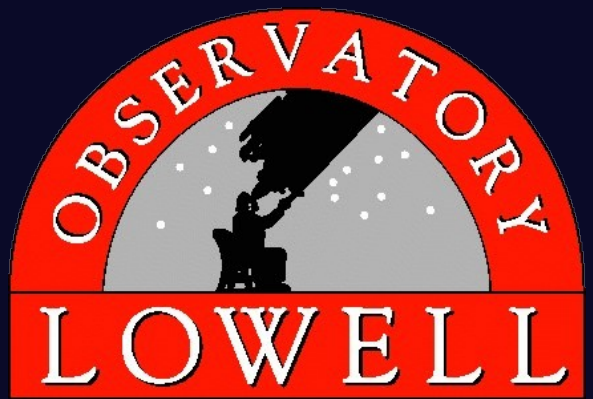
An Outer Solar System Perspective

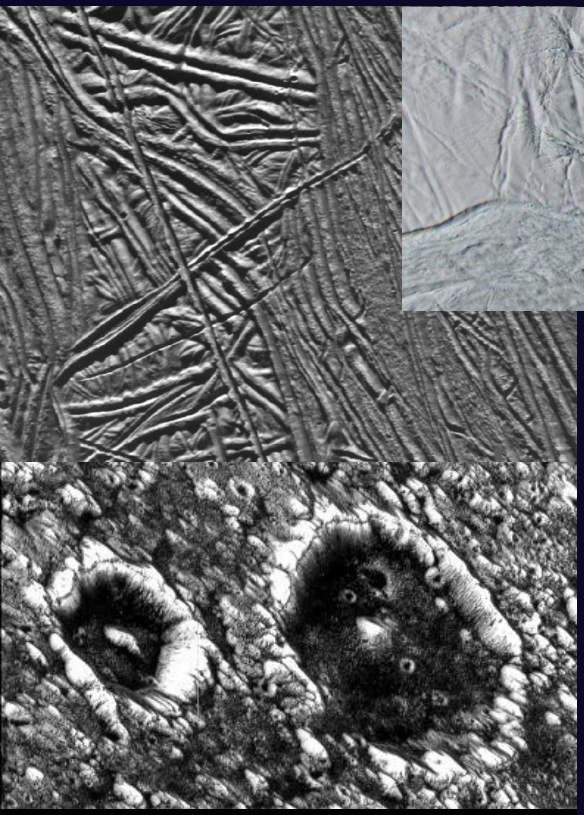
Will Grundy
Lowell Observatory

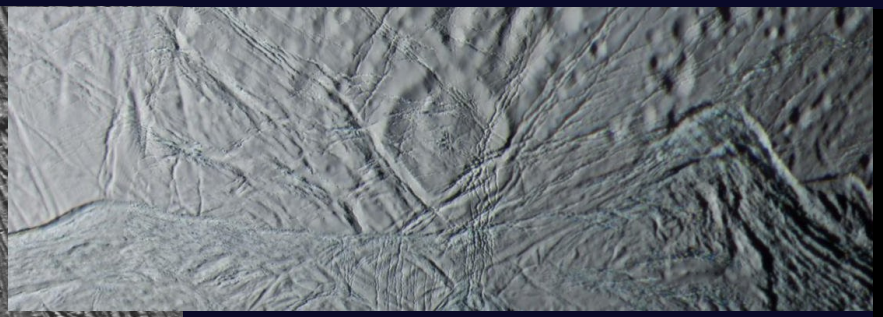


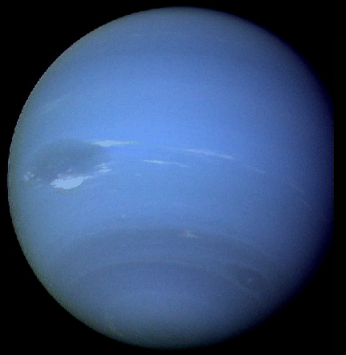
Outline

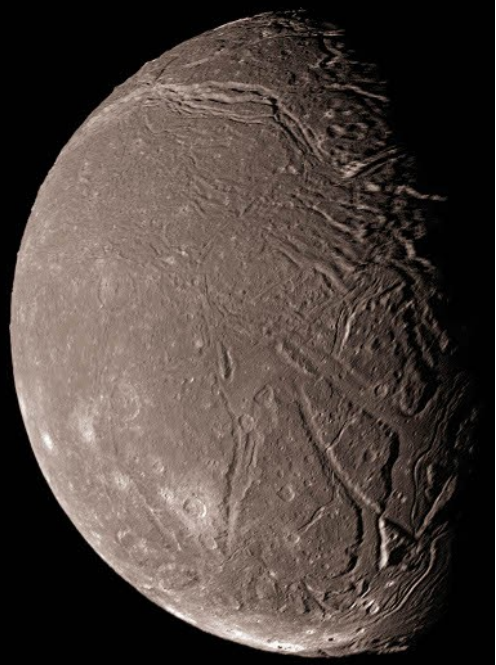
- Ice is the most abundant mineral in the solar system
- Ice remote sensing issues
- Distinct reservoirs of water?

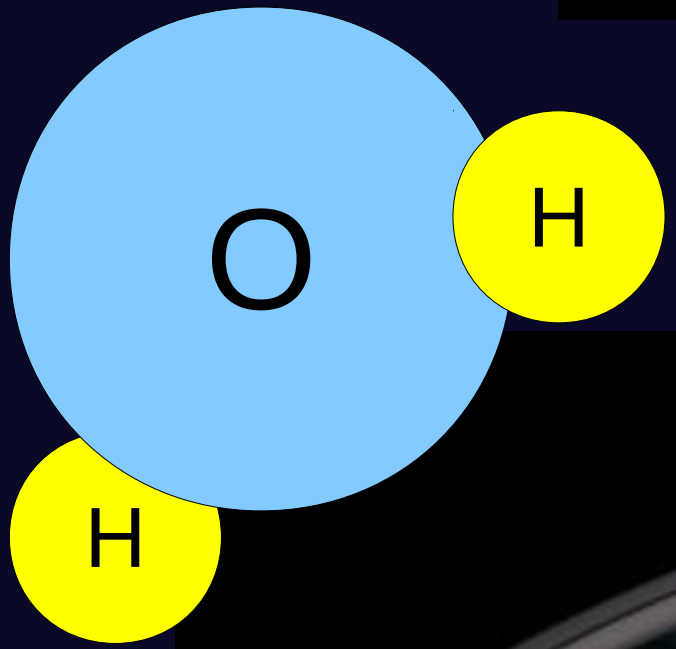
The Solar System's Most Abundant Mineral

