

Electrical Conductivity of Iron in Earth's Core from Microscopic Ohm's Law

Tuesday, February 22, 2022 5:00 PM (30 minutes)

Understanding electronic transport properties of materials under high temperatures and pressures is essential for constraining geophysical processes and provides indispensable insights useful for novel materials discovery. The difficulty of measuring the electrical conductivity of iron under Earth-core conditions reliably in experiments [1] calls for sophisticated theoretical methods that can support diagnostics. We present results of the electrical conductivity in iron within the pressure and temperature ranges found in Earth's core from simulating microscopic Ohm's law using time-dependent density functional theory. Our predictions are independent of previous studies, which primarily used the Kubo-Greenwood formula, and therefore provide a new perspective on resolving discrepancies in recent experiments [2,3]. [1] D. Dobson, Nature 534, 45 (2016) [2] K. Ohta, Nature 534, 95 (2016) [3] Z. Konopkova, Nature 534, 99 (2016)

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