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Power law Kohn anomaly in graphene induced by Coulomb interactions FERNANDO DE JUAN, HERBERT A. FERTIG, Indiana University, Bloomington — Phonon dispersions generically display non-analytic points, known as Kohn anomalies, due to electron-phonon interactions. We analyze this phenomenon for a zone boundary phonon in graphene. When electron-electron interactions with coupling constant β are taken into account, one observes behavior demonstrating that the electrons are in a critical phase: the phonon dispersion and lifetime develop power law behavior with β dependent exponents. The observation of this signature would allow experimental access to the critical properties of the electron state, and would provide a measure of its proximity to an excitonic insulating phase.

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