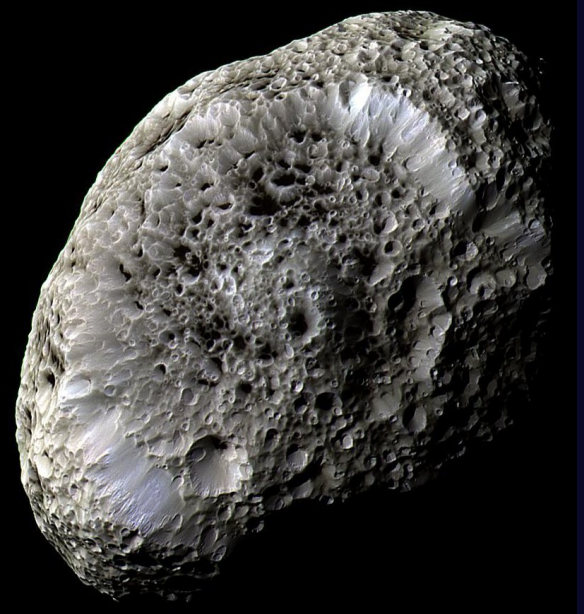




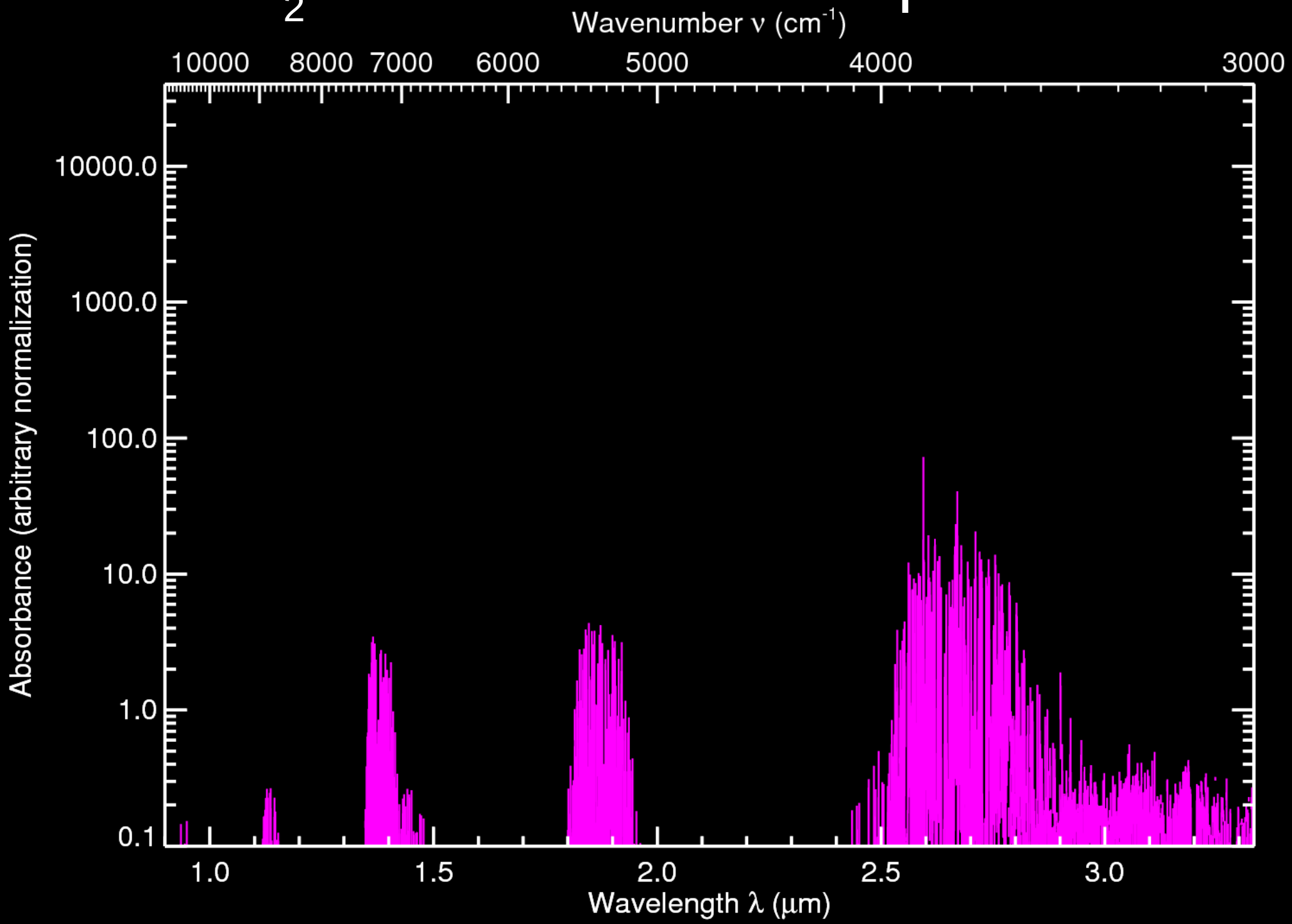








H_2O Vibrational Absorption



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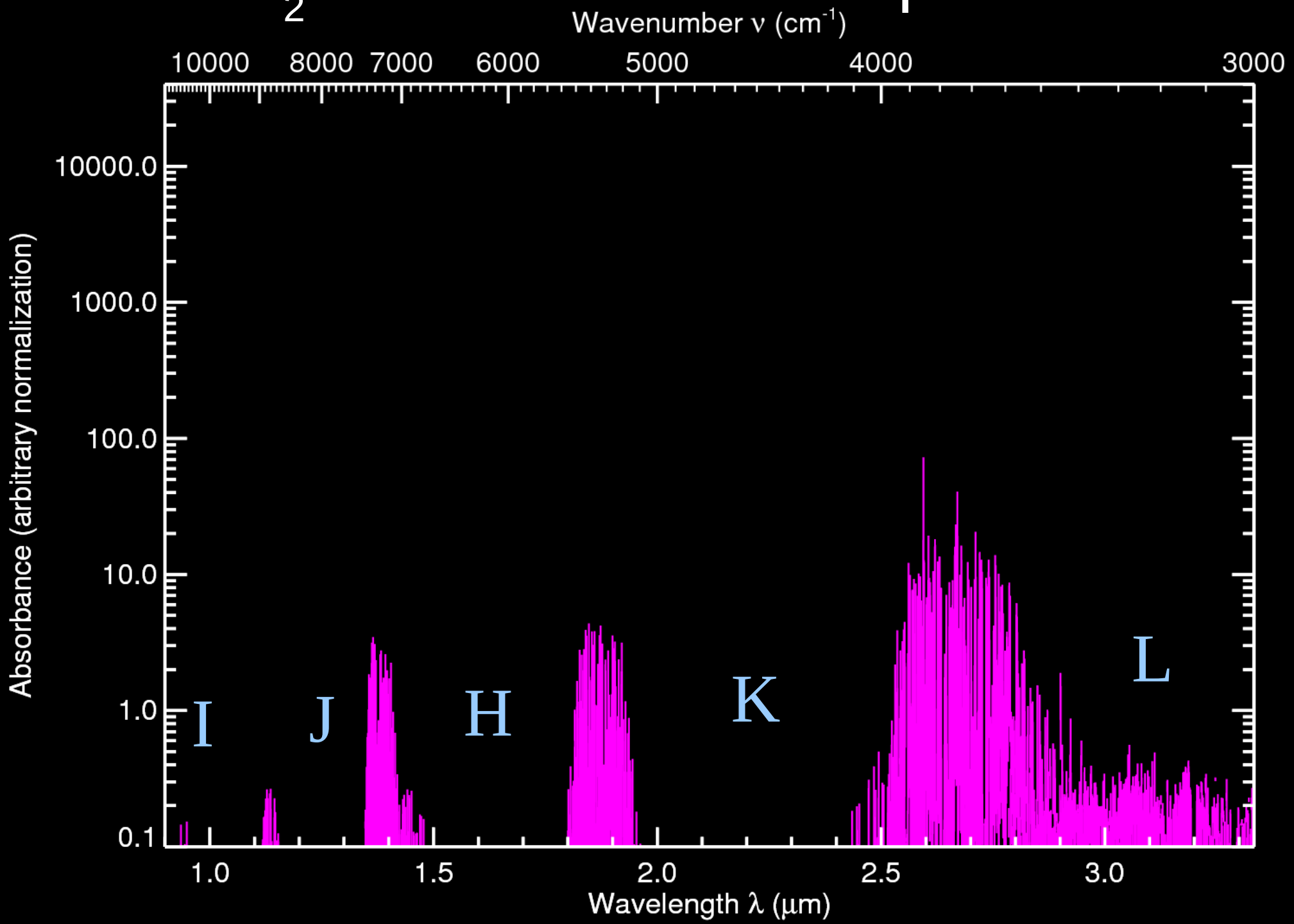

