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proposes a d-wave superconducting phase only for electron doping, SM-FRG addresses two possible scenarios: a mixed singlet-triplet SC with $d_{x^2-y^2}$symmetry for electron doped and a mi xed singlet-triplet SC with s symmetry for the hole doped cases. In addition to these methods, DMFT foresees a topological p+ip pseudo-spin (singlet d-wave) pairing for hole (electron) doped samples. From experimental point of view, the existence of Fermi arcs suggests electron doped as a potential candidate for the d-wave SC but with Tc lower than that of La_2CuO_4. Furthermore, a p-wave pairing state is also reported by substitution of Ru (hole-doping). We investigate the potential existence of a superconducting phase in 5d Mott insulators with an eye to hole doped Sr_2IrO_4. Using a mean-field method, a mixed singlet-triplet superconductivity is observed due to the antisymmetric exchange originating from a quasi-spin-orbit-coupling. Our calculation on ribbon geometry shows possible existence of the topologically protected edge states while the spin-triplet component of the order parameter is larger than the spin-singlet one. These edge modes emerge as zero-energy flat bands, supporting a symmetry protected Majorana states. We propose an innovative approach for experimental observation of these edge states based on the quasi-particle interference (QPI) technique. Despite the fact that the superconductivity has not yet been observed in layered 5d transition metal oxides, we predict that the mixed singlet-triplet superconductivity can exist in hole doped Sr_2IrO_4 as an example of the new class Mott insulators. Our results demonstrates that the Dzyaloshinskii-Moriya interaction plays an important role in finding this interesting novel phase by preserving the time-reversal symmetry. This also conjectures the existence of a mixed-paring phase, boosted by antisymmetric exchange, in other iridates that host a similar mechanism for an insulating state.

- **PS188**

Growth of $ReBa_2Cu_3O_{7-x}$ (Re=Y, Sm) Single Crystals by Self-Flux Method and Their Propertis

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The REBCO (RE=Sm, Nd) single crystals used in fundamental research especially in the melt texture growth of bulk superconductor. Because of complicated stoichiometry and difference evaporation temperatures of the metal ions in the precursor, high temperature superconductor single crystals commonly grown by the self-flux method. In this work, we describe the fabrication method of YBCO and SmBCO single crystal superconductor for investigating superconducting properties

and their crystal structure. In order to obtain high quality REBCO single crystal by flux method several parameters are important. These parameters are as follows: Composition of the flux, type of crucible material, temperature profile of single crystal growth treatment and crystal nucleation process conditions in the flux.
REBCO, as the solute part of the crystal growth route by flux method, was prepared from the chemical reagents of RE_2O_3, $BaCO_3$ and CuO with a molar ratio of 1:2:3 which were mixed mechanically by a ball mill and then performing the calcination process at 920 °C twice. $BaCO_3$ and CuO were used as flux agent with the molar ratio of Ba:Cu=28:72. In order to proceed with the crystal growth rote, REBCO and the flux were mix again with the amount of 10 wt% and 90wt% respectively. The Mixture was then calcinated at 910 °C in Al_2O_3 crucible. The XRD results showed the existence of three phases of $BaCuO_2$, CuO and $REBa_2Cu_3O_7$ simultaneously in the sample. An especial design performed in the tube furnace in order to deliver and guided the cold air to the vicinity of the crucible for performing a gradient temperature for the crystal growth process. Apart from that for growing larger single crystal a unique heat treatment were also applied. The temperature in growth step is lowered at a different rate of 0.2–1.0 °C/h. Size of as-grown single crystals increased as the rate was decreased. The flux removes from the crucible at 950 °C. By this method, free standing single crystals larger than $2\times2\times0.5mm^3$ could be achieved. X ray diffraction pattern had an extremely sharp peaks that shown high degree of crystallinity. Single crystals annealed at 860–900 °C in flowing of oxygen atmosphere for 24 h. Critical temperature of single crystals YBCO and SmBCO were found 89 and 85k respectively using standard four probe technique. Decrease of the critical temperature may be associated with the Al Impurities from crucible.

- **PS189**

Long-Distance Entanglement between Microwave Modes Associated with Two Remote Hybrid Electro-Opomechanical Systems Operating in a Pulsed Regime

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In this work, we have presented a scheme for establishing state teleportation and direct quantum state transfer between distant superconducting microwave modes associated with two Hybrid electro-optmechanical systems controlled by independent classical drivers in the weak coupling regime.
Each hybrid electro-optomechanical system contains an optical cavity and a superconducting microwave cavity which are coupled indirectly via a moveable cantilever playing the role of a nanomechanical oscillator. The oscillating cantilever