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Abstract for an Invited Paper
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Laboratory models of the Earth's outer core[1]

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We construct liquid sodium experiments as models of the Earth's core. Key to understanding these several experimental devices is knowing how turbulence is effected by rotation and magnetic fields. In the approach to the planetary regeme, several remarkable behaviors appear [1]. As rotation and magnetic fields add some measure of elasticity to the flows, several types of driven planetary modes are observed depending on the force balances involved. Ordering the Coriolis, Lorentz, and inertial forces is key to understanding the complicated states observed. While these experiments are undertaken in part to understand the geodynamo, they have led to a number of different first observations, including the magneto-rotational instability [2] and inertial waves in spherical Couette flow. These different approaches to using laboratory experiments are opening up a new direction to understanding the dynamics of the Earth's outer core, other Planetary interiors, and a host of astrophysical objects. [1] W.L. Shew and D.P. Lathrop, "Liquid sodium model of geophysical core convection," Phys. Earth and Planetary Interiors, 153, 136-149 (2005). [2] D.R. Sisan, N. Mujica, W.A. Tillotson, Y.-M. Huang, W.Dorland, A.B. Hassam, T.M. Antonsen, and D.P. Lathrop, "Experimental Observation and Characterization of the Magnetorotational Instability," Phys. Rev. Lett. 93, 114502 (2004).

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