

# Dynamo generated by the centrifugal instability

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We present a new scenario for magnetic field amplification where an electrically conducting fluid is confined in a differentially rotating, spherical shell with thin aspect-ratio. When the angular momentum sufficiently decreases outwards, an hydrodynamic instability develops in the equatorial region, characterised by pairs of counter-rotating toroidal vortices similar to those observed in cylindrical Couette flow. These spherical Taylor-Couette vortices generate a subcritical dynamo magnetic field dominated by non-axisymmetric components. We show that the critical magnetic Reynolds number seems to reach a constant value at large Reynolds number and that the global rotation can strongly decrease the dynamo onset. Our numerical results are understood within the framework of a simple dynamical system, and we propose a low-dimensional model for subcritical dynamo bifurcations. Implications for both laboratory dynamos and astrophysical magnetic fields are finally discussed.

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