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Evolution of symmetry-broken states in the pseudogap regime of cuprates - the atomic structure footprints[1] EMIL BOZIN, R. ZHONG, K.R. KNOX, Brookhaven National Laboratory, B.L. WINN, Oak Ridge National Laboratory, G.D. GU, J.P. HILL, J.M. TRANQUADA, S.J.L. BILLINGE, Brookhaven National Laboratory — Revealing the nature of the symmetry broken states in strongly correlated electron systems in general, and in the pseudo-gap (PG) phase of cuprates in particular, is instrumental in understanding the underlying properties. To that effect the knowledge of the local atomic structure may reveal relevant details important for more comprehensive understanding of the character of symmetry broken states in strongly correlated electron systems. Atomic pair distribution function (PDF) is one of the few experimental methods that can speak to this problem. Mounting experimental evidence suggests that the pseudogap phase may represent an electronic state in which the four-fold rotational symmetry of the CuO_2 planes is broken, pointing to stripe or nematic character. Systematic approach has been taken in charting both long and short range structural orders, on an equal footing, across the (x, T) phase diagrams of cuprates. For example, in $La_{2-x}Ba_xCuO_4$, by combining inelastic neutron scattering and neutron PDF approaches, we find evidence consistent with there being a dynamic symmetry breaking well above the charge ordering temperature and within the pseudogap regime. The response has non-monotonic doping dependence that peaks at 1/8 composition.

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