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Measuring flow and yielding with coherent x-rays

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When coherent radiation is scattered by particles, its scattering pattern is modulated by *speckle*. If the scattering particles move, the speckle will change accordingly. This principle forms the basis of XPCS (X-ray photon correlation spectroscopy), which utilizes bright, coherent X-rays to probe nanoscale particle motion. We will discuss our recent efforts to extend XPCS in two different directions: the measurement of fluid flow, and the yielding of colloidal gels. The flow technique involves measuring scattering particle motion in pressure-driven microchannel flow. Our yielding experiments involve in situ measurements of nanocolloidal gels subjected to oscillatory shear strain, which provides information about the spatial character of particle rearrangements during yielding at the nanometer scale.

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