Mixed pairing symmetry in \(\kappa-(BEDT-TTF)_2X\) organic superconductors from ultrasonic velocity measurements

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Universite de Sherbrooke — Discontinuities in elastic constants are detected at the superconducting transition of layered organic conductors \(\kappa-(BEDT-TTF)_2X\) by longitudinal and transverse ultrasonic velocity measurements. Symmetry arguments show that discontinuities in shear elastic constants can be explained in the orthorhombic compound only if the superconducting order parameter has a mixed character that can be of two types, either \(A_{1g}+B_{1g}\) or \(B_{2g}+B_{3g}\) in the classification of irreducible representations of the orthorhombic point group \(D_{2h}\). Consistency with other measurements suggests that the \(A_{1g}+B_{1g} \ d_{xy}+d_{z(x+y)}\) possibility is realized. Such clear symmetry-imposed signatures of mixed order parameters have not been observed in other superconducting compounds.

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Date submitted: 18 Nov 2009

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