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Possible Evidence for Novel Superconductivity in $LaRu_3Si_2$ HAI-HU WEN, SHENG LI, BIN ZENG, XIANGANG WAN, JIAN TAO, FEI HAN, HUAN YANG, ZHIHE WANG, Physics Department, Nanjing University, China, CENTER FOR SUPERCONDUCTING PHYSICS AND MATERIALS TEAM — Superconductivity in $LaRu_3Si_2$ with the honeycomb structure of Ru has been investigated. It is found that the normal state specific heat C/T exhibits a deviation from the Debye model down to the lowest temperature. A relation $C/T = \gamma_n + \beta T^2$-ATlnT which concerns the electron correlations can fit the data very well. The suppression to the superconductivity by the magnetic field is not the mean-field like, which is associated well with the observation of strong superconducting fluctuations. The field dependence of the induced quasiparticle density of states measured by the low temperature specific heat shows a non-linear feature, indicating the significant contributions given by the delocalized quasiparticles. The Wilson ratio estimated here is about 3.3, indicating also a strong correlation effect. Interestingly, the Fe-doping can suppress the superconductivity very easily, while Co-doping kills the superconductivity very slowly. The possible reasons are discussed. All these results suggest that the electronic correlation effect exists in $LaRu_3Si_2$ and superconductivity may be novel.

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