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Orbital short range correlation in $Ba_3CuSb_2O_9$ YUSUKE WAKABAYASHI, YUKI ISHIGURO, Division of Materials Physics, Graduate School of Engineering Science, Osaka University, Japan, KENTA KIMURA, SATORU NAKATSUJI, Institute for Solid State Physics, University of Tokyo, Japan, SATOSHI TSUTSUI, Japan Synchrotron Radiation Research Institute, SPring-8, Japan, ALFRED Q.R. BARON, Japan Synchrotron Radiation Research Institute, SPring-8/Materials Dynamics Laboratory, RIKEN, Japan, TSUYOSHI KIMURA, Division of Materials Physics, Graduate School of Engineering Science, Osaka University, Japan — $Ba_3CuSb_2O_9$ is consist of short range honeycomb lattice of $S = 1/2$ Cu^{2+} with the Weiss temperature -55 K[1]. Because of the similar energy scale of the spin and orbital degrees of freedom, the interaction between them is important in this system. We have studied the behavior of the orbital degree of freedom, which can fluctuate under an effect of frustrated spin system, by means of x-ray diffuse scattering method. Measurements were performed with a four-circle diffractometer at BL-3A of the Photon Factory, KEK, Japan. Clear Huang scattering that reflects lattice strain induced by the Jahn-Teller distortion was observed. The orbital correlation provides additional scattering intensity around the Γ point in low temperatures. The lifetime of the strain field was examined by inelastic x-ray experiments performed at BL-35XU of the SPring-8, Japan. Quasielastic intensity corresponding to the Huang scattering had slightly broader energy width than the instrumental resolution, and the lifetime was estimated as 3 picoseconds.

[1] S. Nakatsuji et al., Science, **336**, 559 (2012).

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