**Thermal Transport of Iron Alloys and Planetary Dynamos**

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In this presentation, I will use recent mineral physics results to discuss thermal and compositional energy sources powering planetary dynamos in the liquid metallic iron cores. Earth's magnetic field is generated by thermal convections of liquid iron alloy in the outer core. Its persistence manifests the interactions between geodynamo, plate tectonics, and climate systems over a long geological time. Importantly, the heat flux across the core-mantle boundary drives the plate tectonic movements, highlighting possible habitable conditions controlled by deep planetary processes[1]. On the other hand, dynamo scenarios in other planetary interiors such as Mars and exoplanets can vary significantly depending on the planet's physical and chemical states[2,3]. This talk will focus on thermal transport properties of iron alloys in high pressure-temperature laboratory experiments and modelling results to provide new insights on our understanding of Earth's dynamo and Martian dynamo cessation.

[1]Zhang, Y., and J.F. Lin, Molten iron in Earth-like exoplanet cores, 375, 146-147, DOI: 10.1126/science.abn2051, Science, 2022.

[2]Hsieh, W.-P., F. Deschamps, Y.-C. Tsao, T. Yoshino, and **J.F. Lin**, A thermally-conductive Martian core and implications for its dynamo cessation, Science Advances, 10, eadk1087, DOI: 10.1126/sciadv.adk1087, 2024.

[3]Zhang, Y., Y. Wang, Y. Huang, J. Wang, L. Hao, Z. Gao, J. Li, Q. Wu, Y. Liu, J. Sun, and **J.F. Lin**, Collective motion in hcp-iron at Earth's inner core conditions, *Proc. Natl. Acad. Sci.*, 120, 41, e2309952120, 10.1073/pnas.2309952120, 2023.