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Raman response in density wave materials

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Raman spectroscopy, which uses different incoming and outgoing light polarizations to measure different areas of the Brillouin zone, allows researchers to probe the nature of charge and spin density wave gaps. We present calculations of the Raman response for two density wave materials: rare earth tri-tellurides in the charge density wave state and the iron pnictides in the spin density wave state. Both of these materials have phase diagrams which can be further understood by clarifying the nature of the density wave state. For example, in the tri-tellurides, either one or two charge density wave gaps are present depending on the type of rare earth element in the compound. In the pnictides, superconductivity coexists with or is in close proximity to an antiferromagnetic spin density wave state, and there is debate over whether the magnetism is best described by an itinerant or local moment picture. We discuss what can be learned from our calculations and compare to experimental results.

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