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The Bullard Von Kármán experiment GAUTIER VERHILLE, CNRS-ENS Lyon, MICKAEL BOURGOIN, CNRS, NICOLAS PLIHON, JEAN-FRANÇOIS PINTON, CNRS-ENS Lyon — Since Larmor at the beginning of the XX° century, the magnetic field of the earth is thought to be produced from motions of the liquid iron core. Part of the kinetic energy of the flow is converted into magnetic energy. A generic model of the dynamo instability is based on two induction processes, namely α and ω. The α- effect is the production of a current density $\vec{j}$ parallel to the initial magnetic field $\vec{b}$, and the ω-effect is linked to the velocity $\vec{v}$ gradients via the term $\vec{b}\cdot\vec{\nabla}\vec{v}$ in the induction equation. We developed an experimental semi homogeneous $\alpha-\omega$ dynamo (a model commonly used in astrophysics) in a Von Kármán flow : motion is imparted to liquid Gallium by the counter-rotation of two coaxial impellers with blades. The ω effect is due to the shear in the mid plane of a Von Kármán flow and fully includes turbulence. The α- effect is simulated by current flow in two coils. Complex dynamics of the dynamo (On-Off intermittency, chaotic reversals, excursions) are observed to be linked with the statistics of the turbulent ω induction process.

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