Abstract Submitted
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**The Reynolds number dependence of classical grid turbulence**[1]
EBERHARD BODENSCHATZ, GREGORY BEWLEY, MICHAEL SINHUBER, Max Planck Institute (DS) Goettingen, MARGIT VALLIKIVI, MARCUS HULTMARK, ALEXANDER SMITS, Princeton University, INTERNATION COLLABORATION FOR TURBULENCE RESEARCH COLLABORATION — We measured inertial and dissipation range statistics in the decaying turbulence generated by a biplanar grid of crossed bars. We did so at Taylor Reynolds numbers between 130 and 1700, reaching higher than any previous study of reasonably homogeneous and isotropic turbulence. The measurements were made in the Variable Density Turbulence Tunnel at the Max Planck Institute in Göttingen with both traditional hot-wire anemometers and the new nano-fabricated NSTAP anemometers developed at Princeton. We fixed the large-scale conditions of the flow while changing the Reynolds number only by changing the viscosity of the fluid. To do this, we used two gases, air and sulfur hexafluoride, and adjusted the pressure of the gases to between 1 and 15 bar. The data confirm that even when the large-scale conditions are controlled as the Reynolds number is raised, scaling ranges are not well-defined unless Extended Self-Similarity is employed.

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