

# ACOUSTICS2008/2904

## The role of coherent phonons in the vibronic laser

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Herewith we present the quantum theory of the vibronic laser, which is based on the crucial role played by the host crystal phonons in the laser dynamics. In the solid state transition-metal ion laser the operation takes place between the vibronically broadened electronic levels of the gain center, thus the laser action is accompanied by the creation or annihilation of the host lattice phonons. The nonequilibrium coherent phonons, produced in the process of the nonradiative energy transition from the photoexcited impurity ion, pump the energy level, from which the laser action takes place. One can say that the laser photons are produced at the cost of lattice phonons. This is the reason why the coherent phonons strongly influence the character of the laser action and govern the complicated laser dynamics. In the laser equations, derived by us, the number of coherent phonons is treated as one of dynamical variables coupled with the number of photons. In solution we observe the effect of energy pulling between photons and phonons. Phonons follow all forms of the photon dynamics including self-pulsations and chaotic dynamics.