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X-Ray-Induced Disordering of the Dimerization Pattern and Apparent Low-Temperature Enhancement of Lattice Symmetry in Spinel $CuIr_2S_4$.

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Beamline(s): X25, X20C

Results: At low temperatures, spinel $CuIr_2S_4$ is a charge-ordered spin-dimerized insulator with triclinic lattice symmetry. We find that x rays induce a structural transition in which the local triclinic structure is preserved, but the average lattice symmetry becomes tetragonal. These structural changes are accompanied by a thousandfold reduction in the electrical resistivity. The transition is persistent, but the original state can be restored by thermal annealing. We argue that x-ray irradiation disorders the lattice dimerization pattern, producing an intriguing nematic-like state in which the orientation of the dimers is preserved, but the translational long-range order is destroyed.