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Excitons and exciton-phonon interactions in 2D MoS2, WS2 and WSe2 studied by resonance Raman spectroscopy MARCOS PIMENTA, ELENA DEL CORRO, BRUNO CARVALHO, LEANDRO MALARD, JULIANA ALVES, CRISTIANO FANTINI, Departamento de Fisica, Universidade Federal de Minas Gerais, HUMBERTO TERRONES, Rensselaer Polytechnic Institute, Department of Physics,, ANA LAURA ELIAS, MAURICIO TERRONES, Department of Physics and Materials Science and Engineering, Penn-State University — The 2D materials exhibit a very strong exciton binding energy, and the exciton-phonon coupling plays an important role in their optical properties. Resonance Raman spectroscopy (RRS) is a very useful tool to provide information about excitons and their couplings with phonons. We will present in this work a RRS study of different samples of 2D transition metal dichalcogenides (MoS2, WS2 and WSe2) with one, two and three layers (1L, 2L, 3L) and bulk samples, using more than 30 different laser excitation lines covering the visible range. We have observed that all Raman features are enhanced by resonances with excitonic transitions. From the laser energy dependence of the Raman excitation profile (REP) we obtained the energies of the excitonic states and their dependence with the number of atomic layers.. In the case of MoS2, we observed that the electron-phonon coupling is symmetry dependent, and our results provide experimental evidence of the C exciton recently predicted theoretically. The RRS results WSe2 show that the Raman modes are enhanced by the excited excitonic states and we will present the dependence of the excited states energies on the number of layers.

Marcos Pimenta
Departamento de Fisica, Universidade Federal de Minas Gerais

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