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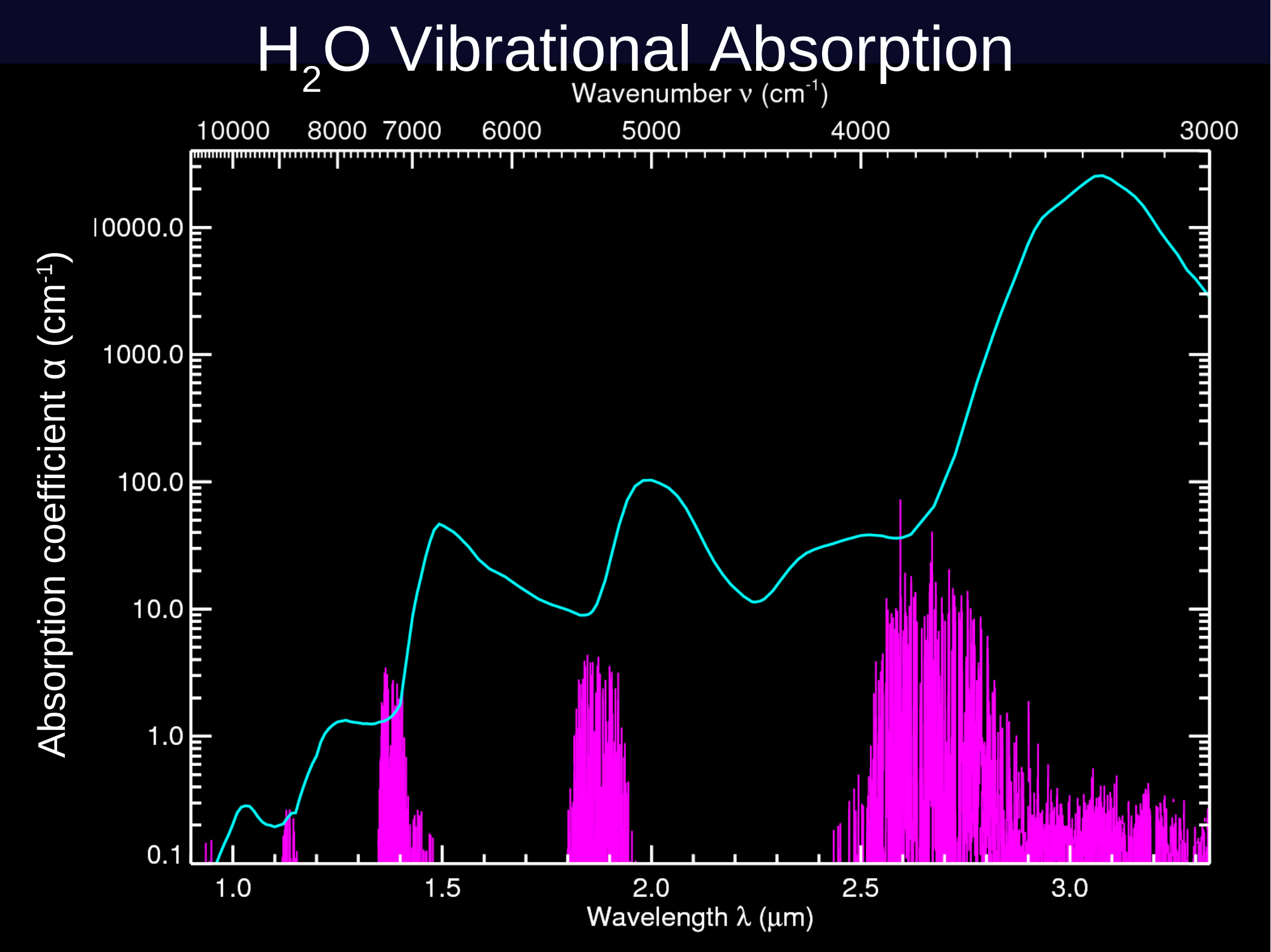
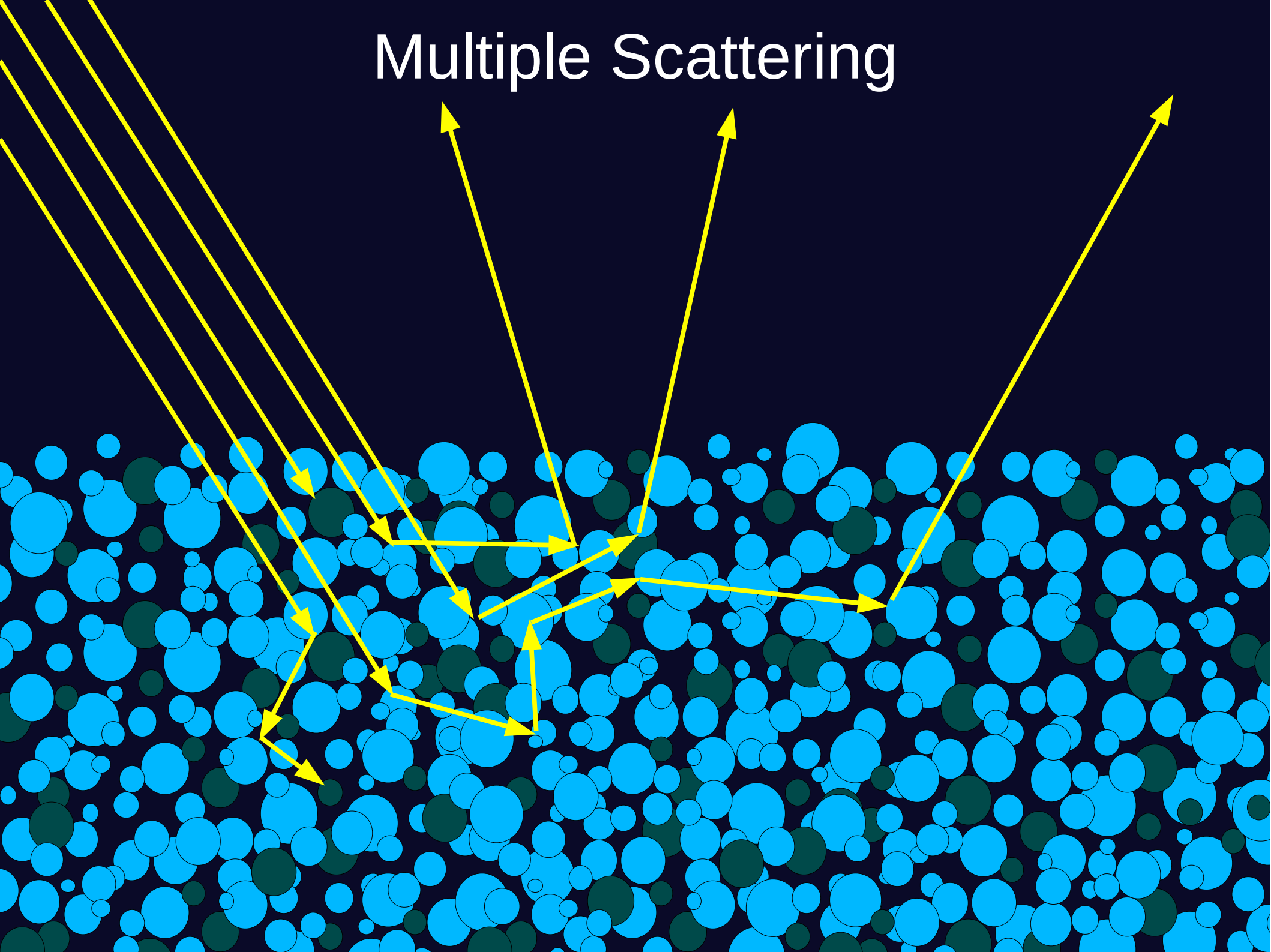
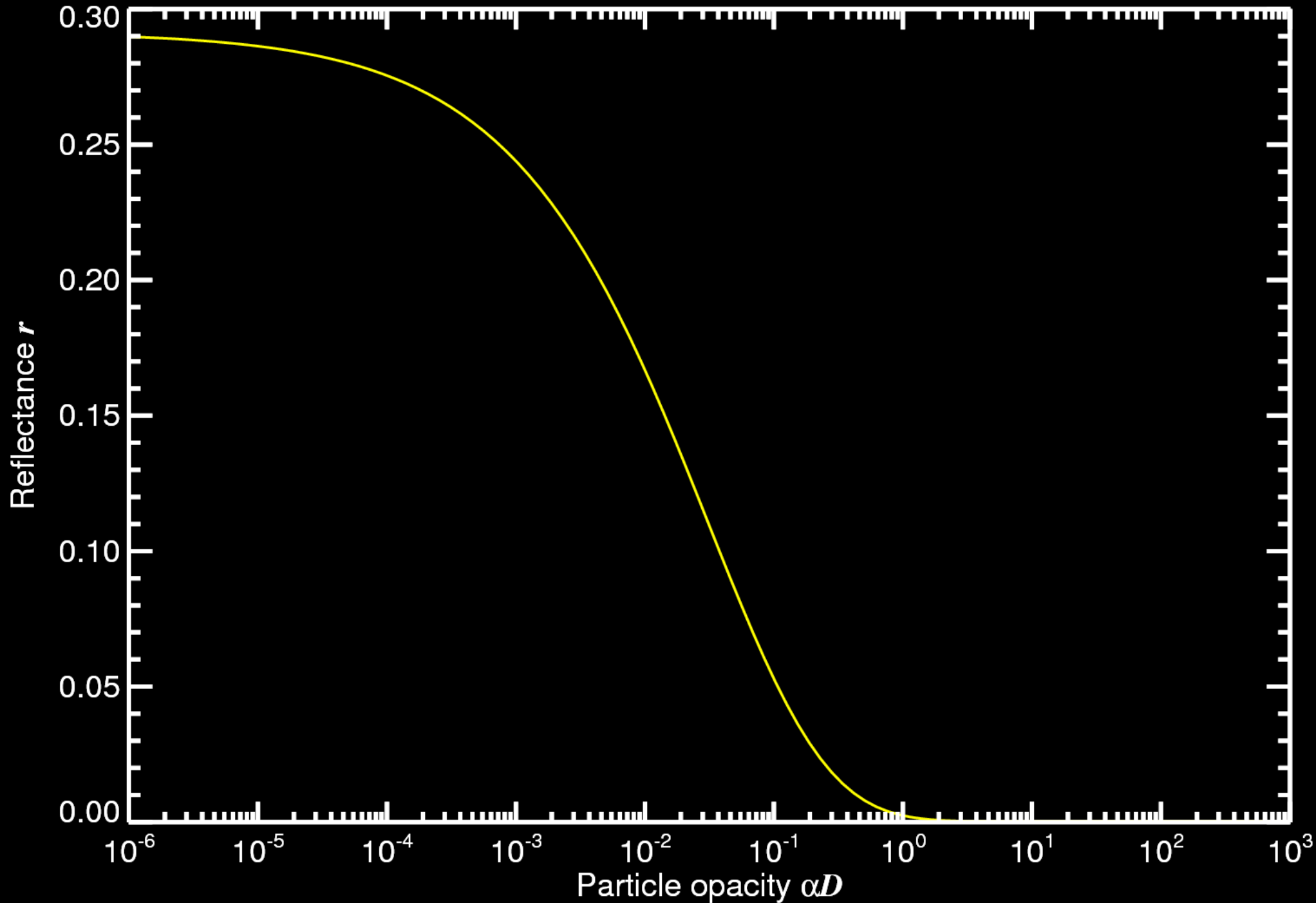
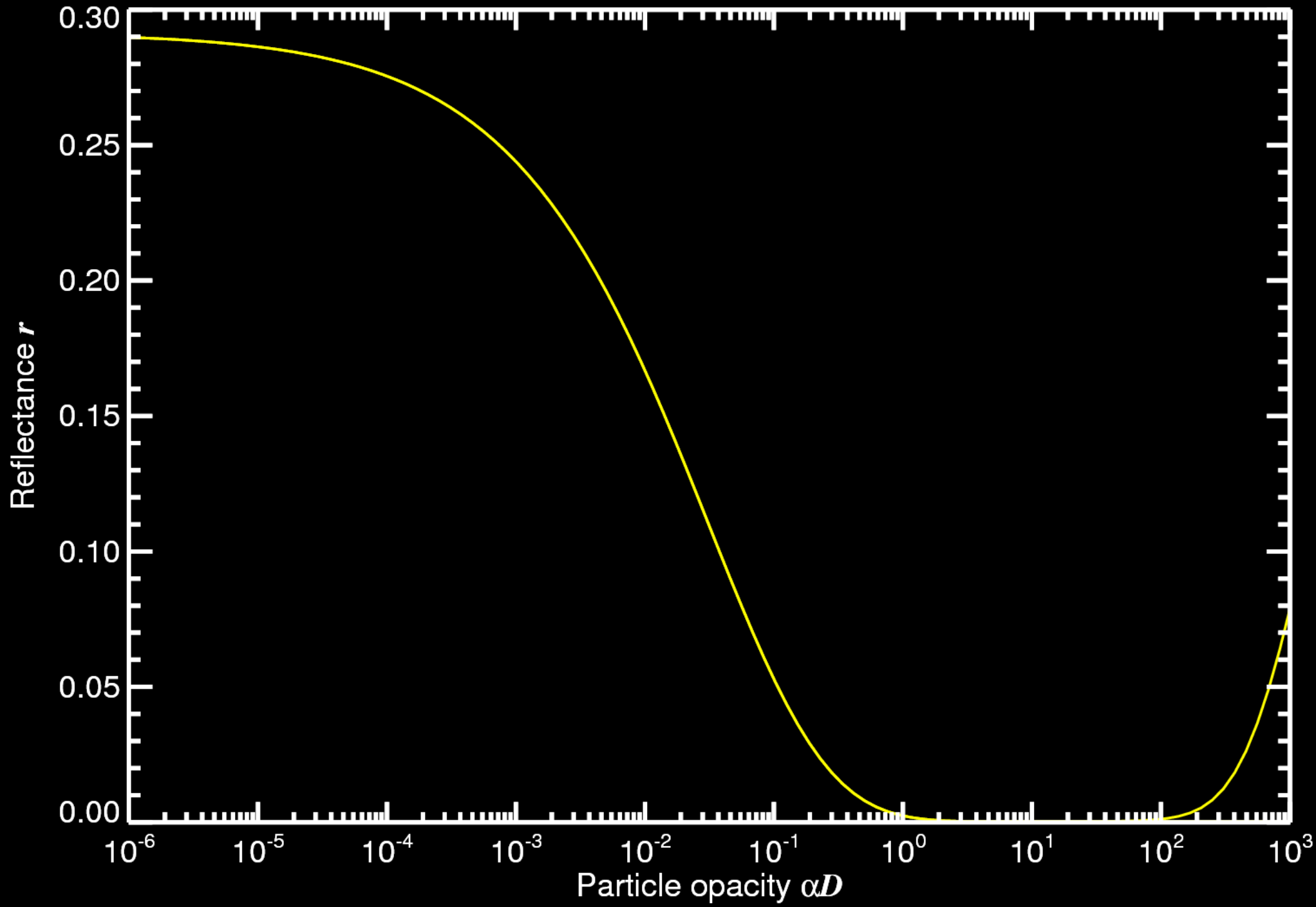


