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# Investigating Metallic Cores using Experiments on the Physical Properties of Liquid Iron Alloys

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An outstanding goal in planetary science is to understand how terrestrial cores evolved to have the composition, thermal properties, and magnetic field that we observe today. To achieve that aim requires the integration of datasets from space missions with experiments in the laboratory conducted at extreme pressures and temperatures. Over the past decade, technological advances have enhanced the capability to conduct *in situ* measurements of physical properties on samples that are analogs to planetary cores. These challenging experiments utilize large-volume presses that optimize control of pressure and temperature. This presentation focuses on the physical properties of iron alloys measured in the laboratory, including electrical conductivity, viscosity, and density, at conditions relevant to the core of small terrestrial planets and moons. As will be shown, these properties are closely connected to models of the thermal evolution and composition of cores. Experimental geochemistry provides additional insights into the nature and abundance of light elements within cores. Applications to several metallic cores will be highlighted, as well as the synergy with field observations from space.