

Abstract Submitted  
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**Origin of magnetic resonance spectrum in cuprate high-temperature superconductors and related issues** A. BANSIL, Northeastern U, TANMOY DAS, Northeastern U and LANL, R.S. MARKIEWICZ, Northeastern U. — A distinct low energy magnetic mode has been observed in almost all the cuprate materials in a broad range of experiments including ARPES, Raman, optical, STM, RIXS, as well as neutron scattering. This mode is enhanced in the superconducting (SC) state and its energy scales universally as  $\omega_{res} \propto 2\Delta$ , suggesting that these modes play an important role in the mechanism of superconducting pairing. Here we study this resonance via first-principle susceptibility calculations in a Hubbard model with  $d$ -wave superconductivity [1]. The resulting excitation mode produces the universal  $\omega_{res} \propto 2\Delta$  relation as well as the puzzling ‘hour-glass’ dispersion and the  $45^\circ$  rotation of the spin excitations with energy in a series of cuprates in accord with experiments [2]. Work supported by US DOE.

[1] Tanmoy Das, R.S. Markiewicz, and A. Bansil, Phys. Rev. B **81**, 174504 (2010).

[2] A. Bansil, *et al.* Journal of Physics and Chemistry of Solids (2010).

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