Abstract Submitted
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Coherent Lattice Vibrations, Kohn Anomalies, and Pseudogaps in Superconductors ALAN M. KADIN, Princeton Junction, NJ — A recent analysis has proposed [1] that the superconducting state is associated with charge density standing waves at k=2k$_F$, coupled to coherent lattice vibrations at 2k$_F$-G, where G is a reciprocal lattice vector. Independently, Aynajian et al. [2] have recently observed phonon spectral anomalies in Nb and Pb that correspond to Kohn anomalies in the Fermi surface, at energies matching the low T energy gap $2\Delta(0)$. Since Kohn anomalies are also defined by k=2k$_F$-G, these observations appear consistent with [1]. This also suggests that Kohn anomalies and an associated pseudogap provide a universal precursor of the superconducting state. Further experiments are proposed that should provide direct evidence of the coherent lattice vibrations in the superconducting state of conventional electron-phonon superconductors, and of alternative coherent oscillations (spin waves, etc.) in unconventional materials.

[1] A.M. Kadin, "Coherent Lattice Vibrations in Superconductors", Physica C 468, 255 (2008); http://arxiv.org/abs/0706.0338.
[2] P. Aynajian, et al., "Energy gaps and Kohn anomalies in elemental superconductors", Science 319, 1509 (2008); http://arxiv.org/abs/0808.1028.

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