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Introducing NASA Ames' new infrared optical constant facility. Determinations of complex refractive indices for Titan aerosol analogs and other applications.

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Abstract Text:

A new optical constant facility has been developed at NASA Ames that will allow the determination of optical constants in the infrared of various materials, analogs of (exo)planetary hazes and cloud particles. Our facility is composed of a Fourier Transform Infrared (FTIR) spectrometer continuously covering the Near-IR to Far-IR range (from 0.74 to 200 μm), coupled to variable angle transmittance and reflectance accessories that allow the characterization of the scattering properties of non-homogeneous samples (laboratory (exo)planetary aerosol analogs, films, slabs of material, crystals, powders, etc.) over a wide incidence and emittance angle range (0-90 degrees). This new experimental setup allows the characterization of angular light distribution in both transmission and reflection measurements, and enables the determination of the complex indices of refraction, n and k, over the full NIR-FIR range via modeling of the laboratory measurements [1,2]. The resulting refractive indices are critical input parameters in radiative transfer models, microphysical models, cloud models, protoplanetary disk simulations and other models used for the interpretation of observational data from past, current and future (exo)planetary NASA missions. Here we present a description of the facility along with the first determination of optical constants for Titan aerosol analogs produced in the Titan Haze Simulation (THS) experiment on COSmIC, a unique experimental setup developed at NASA Ames that allows the simulation of Titan's complex atmospheric chemistry at Titan-like temperature

(200 K) [3-5]. We also introduce a new study of the optical properties of ammonium-bearing phosphates, potential cloud particles forming in temperate exoplanets and brown dwarfs.

References:

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[4] Sciamma-O'Brien, E. et al., Icarus, 289, 214-225, 2017.

[5] Raymond, A. W. et al., ApJ. 853, 107, 2018.

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Abstract Title:
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Requested Presentation Type:
Assigned by Program Committee (oral or Poster)

Previously Published?:
Yes

Previously Published Material:
Some preliminary results were presented at the AAS Laboratory Astrophysics Division Annual meeting in Saint Louis in June. We plan to have a paper submitted with the final results by the time AGU comes.

AGU On-Demand:
Yes

Comments to Program Committee:
FYI: I am the co-convener of session P003 and would like to be in my session. Hopefully P005 and P003 will not be at the same time... If they are I will just miss the P003 session.

Abstract Payment:
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