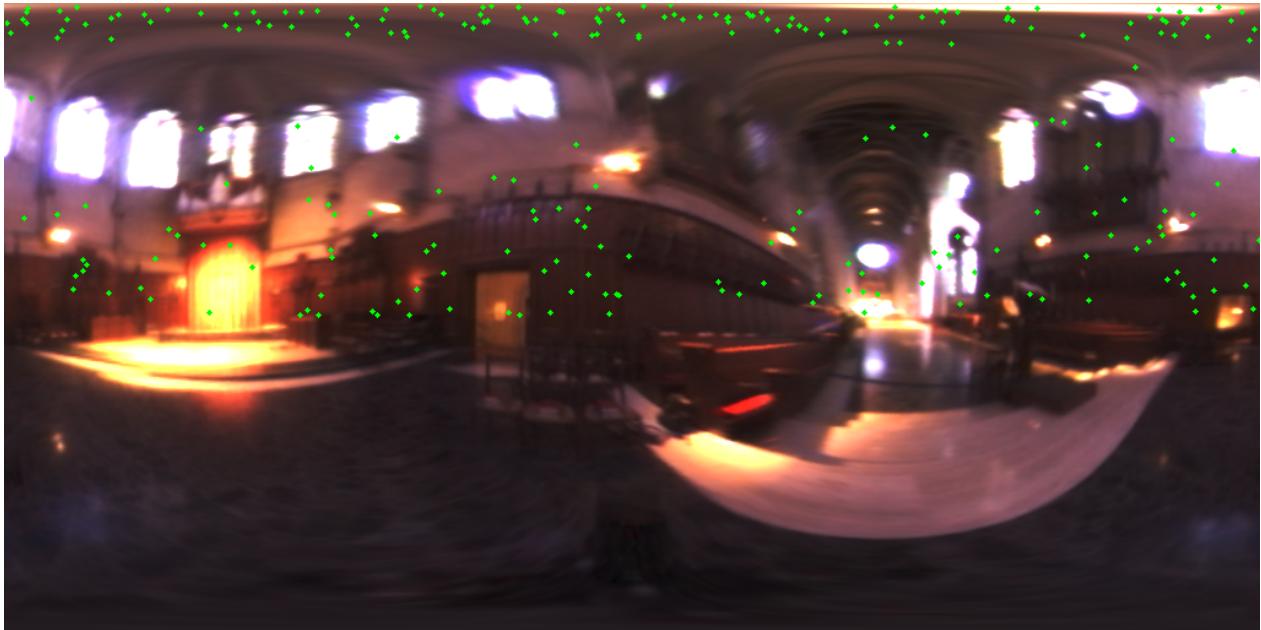


Figure 4.10: 256 diffuse and specular Phong samples on the Environment Map ($s = 200$).

Bibliography

- [1] Eric P Lafortune, Yves D Willems, et al. Using the modified phong reflectance model for physically based rendering. **Report CW**, 197:2–4, 1994.