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Structure uncovering from fluctuation x-ray scattering of randomly oriented nanoparticles[1] GANG CHEN, Lawrence Berkeley National Laboratory, MIGUEL MODESTINO, University of California, Berkekley, BILLY POON, ANDRE SCHIROTZEK, STEFANO MARCHESINI, Lawrence Berkeley National Laboratory, RACHEL SEGALMAN, University of California, Berkekley, ALEXANDER HEXEMER, PETER ZWART, Lawrence Berkeley National Laboratory — We have carried out a fluctuation x-ray scattering experiment on platinum coated gold nanoparticles randomly oriented on a substrate. A complete algorithm for determining the electron density of an individual particle from diffraction patterns of many particles, randomly oriented about a single axis is demonstrated. This algorithm operates on angular correlations among the measured intensity distributions and recovers the angular correlation functions of a single particle from measured diffraction patterns. Taking advantage of the cylindrical symmetry of the nanoparticles, we proposed a cylindrical model to reconstruct the structure of the nanoparticle by fitting both the experimental ring angular auto-correlation and the small angle scattering data. The physical meaning of the resulted structure is discussed in terms of their statistical distributions of the shape and electron density profile.

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