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**Establishing live cell directional 2-point particle tracking microrheology** RICARDO SERRANO, MANUEL GOMEZ-GONZALEZ, JUAN C. DEL ALAMO, University of California, San Diego — Directionality is essential for cell function and relation with its environment: an isotropic cell would not be able to move, mechanotransduct or perform any action other than isotropic compression and expansion. Cell directionality is achieved through chemical gradients and mechanical orientation of the cytoskeleton. The directional mechanics of the cell cytoplasm is described by the Leslie-Ericksen equations, dependent on the 3 Miesowicz viscoelasticity coefficients. They can be measured by using Directional Particle Tracking Microrheology. However, the 3D motion of a particle in a nematic environment provides only 2 independent equations, and only 2 viscoelasticity coefficients could previously be calculated, i.e. by tracking a single particle, we could only fully describe a pseudo-isotropic fluid. In this study, we analyze the motion of two microspheres in a directional nematic fluid. The medium is composed of an elastic directional network viscously coupled to a viscous isotropic liquid. The correlated motion of the two microspheres provide 3 independent equations. These equations can be used to measure the 3 directional viscosity coefficients. We show that, by using Directional 2-Point PTM, we can determine the complete microrheology of a nematic material.

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