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Itinerancy enhanced quantum fluctuation of magnetic moments in iron-based superconductors YUTING TAM, DAO-XIN YAO, Sun Yat-sen University, WEI KU, Brookhaven National Laboratory — The serious mismatch of large local magnetic moments and small ordered moments in iron-based superconductors is one of the unique and essential features of this new class of high-temperature superconductors. Here we demonstrate the active role of electron itinerancy in modulating strong anisotropic quantum spatial fluctuation and tuning the ordered anti-ferromagnetic moments. This is performed by first integrating out the itinerant degree of freedom of a degenerate spin-fermion model with Hund's coupling, followed by estimation of quantum fluctuation via spin-wave theory. Our results complement current emphasis on the temporal fluctuation in the literature, and highlight the essential interplay between itinerant and local degree of freedoms, paving the way to systematic studies of transport, superconductivity and other fluctuation dominant phenomena in iron-based superconductors.

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