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Quantum Generation Dynamics of Coherent Phonon in Semiconductors: Transient and Nonlinear Fano Resonance YOHEI WATANABE, Grad. School of PAS. Univ. Tsukuba, KEN-ICHI HINO, MUNEAKI HASE, NOBUYA MAESHIMA, Div. of PAS. Univ. Tsukuba — The coherent phonon (CP) generation is one of the representative phenomena induced by ultrashort pulsed laser. In particular, in the initial stage of the CP generation in lightly n -doped Si, the vestige of Fano resonance (FR) manifested in a flash was observed in time-resolved spectroscopy experiments, in which it was speculated that this phenomenon results from the birth of transient polaronic quasiparticles composed of electrons and phonons strongly interacting each other [1]. This study is aimed at constructing a fully-quantum-mechanical model for the CP generation and tracking the origin of the transient FR. We calculate two physical quantities in both of polar and non-polar semiconductors such as GaAs and undoped Si. One is a retarded longitudinal susceptibility which allows one to calculate a transient induced photoemission spectrum. The other is the Fourier-transform of LO-phonon displacement into frequency domain. We have succeeded in showing that the transient FR is exclusively caused in Si in harmony with the experiments, though, not observed in GaAs [2]. [1] M. Hase, M. Kitajima, A. M. Constantinescu and H. Petek, Nature **426**, 51 (2003). [2] Y. Watanabe, K. Hino, M. Hase and N. Maeshima, Phys. Rev. B (submitted), arXiv:1510.00263.

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