Structure and electronic properties of the La$_4$Ni$_3$O$_8$ KONSTANTIN LOKSHIN, TAKESHI EGAMI, University of Tennessee — The Ni$^{1+}$/Ni$^{2+}$ states of nickelates have the identical (3$d^9$/3$d^8$) electronic configuration as Cu$^{2+}$/Cu$^{3+}$ in the high temperature superconducting cuprates, and are expected to show interesting properties. However, La$_4$Ni$_3$O$_8$, has infinite NiO$_2$ layers with Ni valence 1.33 and demonstrate a magnetic transition at 105 K, which has not been explained unambiguously yet. Here we report X-rays and Neutron diffraction evidences clarifying the nature of the transition. The observed structural changes around 105 K suggest that the magnetic transition in La$_4$Ni$_3$O$_8$ originates from Yahn Teller effect that accompanies with high spin – low spin transition. Thus, at low temperature the structural motive, electronic configuration and the spin state of Ni$^{1+}$/Ni$^{2+}$ nickelates are identical to Cu$^{2+}$/Cu$^{3+}$ cuprates.