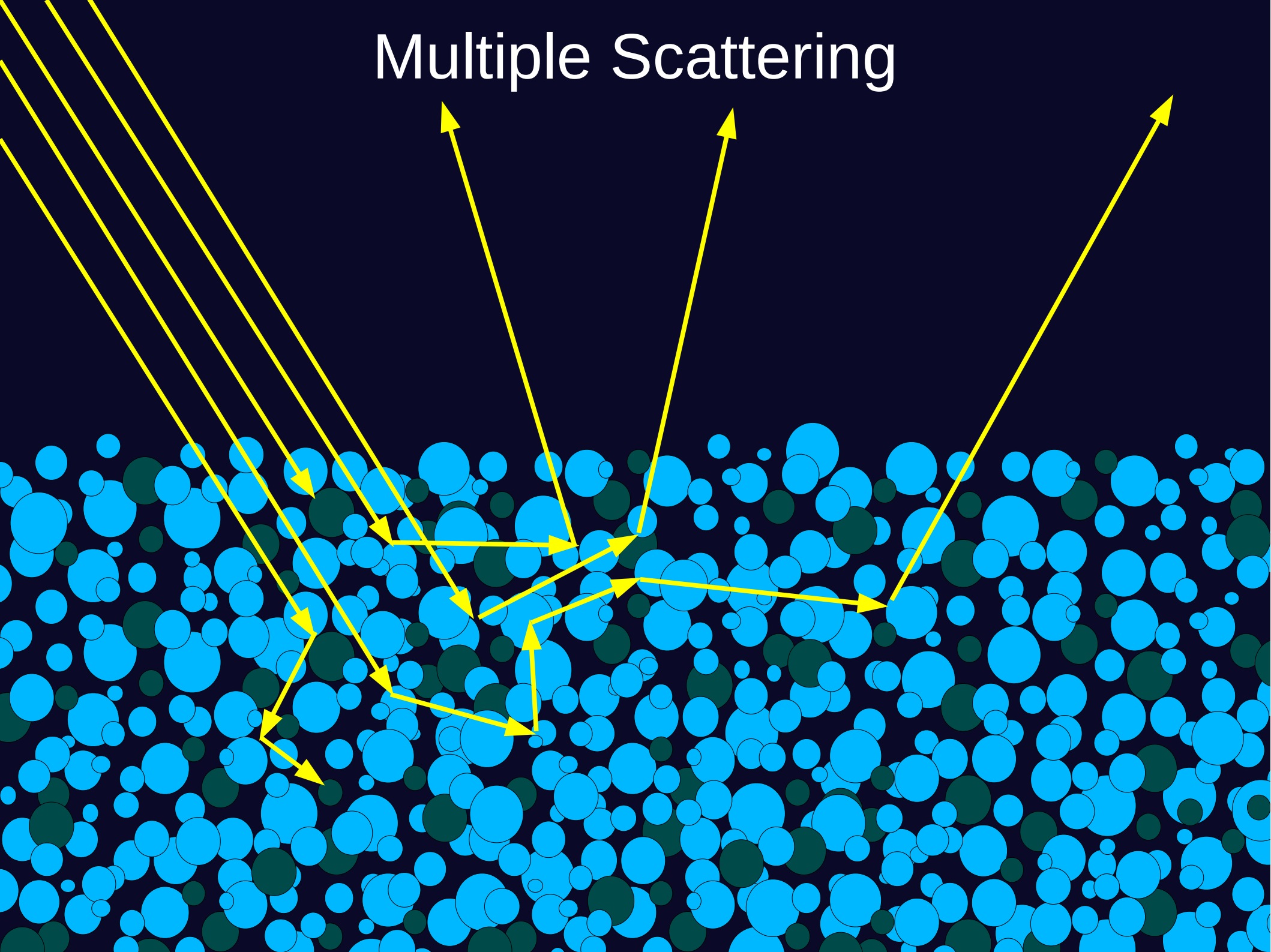

Multiple Scattering

Albedo Versus Opacity αD



Albedo Versus Opacity αD




Multiple Scattering

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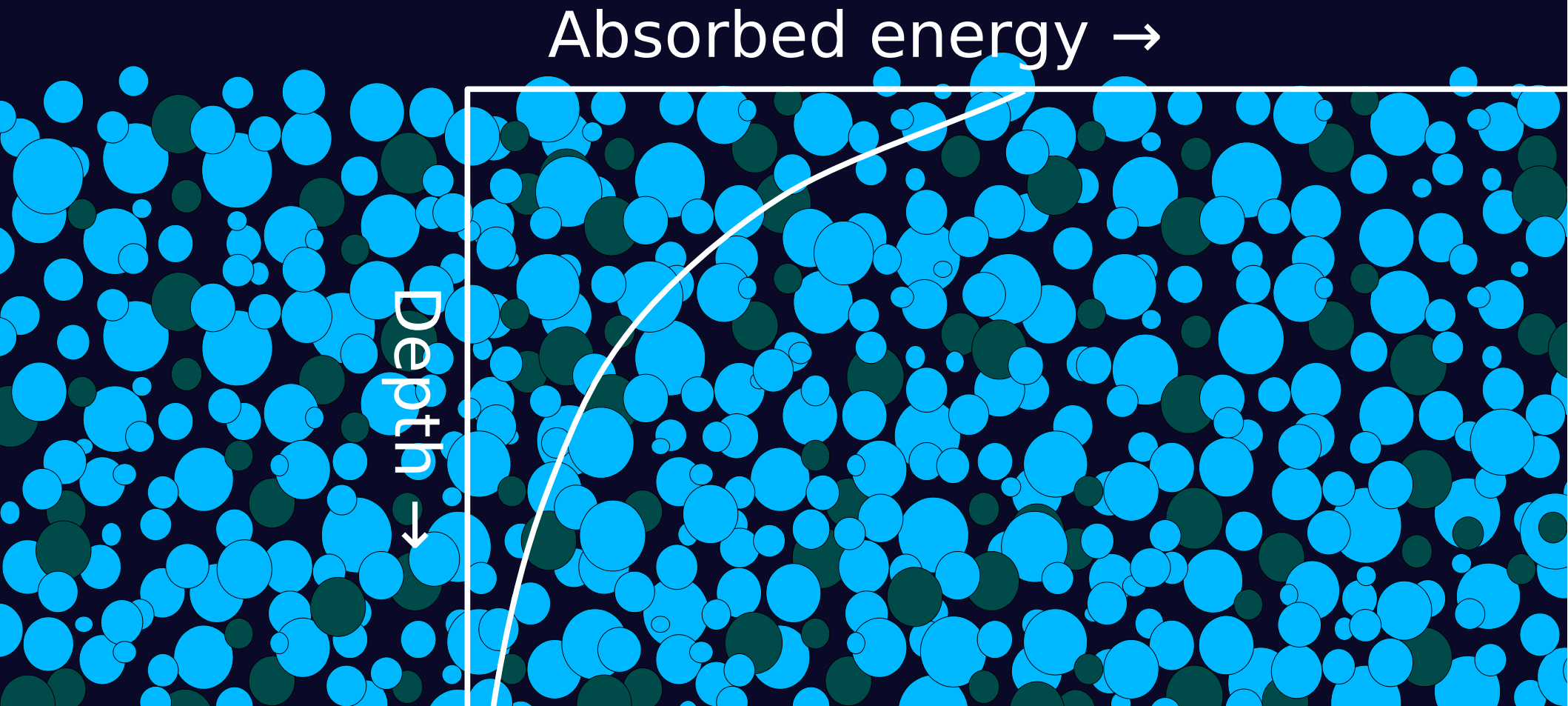

