



Contribution ID: 20

Type: Contributed talk

A Near-Infrared Spectral Library of Very Young Brown Dwarfs and Planetary-Mass Objects in the Orion Nebula Cluster

Tuesday, December 16, 2025 11:50 AM (20 minutes)

Age-benchmark brown dwarfs' and planetary-mass objects' spectroscopy is key to characterize substellar evolution. In this paper we present the JHK medium resolution ($R \sim 3000$) spectra of 25 $7-76 M_{\text{Jup}}$ (spectral types L3.0-M6.0) brown dwarfs and planetary-mass objects in the Orion Nebula Cluster obtained with MOSFIRE installed at the W. M. Keck telescope. We obtained the spectral types of the targets in our sample using template brown dwarf and planetary-mass objects' spectra. We confirmed their extreme youth (< 5 Myr) and membership to the cluster using spectral indices, and the diversity of their spectra even for targets with similar spectral types. Six of our targets presented Pa- β and Br- γ emission lines, suggesting the existence of accreting protoplanetary disks to objects with masses as low as $7 M_{\text{Jup}}$. After analyzing the emission lines of those objects, and measuring their accretion rates, we compared them to those of stars, brown dwarfs and planetary-mass objects, confirming that planetary-mass young objects deplete their disks quickly at young ages. Finally, we illustrate the spectral evolution of a $7-10 M_{\text{Jup}}$ planetary-mass object through its life from 1-3 Myr to 200 Myr old using one of our targets.

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Session Classification: Spectra / Atmospheres

Track Classification: In-person