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Indirect RIXS study of bimagnon excitations in triangular-lattice quantum Heisenberg antiferromagnet[1] TRINANJAN DATTA, Georgia Regents University, CHENG LUO, ZENGYE HUANG, DAO-XIN YAO, Sun Yat-Sen University — Bimagnon correlations in triangular-lattice quantum Heisenberg antiferromagnet can be probed by the resonant inelastic X-ray scattering (RIXS) technique. Utilizing an interacting spin wave theory within the Bethe-Salpeter approximation scheme, we compute the K-edge indirect RIXS spectra for the nearest neighbor Heisenberg model with a general S for the entire magnetic brillouin zone. The non-collinear spin arrangement in the triangular lattice geometry supports the intrinsic spontaneous single-magnon decay or recombination. Based on our calculation, we find that the RIXS spectra display a peak at the antiferromagnetic wave vector $(4\pi/3, 0)$ corresponding to the triangular lattice, which is in contrast to the square lattice case. The major contribution to the RIXS spectra originates from the decay vertices arising from the three-magnon interaction terms, with the quartic interaction contributions subdued. Our results indicate that the spontaneous decay and recombination of magnons inherent to the triangular lattice model can be oberved in the RIXS spectra without a disintegration.

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