Abstract Submitted
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**Implicit spatial averaging in inversion of inelastic x-ray scattering data**[1] P. ABBAMONTE[2], Frederick Seitz Materials Research Laboratory, University of Illinois — Inelastic x-ray scattering (IXS) is usually said to measure the imaginary part of the dynamical density response of a material. However this is not rigorously true. The density response $\chi$, which describes the response of the system to a point charge source, is a function of *two* spatial coordinates and the time, i.e. $\chi = \chi(x_1, x_2, t)$. Its Fourier transform $\chi(k_1, k_2, \omega)$ is therefore a function of two, rather than just one, momenta. IXS does not probe this full response, but only its longitudinal or "diagonal" part $Im[\chi(k, k, \omega)]$. In this talk I will show that recently developed IXS inversion algorithms [2], which have shown promise for imaging attosecond dynamics in real space, yield a specific spatial average of the response, i.e. $\chi(x_1, t) = \int dx' \chi(x_1, x_1 + x', t)$. This can be thought of as an average over all possible source locations, a real space projection, or a specific type of Fourier space filtering. I will show, within a simple model, that the salient real space dynamics nonetheless survive, and that IXS inversion is still a useful and well-posed technique for imaging attosecond dynamics.

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[2]P. Abbamonte, et. al., Proc. Natl. Acad. Sci. 105, 12159 (2008)

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