Excursions into inversions: first results from the QUB secondary eclipse campaign

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Detecting and measuring thermal emission from exoplanets immediately before and after occultation by their host stars is an important tool for studying exoplanet atmospheres. Taking this measurement over a range of wavelengths allows an emission spectrum to be built up, which alludes to atmospheric features including chemical composition, thermal structure and circulation efficiency. To date, secondary eclipse observations have largely been at wavelengths red-ward of 1 μm, in no small part due to the fact that most targets are insufficiently large or hot to have detectable secondary eclipse signals at shorter wavelengths with current instrumentation. Observations of secondary eclipses in the i- and z-bands are of particular interest as this window contains prominent TiO and VO features (compounds thought to give rise to temperature inversions in the hottest exoplanets) and is a good discriminator between models for carbon-rich and carbon-poor planets. There have also been notable discrepancies in the reported secondary eclipse depths in this window, possibly due to variability of planetary thermal emission properties as a result of storms. I will present results from the QUB secondary eclipse campaign for ultra-hot Jupiters WASP-12b and KELT-16b, including the first robust secondary eclipse detections in the i-band. I will also present our U-band secondary eclipses of the recently discovered KELT-9b - the hottest known exoplanet.

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