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## **Spin/Orbital Correlation and Itinerancy-Enhanced Quantum Fluctuation in Iron-Based Superconductors**

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The newly discovered Fe-based superconductors demonstrate various characteristics of strongly correlated materials. This talk will first emphasize the important aspect of orbital degree of freedom and its strong coupling to the lattice and spin correlation. Then, the talk will address the rich magnetic structures across different families of Fe-based superconductors that are proven challenging to standard consideration of Fermi surface instability. I will show that instead a spin-fermion picture, encapsulating the interplay of itinerant carriers and local magnetic moments, offers the simplest understanding that unifies all the observed structures. Finally, the talk will cover the strong quantum fluctuation in the magnetic order, and demonstrate a generic subtle role of itinerant carriers in enhancing the fluctuation while destabilizing the long-range order.

### **References:**

1. Chi-Cheng Lee, Wei-Guo Yin, and Wei Ku, Phys. Rev. Lett. **103**, 267001 (2009).
2. Wei-Guo Yin, Chi-Cheng Lee, and Wei Ku, Phys. Rev. Lett. **105**, 107004 (2010).
3. Yu-Ting Tam, Dao-Xin Yao, and Wei Ku, Phys. Rev. Lett. **115**, 117001 (2015).