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Towards the mysterious origins of warm Jupiters

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Although PLATO is focussed on the detection of small, rocky planets in the habitable zone, there is much still to learn about giant planets, and PLATO will make a significant contribution here. One unsolved problem is the origins of warm Jupiters (WJs). If they formed beyond the snow line, far from their host stars, then migration is required to bring them to their current orbits. It is unclear, however, which migration mechanism(s) are the most important. Obliquity (the angle between the stellar rotation and planetary orbital axes) is a key tracer of migration history. Dynamically violent, high-eccentricity migration leads to planets in significantly misaligned orbits with large obliquities, whereas disc-driven migration should result in orbits coplanar with the stellar equator. In contrast to the hot Jupiters, the imprint of dynamical migration in WJs should not be erased through tidal interactions with the convective zone of their stars, because they are tidally detached. Only around 60 transiting warm Jupiters are currently known, only 16 of which have a measured obliquity. Recent papers predicting the yield of PLATO suggest that the number of giant planets with periods between 10 and 50 days is likely to be doubled by the PLATO nominal mission. We have a VLT/ESPRESSO programme to measure the obliquities of an unbiased sample of eleven WJs, which will greatly increase the size of the measured sample. Our first observations were made earlier this year, and here we present those data, and our preliminary interpretation.

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