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Unidirectional Order and 3D Stacking of Stripes in Orthorhombic $Pr_{1.67}Sr_{0.33}NiO_4$ and $Nd_{1.67}Sr_{0.33}NiO_4$. MARKUS HÜCKER, JOHN M. TRANQUADA, GEN D. GU, Brookhaven National Laboratory, MARTIN V. ZIMMERMANN, HASYLAB at DESY, Hamburg, Germany, BERND K. BÜCHNER, IFW Leibniz-Institute, Dresden, Germany — The crystal structure and charge stripe order in $Pr_{1.67}Sr_{0.33}NiO_4$ and $Nd_{1.67}Sr_{0.33}NiO_4$ was studied by means of single crystal x-ray diffraction in zero and high electric fields. In contrast to tetragonal $La_{1.67}Sr_{0.33}NiO_4$, these crystals are orthorhombic at room temperature. We find that the distortion of the NiO_2 planes associated with the orthorhombic strain dictates the direction of the charge stripes. The critical temperature for charge stripe order is the same as in $La_{1.67}Sr_{0.33}NiO_4$ ($T_{CO} \sim 245$ K), i.e., it does not depend on the crystal symmetry. A second structural transition observed only in $Nd_{1.67}Sr_{0.33}NiO_4$ at temperatures $T \sim 100$ K has no noticeable influence on the stripe order. In crystals with a hole content very close to 1/3 we observe a tripling of the charge stripe unit cell along the c-axis for temperatures $T < 225$ K, which indicates a strong tendency towards a well defined three dimensional order. A high electric field applied to $Nd_{1.67}Sr_{0.33}NiO_4$ had no noticeable impact on the charge stripe order, i.e., a sliding of stripes was not observed. *The work at Brookhaven was supported by the Office of Science, U.S. Department of Energy under Contract No. DE-AC02-98CH10886.*

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