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Magnetic turbulence in the Riga Dynamo experiment

Agris Gailitis,[1] Olgerts Lielausis,[1] Ernests Platacis,[1] Gunter Gerbeth,[2] and Frank Stefani [2]
[1] *Institute of Physics University of Latvia, LV-2169 Salaspils, Latvia*
[2] *Forschungszentrum Rossendorf, PO Box 510119, 01314, Dresden, Germany*

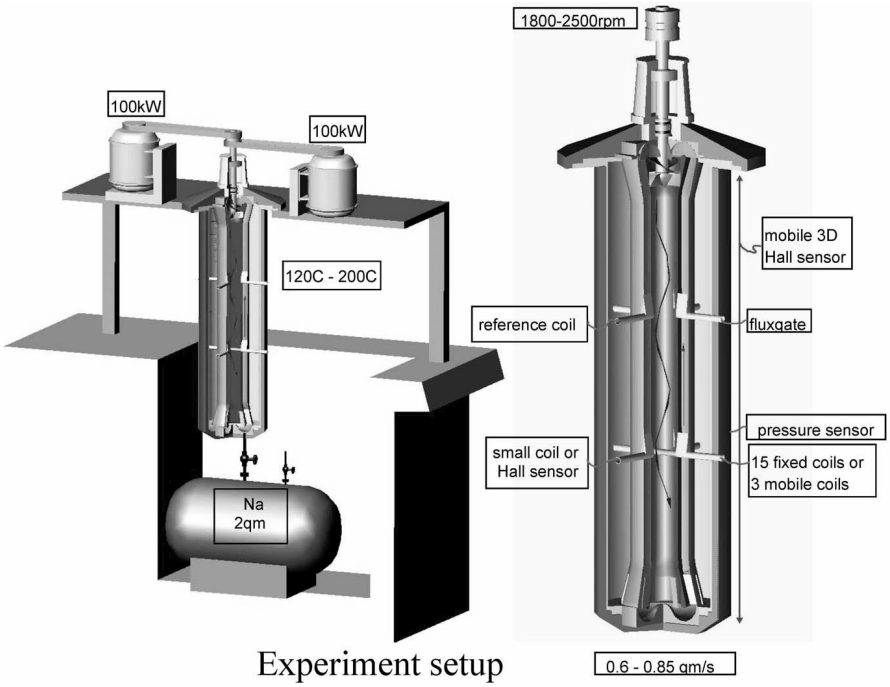

Figure 1:

Riga dynamo experiment demonstrates that enough strong and appropriately directed flow of fluid electroconductor generates magnetic field very likely as Earth and other celestial bodies do. Two 100 kW motors (Fig.1) are driving propeller which forces molten sodium to circulate inside an annular vessel, part of which is located in the basement of sodium lab. The sodium flow is directed by two thin coaxial electro-conducting cylindrical partition walls. In the central channel sodium is swirling down from the propeller. In the coaxial counter-flow channel the flow is raising straight up to the propeller. In an outer part of the vessel the sodium is move-less, it serves for electrical connection. Depending on sodium temperature at a propeller speed of 1800 – 2000 rpm (flow-rate about 0.6 qm/s) the zero state for magnetic field is becoming unstable and field appears seeming from nothing (Fig.2). Magnetic field values are recovered from coil voltage records by means of Fast Fourier processing.

For finer spectral resolution two small coils were inserted alternately in a narrow channel tip penetrating deep inside the central flow. Examples for recorded signals and Fourier processed fields are on Fig.3 while power spectra on Fig.4 .

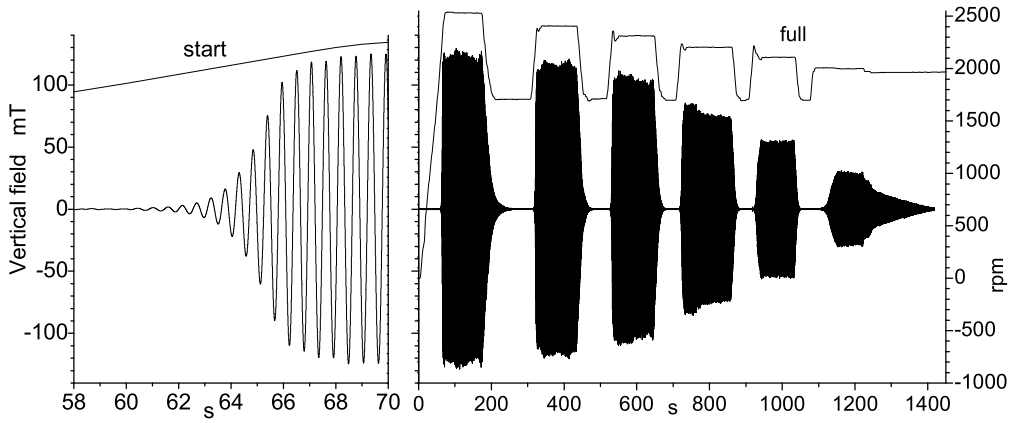

Figure 2: *Field record*

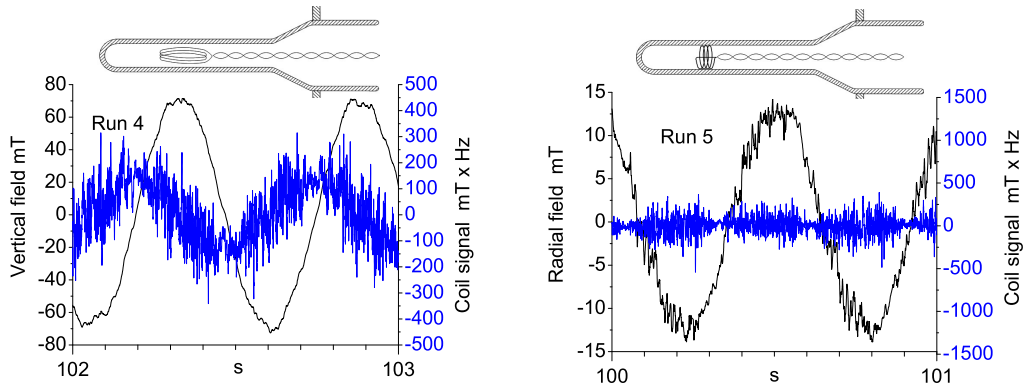

Figure 3: *1 second from recorded signals and Fourier processed fields*

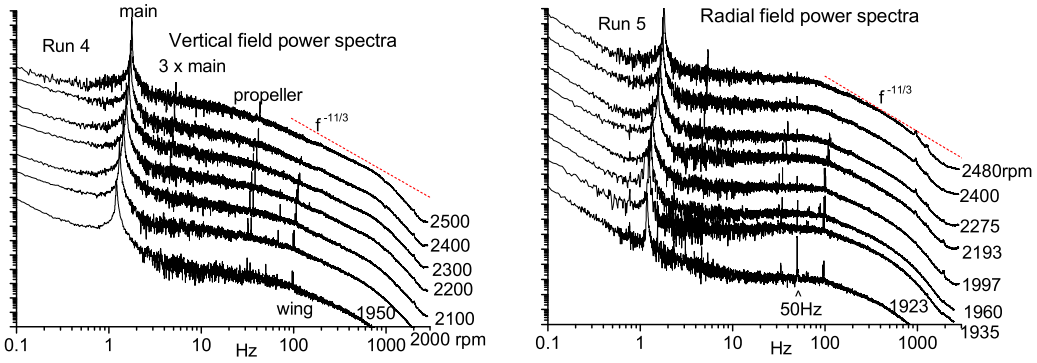

Figure 4: *Magnetic spectra*