Equations of State and the Properties of super-Earths and Mini-Neptunes

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The rate of advancement in the field of exoplanets is outstanding with more than 450 planets discovered to date, from which 15% have a measured mass and radius. As technology progresses towards detecting smaller planets, there will be more and better data on the new class of exoplanets: super-Earths and mini-Neptunes. The first examples are the two transiting low-mass planets reported last year: CoRoT-7b ($M=4.8\pm0.8$ M_E and $R=1.68\pm0.09$ R_E [1,2]) and GJ 1214b ($M=6.55\pm0.98$ M_E and $R=2.68\pm0.13$ R_E [3]). Judging from the progress in the exoplanet field, these are the first of many such discoveries. With masses, radius and internal structure models it is possible to infer the composition of these planets. However, structure models' uncertainties and thus, their usefulness, are highly tied to our knowledge of planetary materials, which is incipient within the pressure-temperature regime of super-Earths. I will present the limitations imposed by the uncertainties in equations of state, what we can infer for each of the two transiting low-mass planets and express where there is more need for progress.

References

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