

The 23rd Global-COE International Frontier Seminar

July 12th, 2011, from 16:30, at the meeting room (#674) 6F

Thermal Conductivity of Earth's Liquid Outer Core from First Principles Calculations

Dr. Nico de Koker

Bayerisches Geoinstitut, Universität Bayreuth

Heat conducted along the geotherm in Earth's liquid outer core is not available to drive magneto-hydrodynamic convection necessary to sustain the geomagnetic field. Characterizing heat transport in the core is thus crucial to relate core cooling and the geodynamo. We perform first-principles electronic structure computations to determine the thermal conductivity and electrical resistivity for liquid Fe, Fe-Si and Fe-O alloys. Computed resistivity agrees very well with existing shock compression measurements, and shows strong dependence on light element concentration and type. At core temperatures thermal conductivity is higher than previous extrapolations. Conductive heat flux near the core-mantle boundary is comparable to estimates of the total heat flux from the core, but decreases with depth so that thermally driven flow would be constrained to greater depths within the core.

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Room674, meeting room 6F
Science Research Bldg I
Ehime University



Contact: T. Irifune
irifune@dpc.ehime-u.ac.jp
<http://www.ehime-u.ac.jp/~grc>