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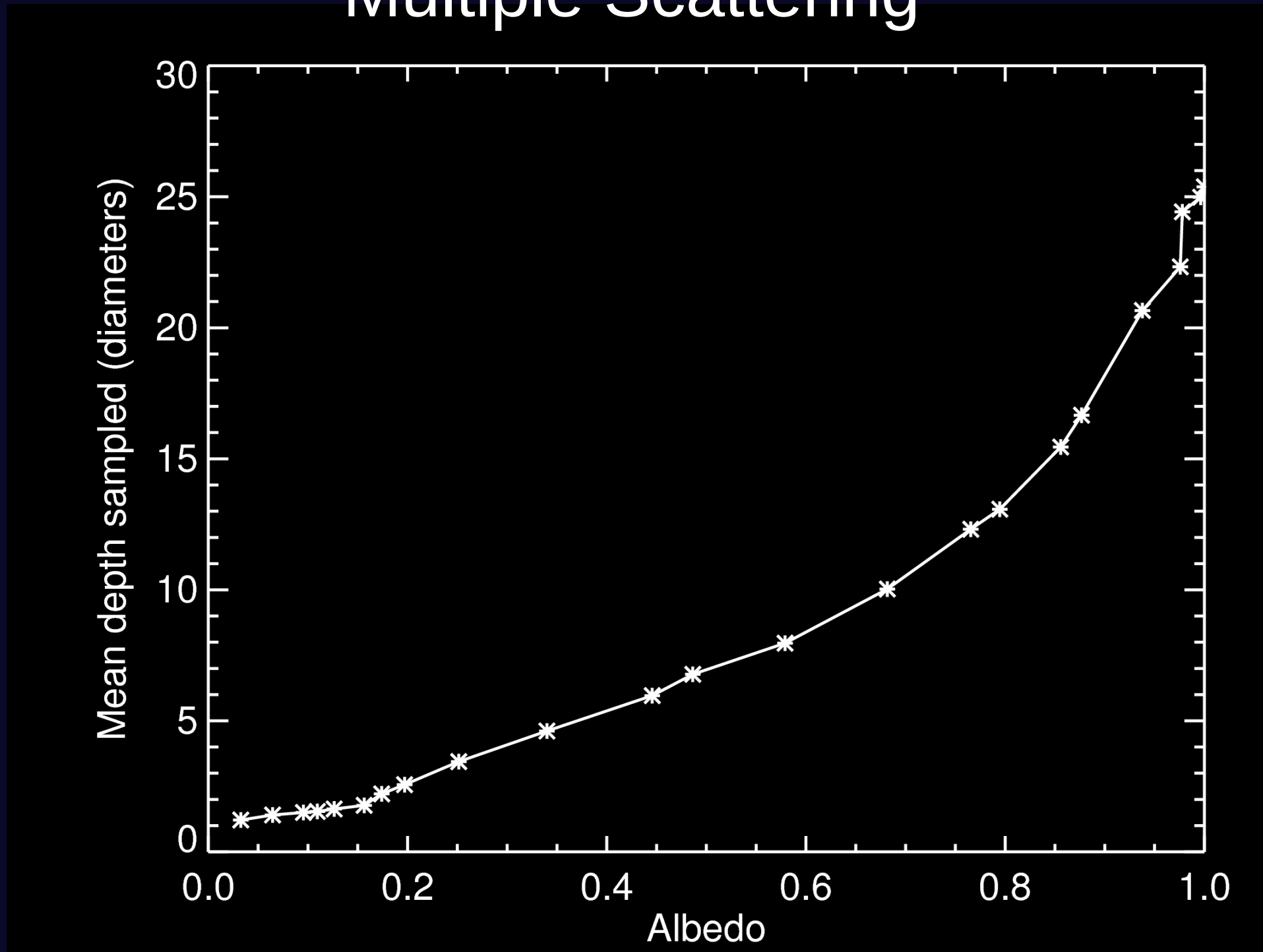
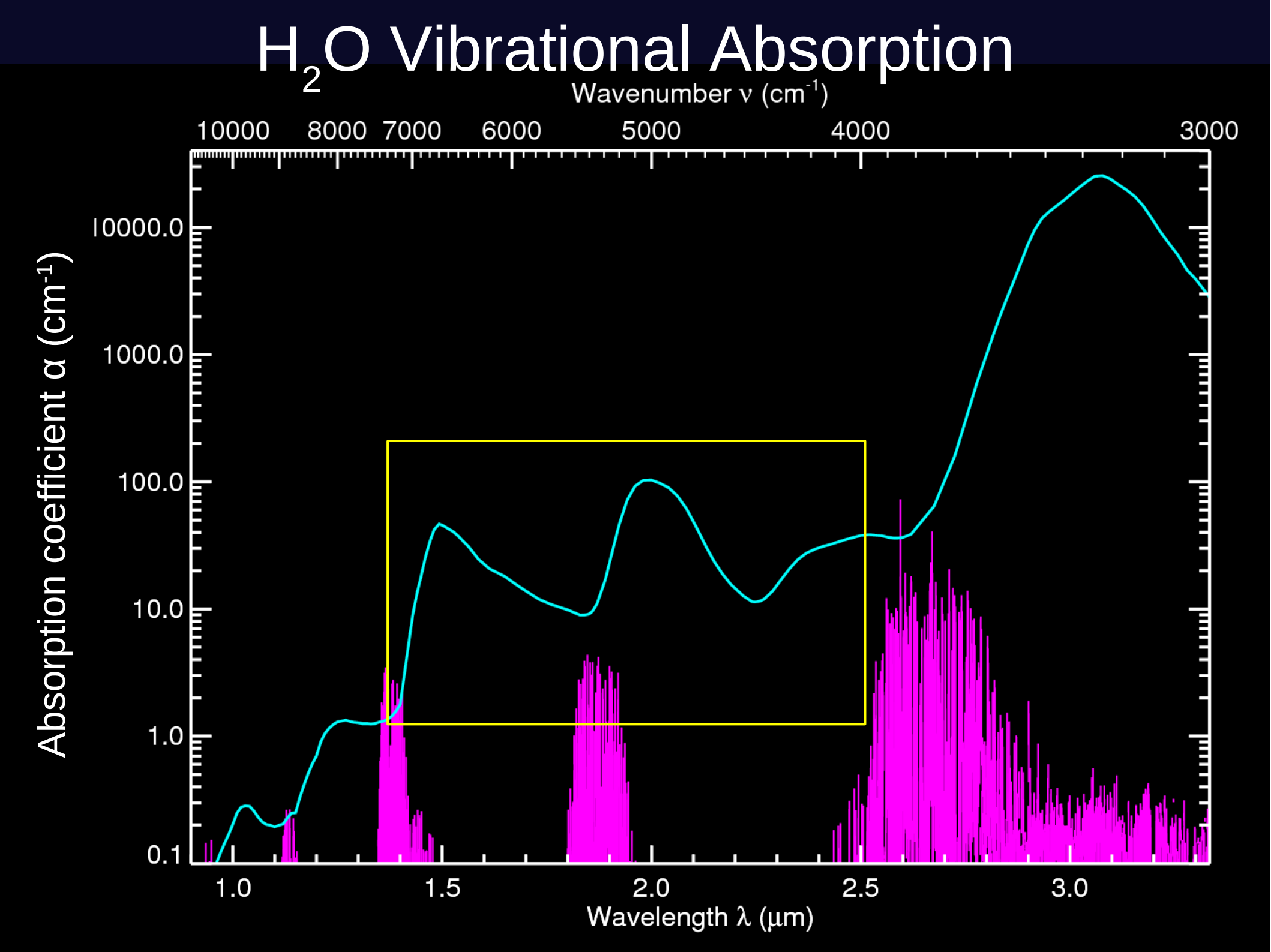
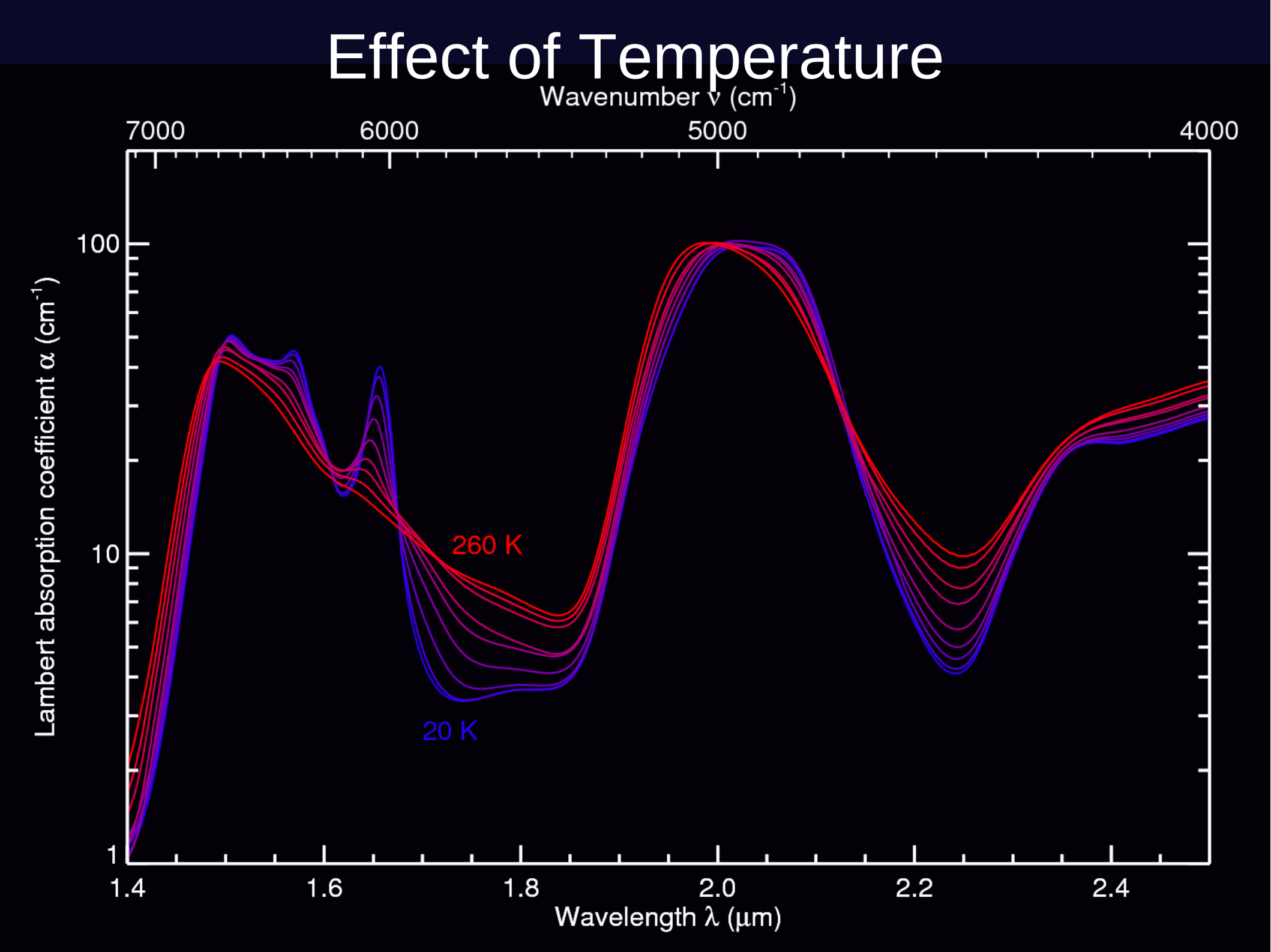


