

Poster-1-3

Charge order above room temperature in kagome superconductor LaRu₃Si₂Igor Plokhikh*Paul Scherrer Institute*

The present work focuses on LaRu₃Si₂, which has one of the highest critical temperatures ($T_c = 7$ K) among kagome superconductors. The structural motif of this material represents Ru-based kagome layers placed between LaSi₂ hexagonal nets. Our current single-crystal X-ray diffraction study of the pristine and Fe-doped LaRu₃Si₂ reveals a cascade of structural phase transitions with temperature, consistent with the previously predicted charge order instabilities. Above 600K, the material crystallizes in an undistorted P6/mmm structure (HT-hex), which doubles along the c-direction upon cooling (LT-hex). Below 400K, additional charge order (CO-I) reflections with $q_1 = (1/4 \ 0 \ 0)$ evolve, followed by the second charge order transition into CO-II with $q_2 = (1/6 \ 0 \ 0)$ below 180K. Apart from detailing the transition in reciprocal space, I will also describe the corresponding structural transformations observed in real space and discuss their potential implications on superconductivity.