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Earth rotation prevents exact solid body rotation of fluids in the laboratory PIERRE-PHILIPPE CORTET, JEAN BOISSON, Laboratoire FAST, CNRS, Univ Paris Sud, UPMC Univ Paris 06, France, DAVID CÉBRON, Institut fur Geophysik, ETH Zurich, Switzerland, FRÉDÉRIC MOISY, Laboratoire FAST, CNRS, Univ Paris Sud, UPMC Univ Paris 06, France, ROTATING FLUID TEAM, EARTH AND PLANETARY MAGNETISM TEAM — We report direct evidence of a secondary flow excited by the Earth rotation in a water-filled spherical container spinning at constant rotation rate. This so-called *tilt-over flow* essentially consists in a rotation around an axis which is slightly tilted with respect to the rotation axis of the sphere. In the astrophysical context, it corresponds to the flow in the liquid cores of planets forced by precession of the planet rotation axis, and it has been proposed to contribute to the generation of planetary magnetic fields. We detect this weak secondary flow using a particle image velocimetry system mounted in the rotating frame. This secondary flow consists in a weak rotation, thousand times smaller than the sphere rotation, around a horizontal axis which is stationary in the laboratory frame. Its amplitude and orientation are in quantitative agreement with the theory of the tilt-over flow excited by precession. These results show that setting a fluid in a perfect solid body rotation in a laboratory experiment is impossible — unless tilting the rotation axis of the experiment parallel to the Earth rotation axis. Reference: J. Boisson, D. Cébron, F. Moisy and P.-P. Cortet, EPL **98**, 59002 (2012), doi: 10.1209/0295-5075/98/59002

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