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Spin excitations and pairing symmetry of sulfur-doped iron selenide superconductors QISI WANG, Fudan University, JITAE PARK, Forschungs-Neutronenquelle Heinz Maier-Leibnitz, YU FENG, YAO SHEN, YIQING HAO, BINGYING PAN, Fudan University, JEFFREY LYNN, NIST Center for Neutron Research, ALEXANDRE IVANOV, Institut Laue-Langevin, SONGXUE CHI, MASAAKI MATSUDA, HUIBO CAO, Oak Ridge National Laboratory, ROBERT BIRGENEAU, University of California, Berkeley, DMITRI EFREMOV, IFW Dresden, JUN ZHAO, Fudan University — In conventional BCS superconductors, electron-phonon coupling gives rise to a sign-preserved s-wave pairing. In high-temperature superconductors, weak coupling theories suggest that superconductivity is mediated by spin fluctuations which lead to a sign reversal between the superconducting order parameters on different parts of the Fermi surfaces. A strong evidence for this comes from the observation of a magnetic resonance mode in the spin excitation spectrum. Here, we report the observation of a transition from sign-reversed to sign-preserved Cooper-pairing symmetry in S-doped iron selenide superconductors $K_xFe_{2-y}(Se_{1-z}S_z)_2$ [1]. Our neutron scattering data show that a sharp magnetic resonance mode well below the superconducting gap (2) in the undoped sample is replaced by a broad hump structure above 2 under 50% S doping. These findings suggest that multiple channels are required to understand the superconductivity in this system. [1] Q. Wang et al., Phys. Rev. Letts. 116, 197004 (2016).

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