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Energy spectrum in the wavenumber-frequency domain from Kraichnan's random sweeping hypothesis with mean flow MICHAEL WILCZEK, Institute for Theoretical Physics, Univ. Muenster, YASUHITO NARITA, Institut fuer Geophysik und extraterrestrische Physik, TU Braunschweig — The energy spectrum in the wavenumber-frequency domain for turbulent flows is derived based on Kraichnan's random sweeping hypothesis with additional mean flow. The resulting model spectrum is parametrized by two parameters, the mean flow velocity and the sweeping velocity associated with Doppler shift and Doppler broadening, respectively. Among others, it has the interesting property that the power-law index of the one-dimensional wavenumber spectrum translates to the frequency spectrum, invariant for arbitrary choices of mean and sweeping velocity. In this talk, various properties of the model including implications for single- and multi-point measurements of turbulent flows are discussed, and the relation to the recently introduced elliptic model for space-time correlations is highlighted.

Michael Wilczek
Institute for Theoretical Physics, Univ. Muenster

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