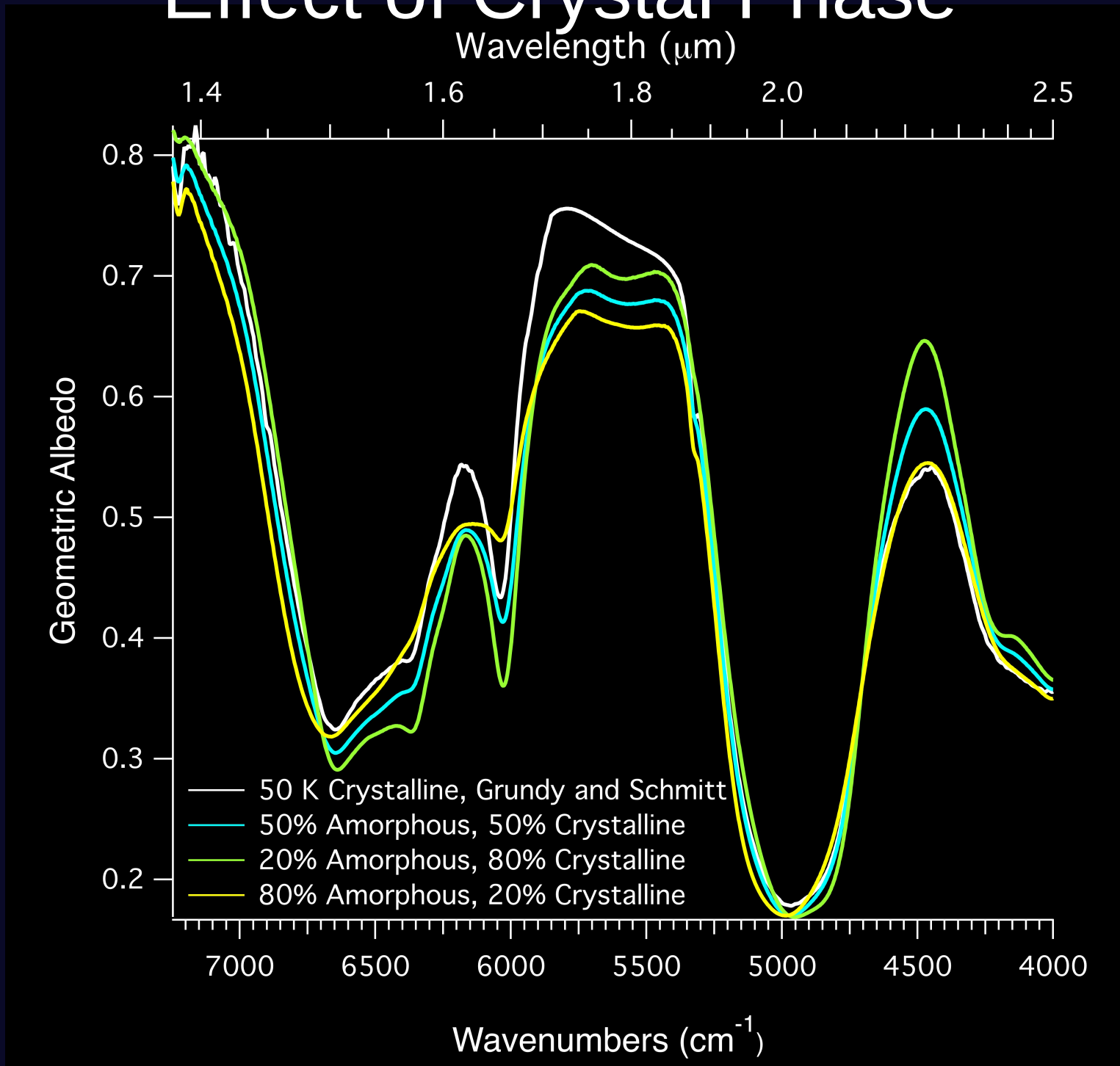
H_2O Vibrational Absorption



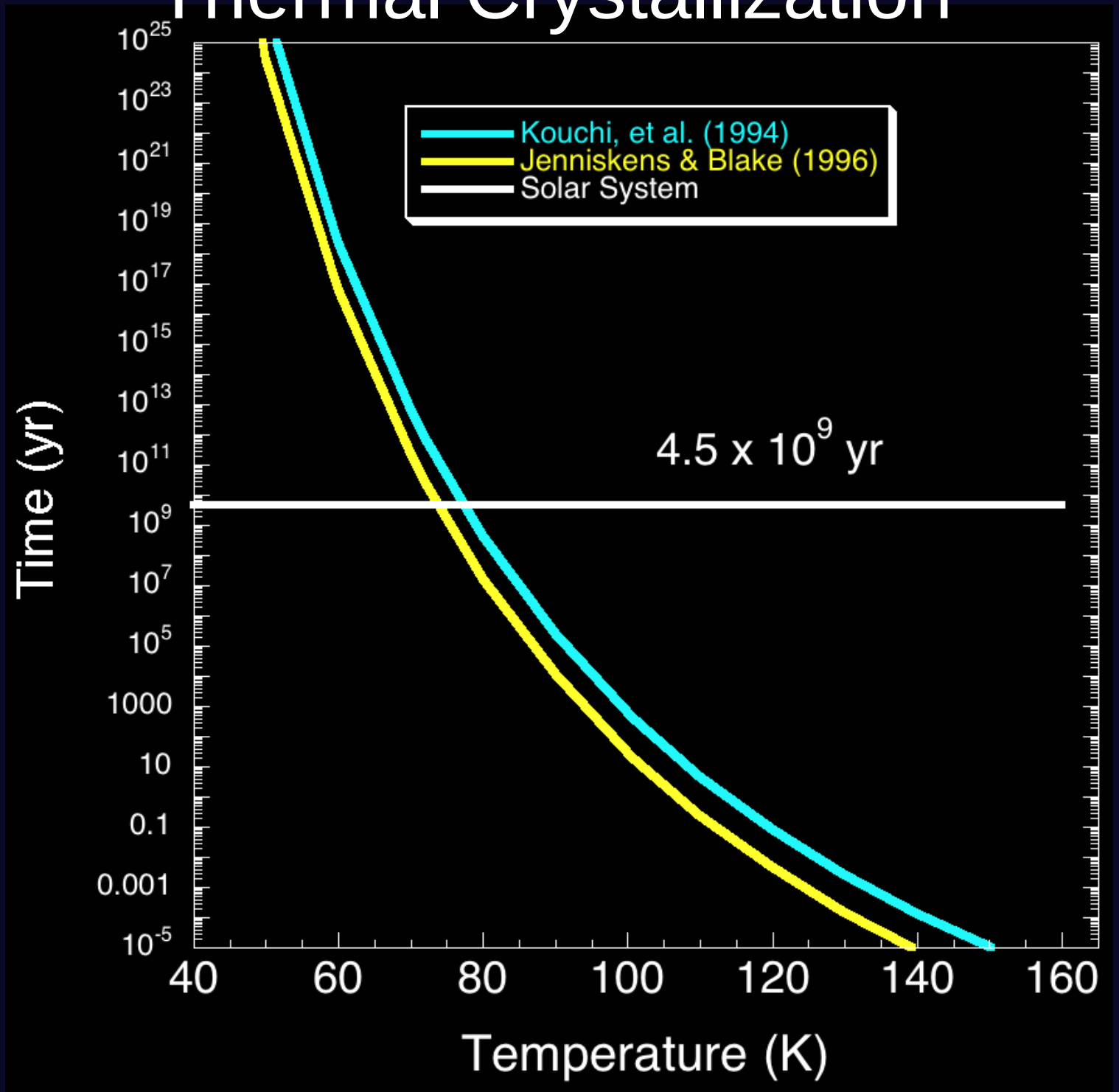
Effect of Temperature



Effect of Crystal Phase



Thermal Crystallization



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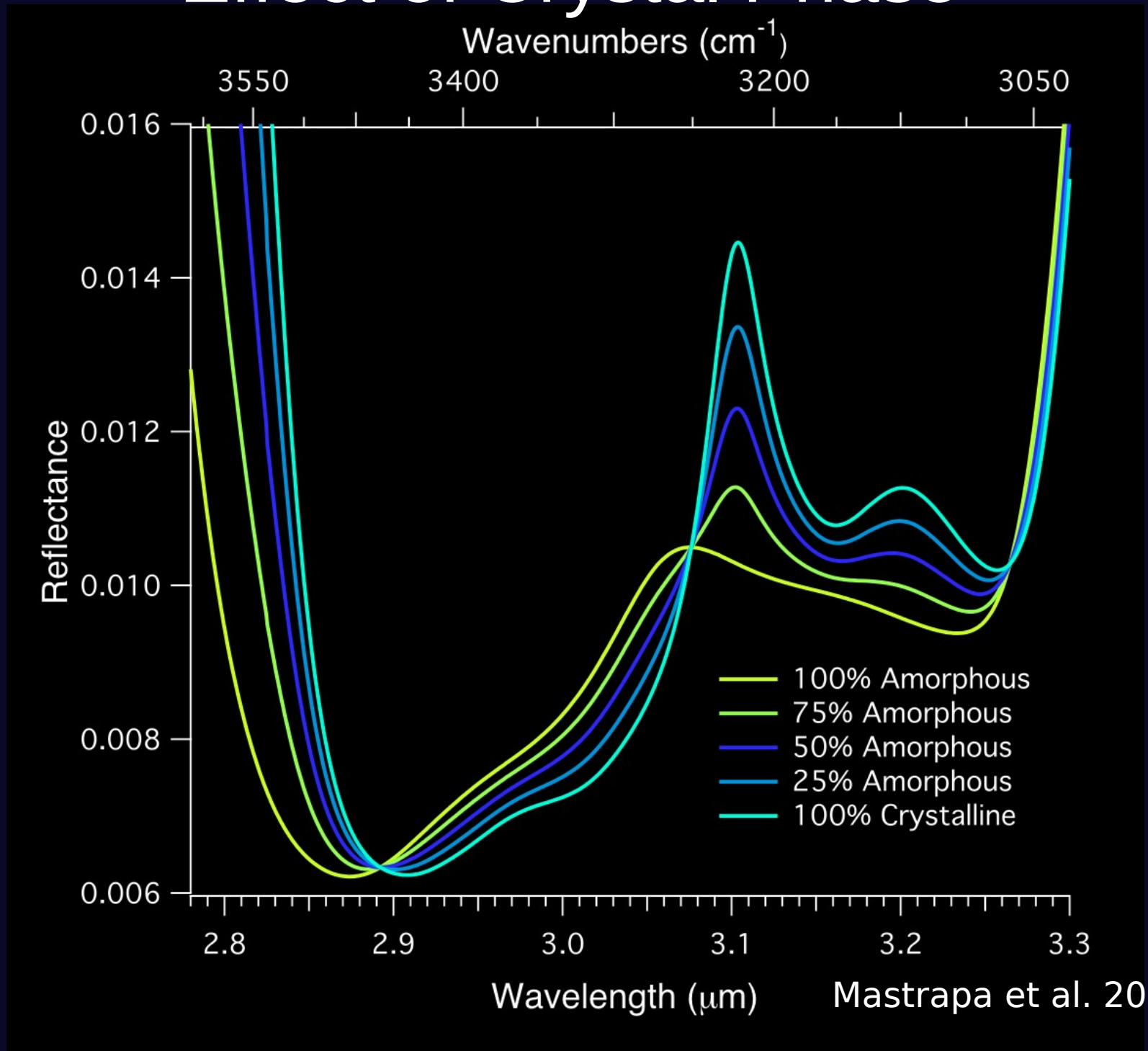
