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Lagrangian Stretching and the Dynamics of Anisotropic Particles in Turbulence GREG VOTH, CONOR HUNT, LYDIA TIERNEY, STEFAN KRAMEL, Wesleyan University — In the past few years, an extensive phenomenology has been developed that describes the orientation and rotation of small axisymmetric particles in turbulent flows. Many of the observed phenomena can be understood using a simple picture that considers the stretching a particle has experienced during the past few Kolmogorov times. The stretching can be quantified using the Cauchy-Green strain tensors. The eigenvectors of these tensors provide a convenient coordinate system in which to describe particle orientation and rotations. Consideration of stretching also offers new insights into the Lagrangian evolution of vorticity and strain in turbulence. Particles tend to align with a long axis along the maximum extensional eigenvector of the left Cauchy-Green tensor. The vorticity also aligns in this same direction leading to alignment between the particle rotation rate vector and a long axis.

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