

Abstract Submitted
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Ab initio melting curve of Fe and Fe-S alloys at extreme pressures: implications for Earth's and exoplanets' cores JOHANN BOUCHET, CEA, GUILLAUME MORARD, Institut de Minéralogie et de Physique des Milieux Condensés, STEPHANE MAZEVET, CEA, FRANCOIS GUYOT, Institut de Minéralogie et de Physique des Milieux Condensés — Exoplanets with masses similar to that of Earth have recently been discovered in extrasolar systems [1]. A first order question for understanding their dynamics is to know whether they possess Earth like liquid metallic cores. However, the iron melting curve is unknown at conditions corresponding to planets of several times the Earth's mass (over 15 Mbar for planets with 10 times the Earth's mass [2]). In the density-temperature region of the cores of those super-Earths, we calculate the iron melting curve using first principle molecular dynamics simulations based on density functional theory. We also propose an equation of state for iron in this pressure range. Finally we show the melting curve of Fe₃S and discuss the effects of the addition of sulfur to the melting curve of pure iron.

- [1] J. P. Beaulieu, D. P. Bennett, P. Fouque et al., *Nature* 439 (7075), 437 (2006).
[2] D. Valencia, R. J. O'Connell, and D. Sasselov, *Icarus* 181, 545 (2006).

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