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Negative thermal expansion of MgB_2 below T_c - violation of the Ehrenfest relation J. NEUMEIER, Montana State University, T. TOMITA, Washington University, J.S. SCHILLING, Washington University, A. SERQUIS, Centro Atomico Bariloche, V.F. NESTERENKO, UCSD, S.S. INDRAKANTI, UCSD — The thermal expansion coefficient α of MgB_2 is observed to change from positive to negative upon cooling through the superconducting transition temperature T_c. The bulk Grüneisen parameter, which is proportional to α, changes sign at T_c as well. The jumps in α and the heat capacity at T_c are used to estimate its pressure dependence, dT_c/dP; comparison to the measured value reveals violation of the Ehrenfest relation by 42%. The results suggest anomalous coupling between the lattice and superconducting electrons via low-energy phonons.

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