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**The turbulent mean-velocity profile: it is all in the spectrum** GUSTAVO GIOIA, NICHOLAS GUTTENBERG, NIGEL GOLDENFELD, PINAKI CHAKRABORTY, University of Illinois — It has long been surmised that the mean-velocity profile (MVP) of a pipe flow is closely related to the spectrum of turbulent energy. Here we perform a spectral analysis to identify the eddies that dominate the production of shear stress via momentum transfer. This analysis allows us to express the MVP as a functional of the spectrum. Each part of the MVP relates to a specific spectral range: the buffer layer to the dissipative range, the log layer to the inertial range, and the wake to the energetic range. The parameters of the spectrum set the thickness of the viscous layer, the amplitude of the buffer layer, and the amplitude of the wake.

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