Diffusion in supersonic, turbulent, compressible flows Ralf S. Klessen Astrophysikalisches Institut Potsdam, An der Sternwarte 16, 14482 Potsdam, Germany UCO/Lick Observatory, University of California at Santa Cruz, Santa Cruz, CA 95064, U.S.A. rklessen@aip.de Douglas N. C. Lin UCO/Lick Observatory, University of California at Santa Cruz, lin@ucolick.org

abstract We investigate diffusion in supersonic, turbulent, compressible flows. Supersonic turbulence can be characterized as network of interacting shocks. We consider flows with different rms Mach numbers and where energy necessary to maintain dynamical equilibrium is inserted at different spatial scales. We find that turbulent transport exhibits super-diffusive behavior due to induced bulk motions. In a comoving reference frame, however, diffusion behaves normal and can be described by mixing length theory extended into the supersonic regime. (Accepted for publication in Phys. Rev. E)