Poster 12

Hidden orbital order in copper monolayer at a cuprate/manganite interface uncovered by RIXS studies

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Resonant inelastic x-ray scattering (RIXS) allows one to exploit tiny differences in the electronic states of copper ions at the interface from the bulk in the cuprate/manganites heterostructures. Using this feature, our RIXS measurement uncovers a new magnetic excitation at the interfacial layer of $YBa_2Cu_3O_7$ with energy and intensity behavior distinctly different from the bulk magnons. Using theoretical modeling, we demonstrate that all observed features can be explained by a hidden orbital order specific for the interface layer that couples with the checkerboard-type antiferromagnetic order. The most remarkable manifestation of the hidden orbital order is the scattering intensity increase under lowering momentum transfer instead expected decrease for the usual single orbital antiferromagnetic order.