

X-ray diffraction on the charge-density wave in the kagome superconductor RbV₃Sb₅

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The newly discovered kagome superconductors AV₃Sb₅ (A=K, Rb or Cs), in which non-trivial band topology, charge-density wave (CDW), and superconductivity are intertwined, have attracted tremendous interests. Despite extensive recent investigations via X-ray diffraction and other complementary local probe techniques such as STM, NMR and muon spectroscopy etc., it remains a major challenge to gain a consistent picture about the CDW superstructure modulation wavevectors across different AV₃Sb₅ samples. For instance, it is rather controversial even only for CsV₃Sb₅ that distinct superstructure reflections in 2x2x2, or 2x2x4, or 1x1x4 types were actually observed below TCDW experimentally. The intriguing CDW fluctuations above TCDW was also found, and further clarifications are still needed. In this talk, we will present our recent single-crystal X-ray diffraction investigations, based on both in-house and synchrotron radiation facilities, of the CDW modulations over a wide temperature range in the less-studied RbV₃Sb₅. A unique CDW modulation of the 2x2x2 type can be confirmed for RbV₃Sb₅ below TCDW = 102 K, and no evidence for CDW fluctuations above TCDW could be found. Our detailed temperature dependence measurements of the CDW superstructure reflections indicate a second-order phase transition with a 2D Ising character. A comparison to other AV₃Sb₅ compounds and possible implications on the understanding of the nature of the CDW in these kagome superconductors will be given.

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