Geodynamo Laboratory

While we are now used to forecasting of the weather on several day spans, forecasting many other aspects of the Earth's future is more difficult. Considering that, throughout all of recorded history, the **Earth's magnetic field** has steadily fallen, forecasting seems essential. While computational models are poised to attempt such forecasts, benchmarking and testing of those models is lacking. Because of the relatively slow evolution of the geomagnetic field, directly benchmarking simulations against the Earth is not possible.

The University of Maryland Geodynamo Lab has undertaken a sequence of experiments of progressively larger size and higher input power to **match the parameters of the Earth's outer core**. The experiments are **performed in liquid sodium**, the best electrical conductor of all liquids, which assists in reaching core-like conditions. These experiments are stimulating new computational models in several countries. Not only can the experiments be used for testing our computational models, they point the way to understanding the **underlying causes of geomagnetic changes**.

An unexpected outcome of this course of experimental research has been the first observation of an important astrophysical instability -- **the magnetorotational instability**. This instability is thought to affect differentially rotating stars and planetary interiors, and the dynamics of accretion disks in protostellar systems and around compact objects such as black holes.

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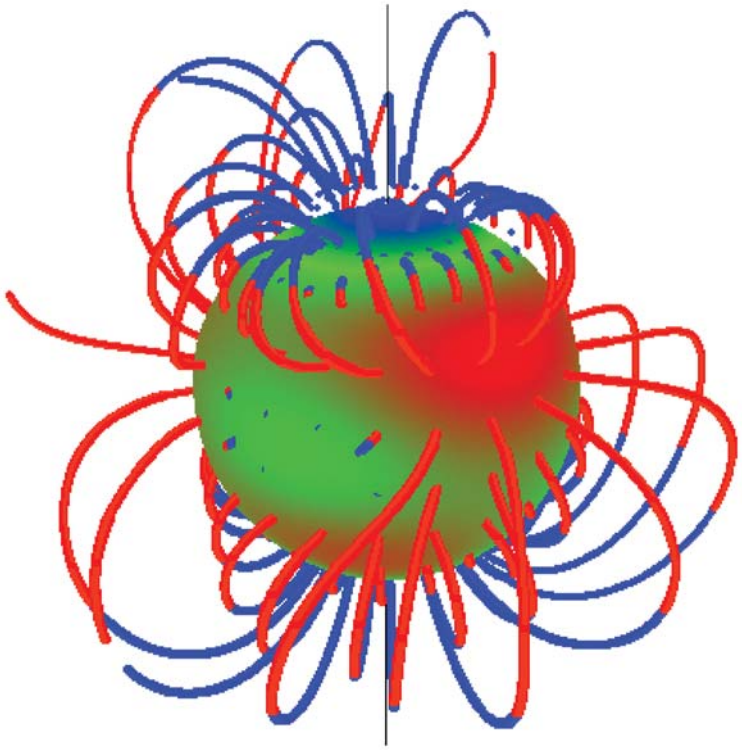

RELEVANT PUBLICATIONS

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2. D.R.Sisan, W.L.Shew, and D.P.Lathrop, "Lorentz Force Effects in Magnetoturbulence," *Phys. Earth Plan. Int.* 135137-159 (2003)

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