Nature of local distortions in newly-discovered disordered superconductor, \( \text{LaO}_{1-x}F_x\text{BiS}_2 \) ANUSHIKA ATHAUDA, BING LI, SHINICHIRO YANO, SEUNGHUN LEE, DESPINA LOUCA, University of Virginia, YOSHIKAZU MIZUGUCHI, Tokyo Metropolitan University — \( \text{LaO}_{1-x}F_x\text{BiS}_2 \) is a disordered, non-magnetic superconductor belonging to the novel family of \( \text{BiS}_2 \) layered superconductors. The parent phase, \( \text{LaOBiS}_2 \), is a band insulator with tetragonal structure (P4/nmm space group). The highest \( T_c \) of \( \text{LaO}_{1-x}F_x\text{BiS}_2 \) is attained at \( x = 0.5 \), as 10.8 K. Upon F doping or temperature change, little change had been reported in the low-energy portion of the phonon spectrum and the question whether \( \text{LaO}_{0.5}F_{0.5}\text{BiS}_2 \) is a BCS superconductor or not remains unsolved. The local atomic structures of \( \text{LaOBiS}_2 \) and \( \text{LaO}_{0.5}F_{0.5}\text{BiS}_2 \) were investigated as a function of temperature by using elastic neutron scattering and the pair density function analysis from 6 to 300 K and 2 to 300K respectively. We present possible models of local structure of \( \text{LaOBiS}_2 \) and \( \text{LaO}_{0.5}F_{0.5}\text{BiS}_2 \) which qualitatively explain the temperature dependence and composition dependence.