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Study of spin-lattice coupling in the Shastry-Sutherland compound $SrCu_2(BO_3)_2$ RAMZY DAOU, MPI-CPfS, MARCELO JAIME, SCOTT CROOKER, NHMFL-Los Alamos, FRANZISKA WEICKERT, MICHAEL NICKLAS, FRANK STEGLICH, MPI-CPfS, HANNAH DABKOWSKA, BRUCE GAULIN, McMaster University — $SrCu_2(BO_3)_2$ supports a network of orthogonally coupled spin-dimers whose ground state consists of localized spin-singlets which can be described by the exactly solvable Shastry-Sutherland Hamiltonian. On applying strong magnetic fields (>20T), however, the spin gap in $SrCu_2(BO_3)_2$ is closed and triplet excitations are generated. As a consequence of the strong geometric frustration, the triplet band is nearly dispersionless and a sequence of steps and plateaux in the magnetisation at integer fractions of the saturation magnetisation are observed, corresponding to static magnetic textures that are commensurate with the lattice. Here we present high resolution measurements in pulsed magnetic fields up to 65T of the magnetostriction and magnetocaloric effect which 1) shed light on the coupling between spin and lattice degrees of freedom and 2) are aimed to address discrepancies between existing data and theoretical predictions for the sequence of field-induced plateaus. Experiments were carried out at the Dresden High Magnetic Field Laboratory and the pulsed field facility of the National High Magnetic Field Laboratory.

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