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Reconstructing the unobserved EUV flux of planet host stars: Implications for planetary evaporation.

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Abstract

One of the most remarkable results of exoplanetary science in recent years has been the discovery of the evaporation of planets. Several of the best studied planets; HD 209458 b and HD 198733 b, have been shown to have filled their Roche lobes with gases undergoing hydrodynamic escape. The majority of planets detected to date exist in tight orbits which should incur an extreme level of X-ray and EUV flux, which is thought to drive evaporation. This implies that this phenomena should be relatively common, and is perhaps an important feature of planetary evolution. However, the constraints on the mechanism of evaporation have been relatively weak, in particular the efficiency of the process. Tackling this problem ideally requires the full high energy spectrum incident on the planet, but due to the distance to most exoplanets the EUV emission from the star is attenuated very efficiently by the ISM. We demonstrate a technique to reconstruct the coronal emissions of a planetary host star using archival Far UV and X-ray data to construct an Emission Measure Distribution. With this information the unobserved EUV flux can be accurately modelled to give the full picture of the high energy environment of the planet and the mechanisms driving it to evaporation.