## Abstract Submitted for the MAR10 Meeting of The American Physical Society

low-energy Investigations of excitations in half-doped  $Pr_{0.5}Sr_{0.5}MnO_3$  thin films by the means of THz time-domain spectroscopy M. TONOUCHI, ILE, Osaka University, Japan, D.S. RANA, ILE, Osaka University, Japan; and IISER Bhopal, India, K.R. MAVANI, ILE, Osaka University, Japan; and IIT Indore, India, I. KAWAYAMA, H. MURAKAMI, ILE, Osaka University, Japan — Epitaxial Thin films of A-type charge-ordered perovskite  $Pr_{0.5}Sr_{0.5}MnO_3$ (PSMO) PSMO were deposited on  $(LaAlO_3)_{0.3}(Sr_2AlTaO_6)_{0.7}$  along (100), (110) and (111) orientations. Terahertz (THz) time domain spectroscopy measurements were performed on all the films and their optical conductivity and dielectric constant were extracted from the complex optical spectra. THz-conductivity exhibits sharp jump for (110) and (111) films and a broader transition for (100) film at the Neél temperature of 150 K. These results were found to corroborate magnetization data which reveals a clear and sharp first-order at 150 K for PSMO (110) and (111) films, but a broader and smeared transition for the phase-separated (100) film. Several exotic features in the optical conductivity were observed, namely, i) thermal cycling across the phase-separated region to above charge-ordering (CO) transition for (100)films results in substantial drop in conductivity, ii) conductivity in metallic region does not obey the Drude law, thus, indicating the existence of pseudo-gap and, iii) a peak centered at  $\sim 6 \text{meV}$  in frequency dependent conductivity depicts the formation of charge-density waves in (110) films.

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