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Magnetostriction and magnetic texture to 100.75 Tesla in frustrated $SrCu_2(BO_3)_2$ M. JAIME, MPA-CMMS, LANL, Los Alamos, NM, USA, R. DAOU, MPI-CPfS, Dresden, Germany, S.A. CROOKER, F. WEICKERT, A. UCHIDA, MPA-CMMS, LANL, Los Alamos, NM, USA, A.E. FEIGUIN, Dep of Phys & Astr, Univ. of Wyoming, Laramie, WY , USA, C.D. BATISTA, Theory Div, LANL, Los Alamos, NM, USA, H.A. DABKOWSKA, Brockhouse Inst for Mat Res, McMaster Univ, Hamilton, ON, Canada, B.D. GAULIN, Dep of Phys & Astr, McMaster Univ, Hamilton, ON, Canada — $SrCu_2(BO_3)_2$, a spin-1/2 Heisenberg antiferromagnet in the archetypical Shastry-Sutherland lattice, exhibits a rich spectrum of magnetization plateaus and stripe-like magnetic textures in applied fields. The structure of these plateaus is still highly controversial due to the intrinsic complexity associated with frustration and competing length scales. We discover magnetic textures in $SrCu_2(BO_3)_2$ via FBG-optical fiber based magnetostriction and magnetocaloric measurements in fields up to 100.75 T. In addition to observing low-field fine structure with unprecedented resolution, the data also reveal lattice responses at 73.6 T and at 82 T that we attribute, using a controlled density matrix renormalization group approach, to a unanticipated 2/5 plateau and to the long-predicted 1/2 plateau. Research supported by NSF, State of Florida and the US DOE Basic Energy Science project "Science at 100T." ref: M. Jaime et al., *PNAS* **109**, 120404 (2012).

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