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Magnon-phonon coupling effects on the indirect K-edge RIXS spectrum of a 2D Heisenberg antiferromagnet[1] TRINANJAN DATTA, Augusta University, ZIJIAN XIONG, Sun Yat-Sen University, KENNY STIWINTER, Augusta University, DAO-XIN YAO, Sun Yat-Sen University — We compute the effects of magnon-phonon coupling on the indirect K-edge bimagnon RIXS intensity in a square lattice antiferromagnet. Including spin wave expansion up to 1/S order, the Bethe-Salpeter ladder approximation scheme for the bimagnon interacting channel, and considering a second order magnon-phonon-magnon scattering interaction we study the role of magnon-phonon effect on the bimagnon RIXS spectrum. Considering the damping effects due to longitudinal acoustic phonon we find that the spectrum is indeed affected with prominent magnon-phonon damping contributions along the Brillouin zone edge. The maximal damping effects are at the zone edge points of ($\pm\pi$,0) or (0, $\pm\pi$). Using magnon-phonon coupling parameters pertinent to cuprates, we find that the RIXS bimagnon-phonon peak can be observed as a discernible shoulder in the bimagnon RIXS spectrum. We also investigate the interplay of phonons with spatial anisotropy and magnetic frustration through next nearest neighbor interaction on the bimagnon RIXS spectrum to highlight the importance of RIXS in strongly correlated systems such as cuprates and pnictides.

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