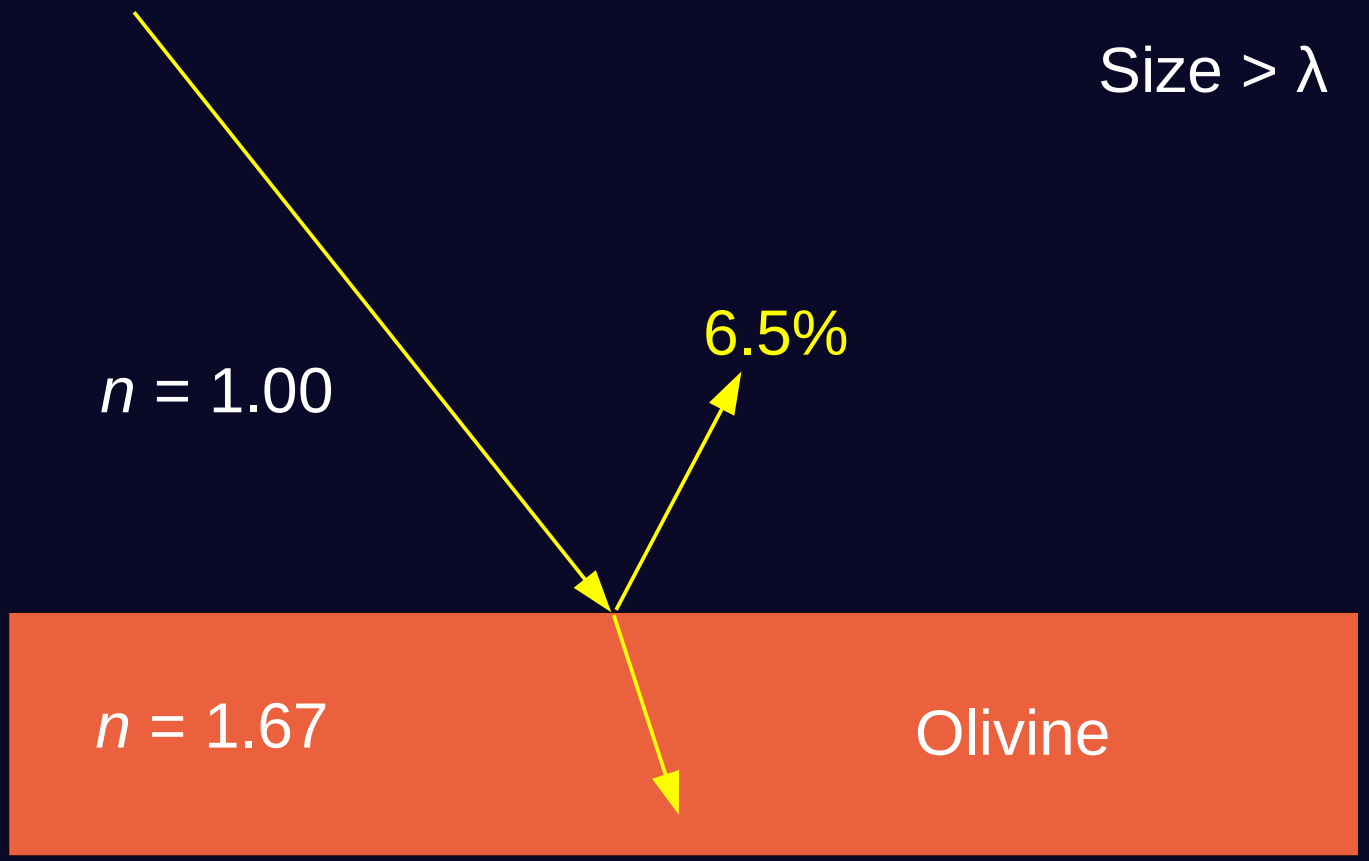


Mastrapa et al. 2012

Effects of Ice On Silicate Spectra



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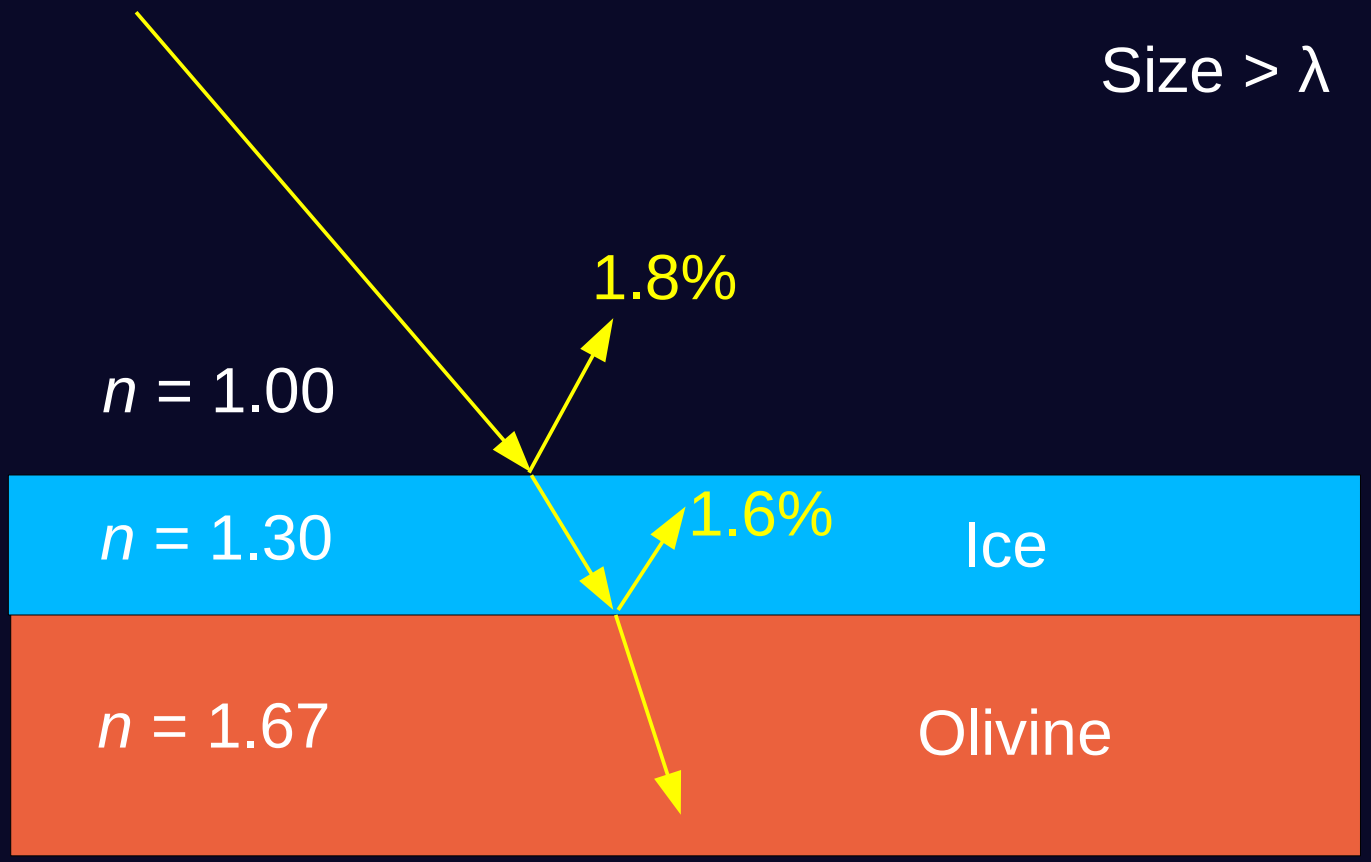
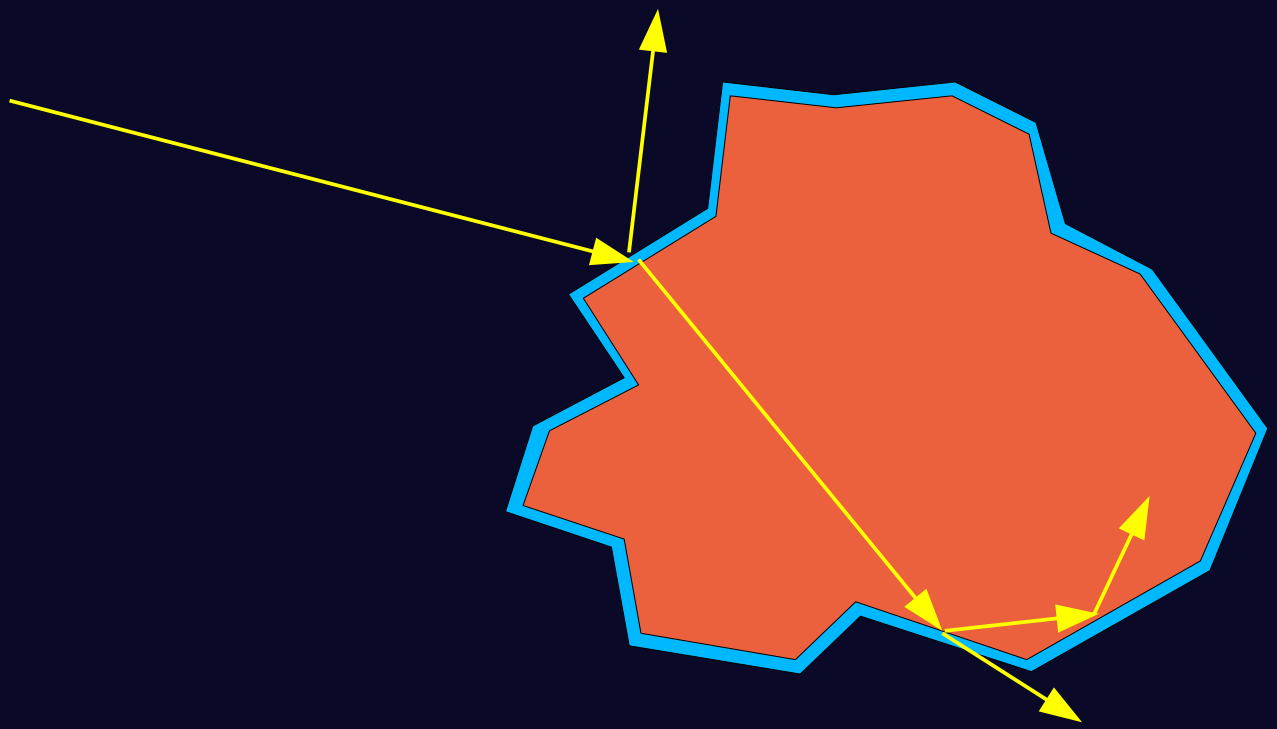


