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Anisotropic Dirac Cones in SrMnBi2 and CaMnBi2 Revealed by Angle-Resolved Photoemission YA FENG, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, CHAOYU CHEN, YOUGUO SHI, ZHUOJIN XIE, HEMIAN YI, AIJI LIANG, SHAOLONG HE, JUNFENG HE, YINGYING PENG, XU LIU, YAN LIU, LIN ZHAO, GUODONG LIU, XIAOLI DONG, JUN ZHANG, LI YU, IOP, CAS, CHUANGTIAN CHEN, ZUYAN XU, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China., XINGJIANG ZHOU, IOP, CAS, IOP, CAS COLLABORATION, TECHNICAL INSTITUTE OF PHYSICS AND CHEMISTRY, CAS COLLABORATION — By carrying out high resolution angle-resolved photoemission measurements on SrMnBi2 and CaMnBi2, we have directly revealed the existence of anisotropic Dirac cone in these two compounds. In particular, we find that SrMnBi2 and CaMnBi2 exhibit markedly different anisotropy in their Dirac cone. In SrMnBi2, four Dirac cones are well separated in the first Brillouin zone forming four crescent moon-like Fermi surface sheets and the ratio of Fermi velocities along and perpendicular to Gamma-M direction is $\sim$18. In CaMnBi2, however, the Dirac cones are connected in the first Brillouin zone forming a ridge-like Fermi surface topology indicating CaMnBi2 as a new Dirac material with a single Dirac cone and giant Dirac anisotropy. The dichotomy of the Dirac cone anisotropy between SrMnBi2 and CaMnBi2 originates from a different local Sr (Ca) arrangement surrounding the Bi square net. It demonstrates the feasibility in engineering the Dirac cone anisotropy by manipulating the environment of the Bi square net.

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