

## Channeling 2018



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# Quantum Versus Classical Approach of Dechanneling and Other Incoherent Processes at High Energy in Aligned Crystals

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Particles travelling in aligned crystals at small angle w.r.t. crystallographic axes or planes are essentially steered by the continuous Lindhard potential. This interaction conserves the energy  $E$ , the parallel momentum  $p_{\parallel}$ , the transverse energy of the particle  $E_T$  and is elastic concerning the crystal wave function. At high enough energy the resulting transverse motion can be described by classical mechanics.

The temporal fluctuations of the positions of the atoms or of the electrons of the crystal create a residual potential on which the particle can scatter. This interaction does not conserve the previous quantities and is inelastic for the crystal. We discuss whether it can be treated classically, like in the binary collision model, or if it should be treated quantum-mechanically. We give arguments for the latter opinion. We show that the quantum approach predicts a slower dechanneling than the classical one.

**Primary author:** Mr ARTRU, Xavier (Institut de Physique Nucléaire de Lyon)

**Presenter:** Mr ARTRU, Xavier (Institut de Physique Nucléaire de Lyon)

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