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Robust Upward Dispersion of the Neutron Spin Resonance in the Heavy Fermion Superconductor $Ce_{1-x}Yb_xCoIn_5$ YU SONG, Rice University, JOHN VAN DYKE, University of Illinois at Chicago, I. K. LUM, B. D. WHITE, SOOYOUNG JANG, DUYGU YAZICI, University of California, San Diego, LEI SHU, Fudan University, ASTRID SCHNEIDEWIND, PETR CERMAK, Julich Center for Neutron Science, YIMING QIU, NIST Center for Neutron Research, M. B. MAPLE, University of California, San Diego, D. K. MORR, University of Illinois at Chicago, PENGCHENG DAI, Rice University — The neutron spin resonance is a collective magnetic excitation that appears in copper oxide, iron pnictide, and heavy fermion unconventional superconductors. Although the resonance is commonly associated with a spin-exciton due to the $d(s^{\pm})$-wave symmetry of the superconducting order parameter, it has also been proposed to be a magnon-like excitation appearing in the superconducting state. Here we use inelastic neutron scattering to demonstrate that the resonance in the heavy fermion superconductor $Ce_{1-x}Yb_xCoIn_5$ with $x = 0, 0.05, 0.3$ has a ring-like upward dispersion that is robust against Yb-doping. By comparing our experimental data with random phase approximation calculation using the electronic structure and the momentum dependence of the $d_{x^2-y^2}$-wave superconducting gap determined from scanning tunneling microscopy for $CeCoIn_5$, we conclude the robust upward dispersing resonance mode in $Ce_{1-x}Yb_xCoIn_5$ is inconsistent with the downward dispersion predicted within the spin-exciton scenario.

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