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Electron-phonon induced complex quasiparticles in the 1x1 H/W(110) surface.[1] ASIER EIGUREN, Donostia International Physics Center (DIPC), CLAUDIA AMBROSCH-DRAXL, Montan University Leoben — We show that the solution of the complex Dyson equation for the electron-phonon problem induces several quasiparticle states for a given wave vector. The Dyson equation is considered in the full complex plane and it is solved without considering the imaginary part of the self-energy as an small parameter. By a first principle application of the formalism to the 1x1 H covered W(110) surface, we show that some aspects of the surface band splitting [Rotenberg et. al., Phys. Rev. Lett. **84**, 2925 (2000)] can be traced back to electron-phonon coupling, where we present the energy and lifetimes of each quasiparticle. Despite this breakdown of the single quasi-particle picture, it is remarkable that the spectral functions are very well Represented by the predicted multiple quasi-particles. From these results, we can deduce that some of the features that previously where prescribed in ARPES spectra as *incoherent structure* could eventually be re-interpreted as contributions from additional quasi-particle states. Our method could also help to understand similar phenomena observed in high T_c cuprates and various other surfaces.

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