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Transition of energy transfer from MHD turbulence to kinetic plasma YAN YANG, WILLIAM MATTHAEUS, TULASI PARASHAR, Univ of Delaware, YIPENG SHI, Peking University, Beijing, China, MINPING WAN, SHIYI CHEN, South University of Science and Technology of China, Shenzhen, Guangdong, China — The classical energy cascade scenario is of great importance in explaining the heating of corona and solar wind. One can envision that energy residing in large-scale fluctuations is transported to smaller scales where dissipation occurs and finally drives kinetic processes that absorb the energy flux and energize charged particles. Here we inquire how the cascade operates in a compressible plasma, and how the characteristics of energy transfer vary going from MHD to kinetic scales. When filtering MHD equations, we can get an apparent inertial range over which the conservative energy cascade occurs and the scale locality of energy transfer is similar to the cases of incompressible MHD turbulence. Pervasive shocks not only make a significant difference on energy cascade and magnetic amplification, but can also introduce considerable pressure dilation, a complement of viscous and ohmic dissipation that can trigger an alternative channel of the conversion between kinetic and internal energy. The procedure can also be applied to the Vlasov equation and kinetic simulation, in comparison with MHD turbulence, and is a good candidate to investigate the energy cascade process and the analogous role of the (tensor) pressure dilation in collisionless plasma.

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