

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Experiments on the onset of turbulence in shear flows KERSTIN AVILA, BJÖRN HOF, Max Planck Institute for Dynamics and Self-Organization — The onset of turbulence in pipe flow occurs via competition of two contrary processes, relaminarization and spreading of turbulence. The timescales of these processes are balanced at Reynolds number $Re = 2040 \pm 10$ and set the onset of sustained turbulence in pipe flow [1]. However, the extremely long timescales of these processes in pipe flow make it impossible to measure important signatures of criticality, such as the scaling of turbulent fraction. This information would be helpful in determining the phase transition class of the onset of turbulence in shear flows. With this goal in mind we have built a Taylor-Couette experiment with an aspect ratio of more than 200 and an azimuthal length of more than 300 gap-widths, allowing us to measure turbulent fractions in the vicinity of the critical point. We also analyze the primary stability of the flow in the counter-rotating regime and present lifetime measurements.

[1] K. Avila, D. Moxey, A. De Lozar, M. Avila, D. Barkley, B. Hof, *Science* 333(6039), 192-196, 2011

Kerstin Avila
Max Planck Institute for Dynamics and Self-Organization

Date submitted: 11 Aug 2011

Electronic form version 1.4