

Raman scattering study on the new FeSe superconductors (LT26)

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We have performed Raman-scattering measurements on high-quality crystals of the newly discovered Fe-based superconductors $A_{0.8}Fe_{1.6}Se_2$ ($A=K, Tl, Rb$). More than ten phonon modes were observed in the wavenumber range $10\text{--}300\text{ cm}^{-1}$. The spectra possess a four-fold symmetry indicative of bulk vacancy order in the Fe-deficient planes. We perform a vibration analysis based on first-principles calculations, which both confirms the ordered structure and allows a complete mode assignment. We observe an anomaly at T_c in the 180 cm^{-1} A_g mode, which indicates a rather specific type of electron-phonon coupling. Furthermore, we will present some very recent results on electronic and magnetic Raman scattering in the superconductors.