Abstract Submitted
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Observation of quantum decay of homogeneous, isotropic (grid) turbulence[1] GARY IHAS, University of Florida, LYDIA MUNDAY, Lancaster University, JIHEE YANG, University of Florida, KYLE THOMPSON, Universidade de São Paulo, WEI GUO, Florida State University, ROMAN CHAPURIN, University of Colorado, SHAUN FISHER, PETER MCCLINTOCK, Lancaster University, W.F. VINEN, University of Birmingham — In classical grid turbulence fluid is forced through a stationary grid. In the quantum case a grid moves through an initially stationary superfluid driven by a linear motor. We have developed a motor using superconducting drive coils and bearings, moving a grid at constant speed (0 and 15 cm/s). Stalp *et al*[2] report the decay of vortex-line density L in the grid's wake measured by 2^{nd} sound attenuation. L decayed at large times as $t^{-3/2}$, interpreted as a quasi-classical Richardson cascade of energy-containing eddies size limited by channel width, associated with a Kolmogorov energy spectrum. It is assumed eddies produced on a scale of the grid mesh grow through the classical fluids mechanism.[3] We can now test a semi-quantitative theory with different mesh grids or channel sizes, relating to the possible existence of inverse turbulent cascades. Our 2^{nd} sound system is conventional, but with a novel phase and amplitude feedback loop making stringent constant temperature unnecessary. Both $t^{-3/2}$ and non-$t^{-3/2}$ decays have been observed with 2 mesh sizes.

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[2]S. R. Stalp, L. Skrbek, and R. J. Donnelly, *Phys. Rev. Lett.* ***82***, *4831* (*1999*).
[3]P.A. Davidson, *Turbulence*, Oxford Univ. Press., UK (2004).

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