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Resonance Raman Spectroscopy of Layered, Metallic Niobium Diselenide HEATHER HILL, ALBERT DAVYDOV, ANGELA HIGHT WALKER, NIST - Natl Inst of Stds Tech — Transition metal dichalcogenides (TMDCs) are a popular set of materials due to their ability to be isolated into atomically-thin, 2D layers. Most recent research has focused on semiconducting TMDCs, but TMDCs can also be insulating, metallic, and superconducting. Niobium diselenide ($NbSe_2$) is a metallic, superconducting TMDC that exhibits a charge density wave phase below 33.5 K in bulk. In our work, we investigate the laser energy dependence of the Raman modes of $NbSe_2$ using resonance Raman spectroscopy and compare our results with reflectance contrast spectroscopy. We measure the Raman intensity, shift, and FWHM as a function of polarization and excitation energy in the range from 1.6 to 2.7 eV. An increasing intensity of one Raman mode, A_{1g}, with decreasing energy in the visible range is observed, while the opposite behavior is seen for the other dominant Raman mode, E_{2g}. We use the absorption peaks in the reflectance contrast of $NbSe_2$ to relate the resonance Raman spectrum to the band structure. Finally, we compare our results with the existing literature on the resonance Raman spectroscopy on molybdenum disulfide, a semiconducting TMDC with surprising band structure similarities.

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