Effects of Ice On Silicate Spectra

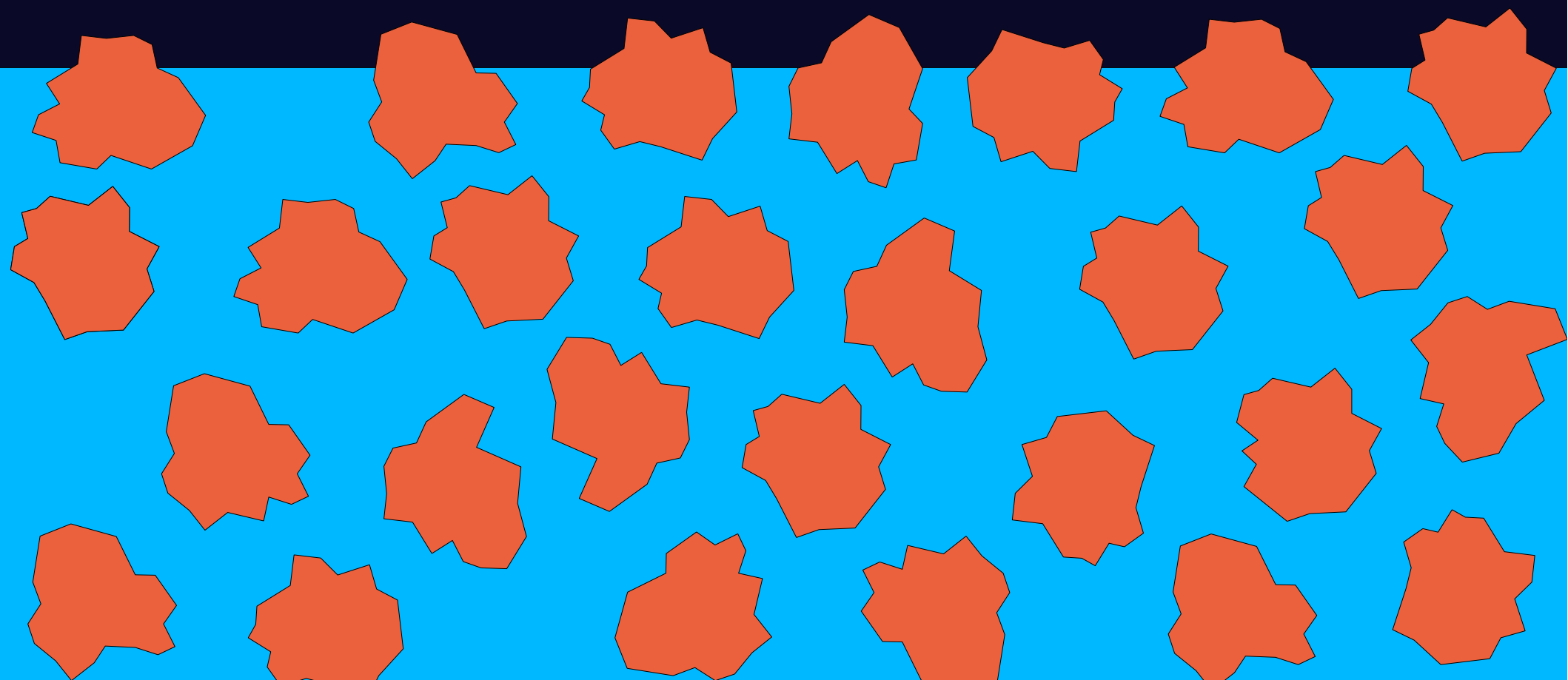
Size > λ



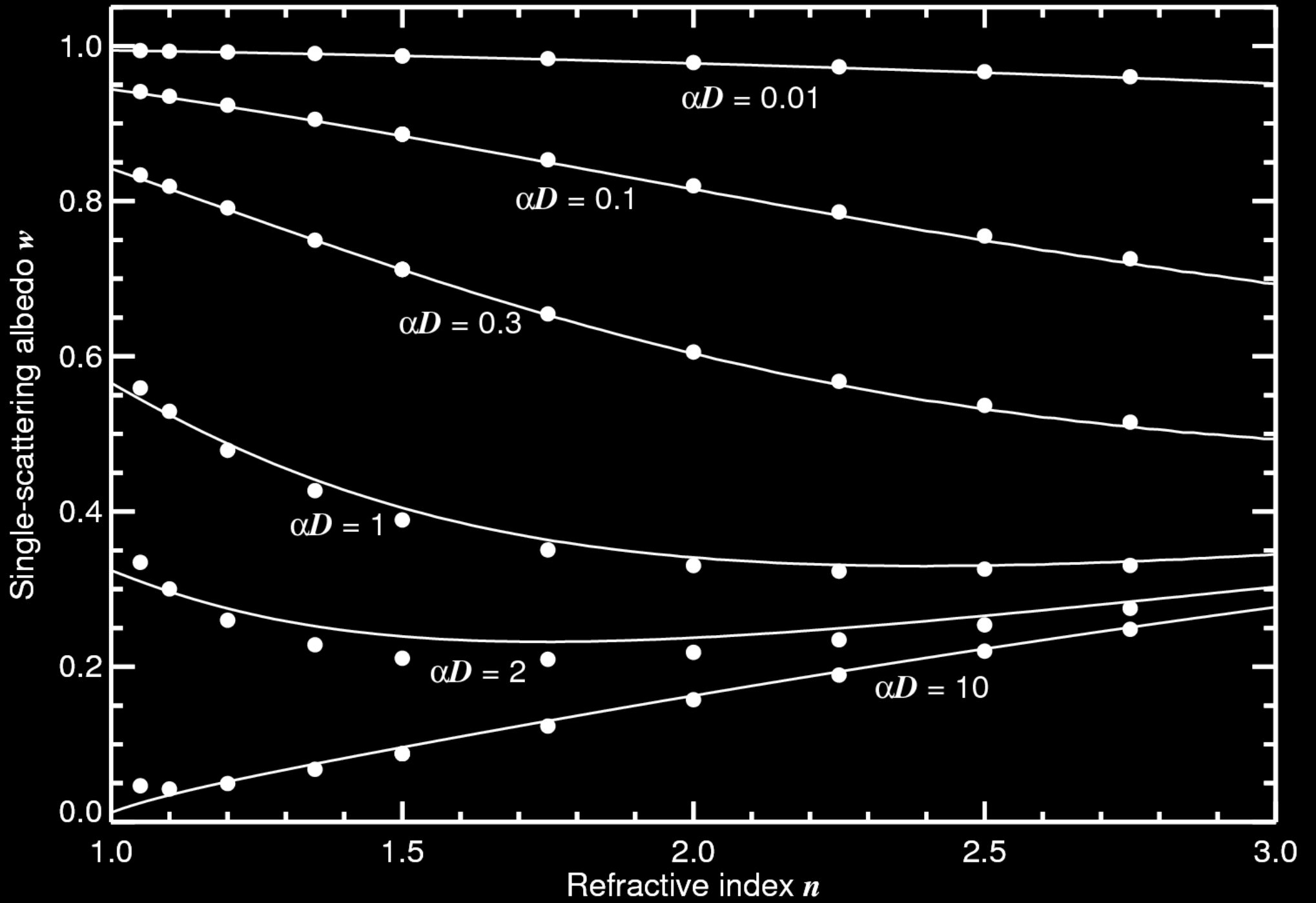
Ray tracing → $P(g)$ and w

Effects of Ice On Silicate Spectra

Size > λ



Effect of *n* Depends on α*D*



Summary

- Ice is a peculiar material: amazing spectral contrasts, very transparent at short wavelengths, low refractive index
- Potentially exploitable effects of thermal, phase state
- Implications for ice bands may be obvious, but can also affect spectral characteristics of materials it's with