

Abstract Submitted  
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**Alignment of vorticity and rods with Lagrangian fluid stretching in turbulence**<sup>1</sup> RUI NI, GREG VOTH, Wesleyan University — Stretching in continuum mechanics is naturally described using the Cauchy-Green strain tensors. These tensors quantify the stretching experienced in a Lagrangian reference frame, which provides a powerful way to study interesting processes that involve stretching, such as vortex stretching and alignment of anisotropic particles. We integrate the velocity gradient tensor from direct numerical simulation of isotropic turbulence to obtain the Cauchy-Green strain tensor. We find that the preferential alignment between anisotropic particles and vorticity is because both of them tend to align with the strongest stretching direction, defined by the maximum eigenvector of the left Cauchy-Green strain tensor. In particular, anisotropic particles approach almost perfect alignment with the strongest stretching direction. The alignment of vorticity with the stretching direction is weaker, but still much stronger than previously observed alignment of vorticity with the eigenvectors of the velocity gradient tensor.

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