



Saturation of conductivity by pressure and light elements in iron alloys

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We compute the electrical conductivity of iron and iron alloys at Earth's core conditions and beyond from electron-phonon coupling in the ABINIT implementation. We find an excellent agreement with experimental results for pure hcp iron below 1 mbars. We confidently use our results up to core pressure conditions.

We specifically look at saturation effects of the conductivity. The pressure shows a clear effect, with an asymptotic behavior to values of the core in excess of 90 W/K/m. We treat in detail the effect of Si and H on hcp iron and show a marked saturation effect, an increase in anisotropy and a strong dependence with the substitution pattern.