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Ultimate Taylor-Couette turbulence DETLEF LOHSE, SANDER HUISMAN, DENNIS VAN GILS, University of Twente, SIEGFRIED GROSSMANN, University of Marburg, CHAO SUN, University of Twente — With the Twente turbulent Taylor-Couette (T^3C) facility we can achieve $Re_i = 2 \cdot 10^6$ for the inner cylinder and $Re_o = \pm 10^6$ for the independently rotating outer cylinder. *Global* torque measurements have revealed an effective scaling $Nu_\omega \sim Ta^{0.38}$ for the dimensionless angular velocity flux [1]. We now provide *local* angular velocity flux measurements from high-speed particle image velocimetry (PIV). Though the flux shows huge fluctuations, its spatial and temporal average nicely agrees with the result from the global measurements and in addition reveals the structure of the turbulent flow. From the PIV images we can also derive the scaling of the radial velocity fluctuations, giving $Re \sim Ta^{1/2}$. Both Nu_ω and Re scaling relations exactly follow what had been predicted in ref. [2] for the ultimate regime.

[1] D. van Gils *et al.*, Phys. Rev. Lett. **106**, 024502 (2011).
[2] S. Grossmann and D. Lohse, Phys. Fluids **23**, 045108 (2011).

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