HITRAN2024 Data for Planetary Atmospheres

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Over the past few decades, the number and variety of known exoplanets has expanded as telescopes (e.g., JWST) and detection methods (e.g., transit spectroscopy) have substantially improved. Exoplanets of the hot-Jupiter variety were the first to have their atmospheres studied, revealing distinctive spectral signatures of water and methane in high-temperature environments. As exoplanet observation and retrieval techniques have developed, molecule-rich atmospheres with temperatures approaching the terrestrial regime can now be probed. In addition, the complexity of models applied to exoplanet atmospheres require accurate spectroscopic parameters to retrieve reliable molecule abundances and infer atmospheric processes. The HITRAN database is especially well suited to provide molecular data for terrestrial-like planets, but also includes data for planetary environments such as H_2, He, or CO_2-rich atmospheres. HITRAN2024 includes 61 molecules in line-by-line parametrization, absorption cross sections for over 600 molecules, collision-induced absorption data for many collisional pairs, MT_CKD water vapor continuum, and aerosol properties. HITRAN also provides supplemental programs and files including HAPI, as well as the HITEMP database. This talk will highlight updates made for HITRAN2024 with an emphasis on the additions and improvements of relevance to (exo)planetary atmospheres.