Several Jupiter sized planets found to have only weak Earth like gravity

University of Warwick

Astrophysicists at the University of Warwick have found that several Jupiter sized gas giants beyond our solar system have surface gravities much closer in strength to Earth than the intense gravity of Jupiter.

The University of Warwick team , Dr John Southworth, Dr Peter Wheatley and Giles Sams are the first people to calculate accurate measures of the surface gravity of all 14 known gas giant planets beyond our solar system that can be observed transiting (moving across the face of) their star. They created a new method which enabled the Warwick researchers to deduce the surface gravity of all 14 of these gas giants using a technique which is both simpler and ten times more accurate than an older method that had only produced a rough estimate for just one of the gas giants - HD 209458.

All but one of these 14 known gas giant planets that can be seen transiting their star have a planetary radius bigger than Jupiter. Intriguingly the one older surface gravity estimate available, for HD 209458, suggested it had a surface gravity of only 9.43 to 9.7 ms-2 . Despite being bigger than Jupiter this would give it a surface gravity closer to Earth's at 9.8 ms-2 or our own solar system's smaller gas giants (Saturn 8.96 ms-2, Uranus 8.69 ms-2 and Neptune 11.15 ms-2) rather than Jupiter at 24.79 ms-2 .

On carrying out their more accurate measurement of all 14 of these gas giants the Warwick team have discovered that the surface gravity of HD 209458 is not an anomaly. Despite all but one of the gas giants (HD 149026) being bigger than Jupiter all but one of them turned out to have surface gravities that are much lower than Jupiter's. Only OGLE-TR-113 was found to have a surface gravity higher than Jupiter's.

In fact they found that 4 of these planets actually have surface gravities close to or lower than that of Earth's or our own solar system's "smaller" gas giants rather than Jupiter's much more intense gravity. A further 4 had surface gravities around half to two thirds that of Jupiter's. For the planet for which there was already a rough estimate of surface gravity (HD209458b) they actually found an even lower surface gravity of 9.28 ms-2 (error factor of plus or minus 0.15 ms-2). A full table of their findings now follows:

Surface gravity values for the known transiting extra-solar planets.

Planet	Surface gravity in ms-2	Margin of error	12 Stone man would weigh*
HD 189733	21.5	±3.5	26.33
HD 209458	9.28	±0.15	11.35
OGLE-TR-10	4.5	±2.1	5.47
OGLE-TR-56	17.9	±1.9	21.89
OGLE-TR-111	13.3	±4.2	16.31
TrES-1	16.1	±1.0	19.72
WASP-1	10.6	±1.7	13.02
HAT-P-1	7.1	±1.1	8.65
XO-1	13.3	±2.5	16.26
HD 149026	16.4	±2.5	20.00
OGLE-TR-113	28.3	±4.4	34.61
OGLE-TR-132	18.0	±6.0	21.96
TrES-2	20.7	±2.6	25.34
WASP-2	20.1	±2.7	24.53

University of Warwick researcher John Southworth said: "This research gives us a sense of the sheer variety of types of planet to be found beyond our Solar System. An understanding of the surface gravity of these worlds also gives us a clearer picture of the rate of in the evaporation of planetary atmospheres."

Full paper online at **http://uk.arxiv.org/PS_cache/arxiv/pdf/0704/0704.1570v1.pdf**

* this last column in the table gives the weight that man who was 12 stone on the surface of the Earth would be if he stood the surface of each of those gas giant worlds…. That is just before he sunk into the gaseous atmosphere and was suffocated and roasted to death of course…..

Alternative pictures:

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