

Poster-1-16

Long Ranged Proximity Effect in $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ - Sr_2IrO_4 Thin Film Multilayers Revealed by X-ray Absorption Spectroscopy

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Thin film heterostructures consisting of the high- T_C superconductor $\text{YBa}_2\text{Cu}_3\text{O}_7$ (YBCO) and the iridate Sr_2IrO_4 (SIO) have been predicted to host induced superconducting spin-triplet [1] or Majorana bound states [2] and to find applications in devices such as superconducting diodes. These possibilities emerge because of the strong spin-orbit coupling [3] and the peculiar magnetic properties [4] of SIO.

Using X-ray Absorption Spectroscopy at both the Cu L_3 and the Ir L_3 edge, we observe a large charge transfer in multilayers of these materials with holes being transferred from YBCO to SIO. This leads to insulating behavior for thin YBCO layers. We also study the influence of the interface on the magnetism of both materials with X-ray circular dichroism. We find that the Ir^{4+} ions in sufficiently thick SIO carry a magnetic moment as previously seen in [4]. Further, we also observe an induced magnetic moment in the YBCO layer within the superconducting phase.

The interplay between superconductivity and magnetism in the YBCO layer raises hopes to induce spin-triplet superconductivity and further emerging exotic properties. This work provides important insights on interface interactions in these heterostructures which is a crucial step towards real life applications and devices.

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[3] B. J. Kim et al., Science 323, 1329-1332 (2009).

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