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Theory of generation of angular momentum of phonons by heat current and its conversion to spins MASATO HAMADA, SHUICHI MURAKAMI, Tokyo Institute of Technology — Spin-rotation coupling in crystals will enable us to convert between spin current and mechanical rotations, as has been studied in surface acoustic waves, in liquid metals, and in carbon nanotubes. In this presentation we focus on angular momentum of phonons. In nonmagnetic crystals without inversion symmetry, we theoretically demonstrate that phonon modes generally have angular momenta depending on their wave vectors. In equilibrium the sum of the angular momenta is zero. On the other hand, if a heat current flows in the crystal, nonequilibrium phonon distribution leads to nonzero total angular momentum of phonons. It can be observed as a rotation of crystal itself, and as a spin current induced by these phonons via the spin-rotation coupling.

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