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Spin-rotation symmetry breaking and triplet superconducting state in doped topological insulator CuxBi2Se3

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Spontaneous symmetry breaking is an important concept for understanding physics ranging from the elementary particles to states of matter. For example, the superconducting state breaks global gauge symmetry, and unconventional superconductors can break additional symmetries. In particular, spin rotational symmetry is expected to be broken in spin-triplet superconductors. However, experimental evidence for such symmetry breaking has not been obtained so far in any candidate compounds. We report 77Se nuclear magnetic resonance measurements which showed that spin rotation symmetry is spontaneously broken in the hexagonal plane of the electron-doped topological insulator Cu0.3Bi2Se3 below the superconducting transition temperature Tc=3.4 K. Our results not only establish spin-triplet (odd parity) superconductivity in this compound, but also serve to lay a foundation for the research of topological superconductivity (Ref.*). We will also report the doping mechanism and superconductivity in Sn1-xInxTe. * K. Matano, M. Kriener, K. Segawa, Y. Ando and Guo-qing Zheng, Nature Physics 12, 852 (2016).