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Counterion Liquid Dynamics in F-Actin Bundles: A High Resolution Inelastic X-Ray Scattering Study THOMAS ANGELINI, ROBERT CORIDAN, Department of Physics, University of Illinois, JOHN BUTLER, LORI SANDERS, Department of Materials Science and Engineering, University of Illinois, ALEXANDRE BERAUD, MICHAEL KRISCH, ESRF, Grenoble, France, HARALD SINN, APS, Argonne, IL, USA, GERARD WONG, Department of Materials Science and Engineering, Dept. of Physics, Dept. of Bioengineering, University of Illinois — The behavior of counterions plays a pivotal role in the interaction between charged polyelectrolytes. Previously, we observed the counterion distribution in bundles of the polyelectrolyte F-actin using small angle x-ray scattering (SAXS) and found that the ions take on a periodic arrangement in the form of 1D counterion density waves (CDW), coupling to twist deformations of the F-actin helix [Angelini, et. al., PNAS 100 (2003)]. To probe the *dynamics* of the CDW ions, we carried out a series of \sim meV resolution inelastic x-ray scattering (IXS) experiments on F-actin bundles condensed by different ion species. We find a new acoustic-like mode associated with the CDW, which has dispersive properties sensitive to ion species as well as ion density.

Thomas Angelini
Department of Physics, University of Illinois

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