RETRACTION

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Retraction: Effects of electron correlations on transport properties of iron at Earth's core conditions

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In this Letter we reported density functional theory plus dynamical mean-field theory (DFT + DMFT) computations of the resistivity from electron–electron scattering at the conditions of Earth's core, and found that the electron–electron scattering was about the same magnitude as the conventional electron–phonon scattering, giving a total resistivity that was sufficient to allow a classical thermal-convection-driven dynamo. However, L. Pourovskii, J. Mravlje, S. Simak and I. Abrikosov could not reproduce our findings, which led us to re-examine our computations. We found an error of a factor of two that is due to our neglect of spin degeneracy (two electrons per band), which would halve the electron–electron resistivity and probably make the electron–electron scattering insignificant for the geodynamo, at least for pure iron. We therefore wish to retract this Letter.

The smaller electron–electron scattering supports the high conductivity of iron that was predicted[1] from electron–phonon density functional calculations. However, preliminary calculations show that using the exact double counting[2] recently developed for the DFT + DMFT method increases the electron–electron scattering. It is also probable that the Wiedemann–Franz law, assumed in our previous work, is not followed or has a non-constant Lorenz number in liquid metals[3] or correlated systems[4]. Whether the resulting conductivity is consistent with a geodynamo driven by thermal convection requires further detailed calculations; the results will be reported elsewhere. The results and conclusions in the Letter that refer to resistivity at low temperatures (in Fig. 2b), and scattering rate and electronic structure (in Fig. 3) remain valid.

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