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Rotation of orbital stripes and the consequent charge-polarized state in $\mathbf{Pr(Sr,Ca)_2Mn_2O_7}$[1] YUSUKE TOKUNAGA, THOMAS LOTTER-MOSER, YUNSANG LEE, ERATO-JST, REIJI KUMAI, CERC-AIST, MASAYA UCHIDA, ERATO-JST, TAKAHISA ARIMA, ERATO-JST, Tohoku Univ., YOSHINORI TOKURA, ERATO-JST, The Univ. of Tokyo — Nano-scale self-organization of electrons is ubiquitously observed in correlated-electron systems such as complex oxides of transition metals. The phenomenon of charge ordering (CO) or the formation of charge stripes, as observed for layered-structure cuprates and nickelates, is one such example. Among them, the CO in the manganites is closely tied to the orbital degree of freedom of $3d$ electrons, leading to the staggered orbital ordering (OO) or the formation of orbital stripes in the layered structure. Here, we present the phenomena of thermally-induced rotation of the orbital stripes by 90 degrees for bilayered manganite $Pr(Sr_{1-x}Ca_x)_2Mn_2O_7$(x=0.9) with half hole-doping, i.e., a 1:1 ratio of Mn^{3+}/Mn^{4+} [1]. The rotation of orbital stripes and the consequent CO coupled with the underlying lattice distortion were found to produce the charge-polarized state, as also evidenced by its activity of optical second harmonic generation. [1] Y. Tokunaga *et al.*, Nature Materials, doi:10.1038/nmat1773 (2006).

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