P310b Can hot jupiters host exomoons?

Trani, A. Alessandro (The University of Tokyo); Hamers, Adrian (IAS), Geller, Aaron (CIERA)

All the giant planets in the solar system host a large number of natural satellites. Moons in extrasolar systems are obviously difficult to detect, but a yet-to-be-confirmed Neptune-sized exomoon has been recently found around a Jupiter-sized planet in the Kepler 1625 system. Of the many extrasolar jupiters detected so far, about one-tenth has been on a 1-2 period orbit. Whether the hot jupiter population can host (or may have hosted) exomoons is still unknown. We investigated if the presence of exomons can allow the tidal migration of a hot jupiter, and if the exomoon can survive the migration process, by means of direct N-body simulations including tidal interactions. Our results show that it is unlikely that a hot jupiter can host exomoons, since the moon will either crash into the planet or escape from it during the migration process. In some extreme cases, perturbations from the stellar companion can even lead the planet to escape from the system, thus becoming a rogue planet with a moon. This mechanism could explain the exomoon candidate MOA-2011-BLG-262L, a candidate exomoon of a free-floating planet, and could explain future detections. Therefore, future detections of exomoons around hot jupiters seem unlikely.