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Resonant diffuse scattering in metallic VO₂

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Metal-Insulator transitions are among the most active topics in condensed matter physics. The electronic transition takes place concomitantly with a structural transition, making it hard to disentangle the underlying mechanism. Two scenarios are possible and are at the core of an unresolved and longstanding debate: i) the transition is driven by purely electronic interactions or ii) it is driven by electron-phonon coupling. Using VO₂ as case study, we investigated the nature of electronic and structural fluctuations within the metallic state by measuring resonant and off-resonance diffuse scattering. We found strong, pre-transitional structural fluctuations above T_c, which show no enhancement on resonance. Our results hint that structural and electronic fluctuations are strongly coupled in metallic VO₂, supporting electron-phonon coupling as the driver of the metal-insulator transition.

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