

Abstract Submitted
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Infrared phonon anomaly in BaFe₂As₂¹ C. C. HOMES, A. AKRAP,
Condensed Matter Physics and Materials Science Dept., Brookhaven National Laboratory, Upton, New York, J. J. TU, Dept. of Physics, CCNY, New York, New York, L. J. LI, G. H. CAO, Z. A. XU, Dept. of Physics, Zhejiang University, Hangzhou 310027, China — The detailed in-plane optical properties of single-crystal BaFe₂As₂ have been determined over a wide frequency range above and below the structural and magnetic transition at $T_N \simeq 138$ K. Both infrared-active E_u modes are observed at 94 and 253 cm⁻¹ (11.6 and 31.4 meV) at 295 K. Below T_N the modes are expected to split, $E_u \rightarrow B_{2u} + B_{3u}$. The 94 cm⁻¹ mode displays little temperature dependence, but may split at low temperature. In contrast, the 253 cm⁻¹ vibration softens discontinuously at T_N but does not split; for $T < T_N$ the frequency of this mode displays almost no temperature dependence, yet it nearly doubles in intensity.² This anomalous behavior appears to be a consequence of orbital ordering in the Fe-As layers.³

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²A. Akrap *et al.*, Phys. Rev. B **80**, 180502(R), (2009).

³C.-C. Lee, W.-G. Yin, and W. Ku, arXiv:0905.2957.

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