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Clustering Instability of Fiber Suspensions in Turbulent Shear Flows LEE WALSH, GREG VOTH, Wesleyan University — In a suspension of non-attractive rigid rods in a turbulent shear flow, we observe spontaneous aggregation into traveling clusters of high concentration. The fibers first accumulate in the turbulent boundary layer where they then break the symmetry of the apparatus by collecting into a few traveling clusters. The experimental apparatus is a Taylor–Couette cell whose floor and inner wall are rotating, and ceiling and outer wall are fixed. The heavy particles sediment downward and outward, so their concentration is highest near the junction of the rotating floor and the fixed outer cylindrical wall. With a multi-camera imaging system we can measure 3D fluid and fiber motion in the entire volume, and we are able to resolve individual fiber dynamics in the high-concentration regime where fiber-fiber interactions become important.

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