

Abstract Submitted  
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**Experimental test of a missing spectral link in turbulence** PINAKI CHAKRABORTY, Okinawa Institute of Science and Technology, HAMID KEL-LAY, Univ. Bordeaux, France, TUAN TRAN, University of Twente, The Netherlands, WALTER GOLDBURG, University of Pittsburgh, NIGEL GOLDENFELD, University of Illinois, GUSTAVO GIOIA, Okinawa Institute of Science and Technology — Although the cardinal attribute of turbulence is the velocity fluctuations, these fluctuations have been ignored in theories of the frictional drag of turbulent flows. Our goal is to test a new theory that links the frictional drag to the spectral exponent  $\alpha$ , a property of the velocity fluctuations in a flow. We use a soap-film channel wherein for the first time the value of  $\alpha$  can be switched between 3 and  $5/3$ , the two theoretically possible values in soap-film flows. Remarkably, the new theory holds in both soap-film flows and ordinary pipe flows, even though these types of flow are governed by different equations. We conclude that even where the governing equations are unknown and  $\alpha$  can take anomalous values (as in sediment-laden rivers and polymer-doped oil pipelines), the frictional drag might be estimated from simple measurements of  $\alpha$ .

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