

Non-LTE opacities and radiative transfer for exoplanets

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A new tool for solving radiative transfer problems and computing molecular opacities in non-LTE exoplanet atmospheres is presented. The ultra-hot Jupiter KELT-20 b is used as a case study to test the wavelengths at which non-LTE effects may be detectable. It is shown that upper atmospheric OH in vibrational non-LTE should be observable primarily via hot bands in the mid-infrared and visible. Enhanced emission in non-LTE may impact retrieved abundances by a factor of 10. Using recent calculations for the photodissociation cross sections of OH it is shown that non-LTE effects can increase the total photodissociation rate by two orders of magnitude, which is likely to have a significant impact on atmospheric modelling.