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Weak-coupling superconductivity in a strongly correlated iron pnictide[1] ALIAKSEI CHARNUKHA, Univ of California - San Diego — Iron-based superconductors have been found to exhibit an intimate interplay of orbital, spin, and lattice degrees of freedom, dramatically affecting their low-energy electronic properties, including superconductivity. Albeit the precise pairing mechanism remains unidentified, several candidate interactions have been suggested to mediate the superconducting pairing, both in the orbital and in the spin channel. Here, we employ optical spectroscopy (OS), angle-resolved photoemission spectroscopy, ab initio band-structure, and Eliashberg calculations to show that nearly optimally doped $NaFe_{0.978}Co_{0.022}As$ exhibits some of the strongest orbitally selective electronic correlations in the family of iron pnictides. Unexpectedly, we find that the mass enhancement of itinerant charge carriers in the strongly correlated band is dramatically reduced near the Γ point and attribute this effect to orbital mixing induced by pronounced spin-orbit coupling. Embracing the true band structure allows us to describe all low-energy electronic properties obtained in our experiments with remarkable consistency and demonstrate that superconductivity in this material is rather weak and mediated by spin fluctuations.

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