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Control of Two-Dimensional Multi-Component Superconductivity in $SrTiO_3$ Heterostructures by Interlayer Coupling HISASHI INOUE, MINU KIM, SLAC National Accelerator Laboratory, University of Tokyo, CHRISTOPHER BELL, YASUYUKI HIKITA, SLAC National Accelerator Laboratory, HIROSHI OKAMOTO, University of Tokyo, HAROLD HWANG, Stanford University, SLAC National Accelerator Laboratory, University of Tokyo — Two-dimensional (2D) superconductivity (SC) in the clean limit is of particular interest since novel phases such as the Fulde-Ferrell-Larkin-Ovchinnikov state [1,2], and Landau-quantized SC [3] are suggested theoretically. In an attempt to approach this limit experimentally, SC was confined in a narrow δ-doped region of $SrTiO_3$ [4]. 2D subbands (SBs) were observed as well as 2D SC. Building on these results, we have explored the coupling between two 2D superconducting layers in structures with two δ-doped layers, with variable interlayer coupling controlled by their spacing. We observe multiple components of the SC in the temperature and angular dependent upper critical field plots. These data suggest that the SB structure in the doped and interlayer regions directly impact the SC, and may play an important role for the design and investigation of multi-component SC. [1] P. Fulde *et al.*, *Phys. Rev.* **135**, A550 (1964). [2] A. I. Larkin *et al.*, *Sov. Phys. JETP* **20**, 762 (1965). [3] M. Rasolt *et al.*, *Rev. Mod. Phys.* **64**, 709 (1992). [4] Y. Kozuka *et al.*, *Nature* **462**, 487 (2009).

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