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**Structural symmetry of  $\text{Cd}_2\text{Re}_2\text{O}_7$  from nonlinear optics** JESSE C. PETERSEN, MICHAEL D. CASWELL, J. STEVEN DODGE, Department of Physics, Simon Fraser University, Burnaby, British Columbia, Canada, JIAN HE<sup>1</sup>, DAVID MANDRUS, Department of Physics and Astronomy, The University of Tennessee, Knoxville and Solid State Division, Oak Ridge National Laboratory —  $\text{Cd}_2\text{Re}_2\text{O}_7$ , a superconducting metallic pyrochlore, undergoes a second-order structural phase transition at 200 K from a cubic to tetragonal lattice. Landau theory predicts that any second-order cubic-to-tetragonal phase transition must also possess an order parameter associated with broken inversion symmetry. By observing optical second-harmonic generation, we provide a direct demonstration that the 200 K transition in  $\text{Cd}_2\text{Re}_2\text{O}_7$  involves broken inversion symmetry. Moreover, we have used the polarization dependence of SHG to refine the crystal structure. We find that the low-temperature crystal symmetry is that of the  $F\bar{4}2m$  space group.

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