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Active microrheology of fluids inside developing zebrafish MIKE TAORMINA, RAGHUVEER PARTHASARATHY, Department of Physics, University of Oregon — Biological fluids are a source of diverse and interesting behavior for the soft matter physicist. Since their mechanical properties must be tuned to fulfill functional roles important to the development and health of living things, they often display complex behavior on length and time scales spanning many orders of magnitude. For microbes colonizing an animal host, for example, the mechanical properties of the host environment are of great importance, affecting mobility and hence the ability to establish a stable population. Indeed, some species possess the ability to affect the fluidity of their environment, both directly by chemically modifying it, and indirectly by influencing the host cells' secretion of mucus. Driving magnetically doped micron-scale probes which have been orally micro-gavaged into the intestinal bulb of a larval zebrafish allows the rheology of the mucosal layer within the fish to be measured over three decades of frequency, complementing ecological data on microbial colonization with physical information about the gut environment. Here, we describe the technique, provide the first measurement of mucosal viscosity in a developing animal, and explore the technique's applicability to other small-volume or spatially inhomogeneous fluid samples.

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