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Spin excitations in hole-overdoped iron-based superconductors $\mathbf{Ba_{1-x}K_xFe_2As_2}$[1] KAZUMASA HORIGANE, Okayama University, KUNIHIRO KIHOU, AIST, KAY FUJITA, Aoyama-Gakuin University, RYOICHI KAJIMOTO, J-PARC, KAZUHIKO IKEUCHI, CROSS, SUNGDAE JI, Pohang University of Science and Technology, JUN AKIMITSU, Okayama University, CHUL-HO LEE, AIST — Understanding the overall features of magnetic excitation is essential for clarifying the mechanism of Cooper pair formation in iron-based superconductors. Here we report a study on the spin fluctuations of the hole-overdoped iron-based superconductors $Ba_{1-x}K_xFe_2As_2$ (x = 0.5 and 1.0; T_c = 36 K and 3.4 K, respectively) over the entire Brillouin zone using inelastic neutron scattering. We find that their spin spectra consist of spin wave and chimney-like dispersions. The chimney-like dispersion can be attributed to the itinerant character of magnetism. The band width of the spin wave-like dispersion is almost constant from the non-doped to optimum-doped region, which is followed by a large reduction in the overdoped region. This suggests that the superconductivity is suppressed by the reduction of magnetic exchange couplings, indicating a strong relationship between magnetism and superconductivity in iron-based superconductors.

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