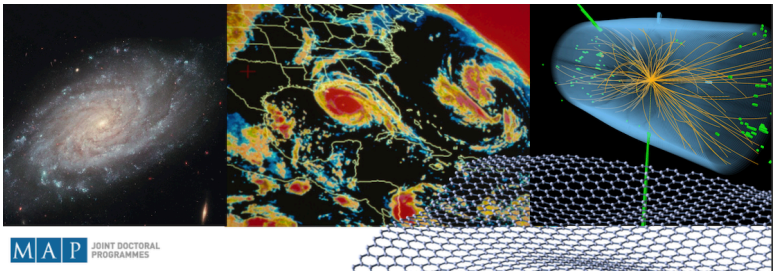

Contribution ID: **161** Type: **Contributed Talk (20 minutes)**

Analytical results for the quantum dynamics of electrons under strong fields with dissipation

The theory of open quantum systems is one of the most essential tools for the development of quantum technologies. A particular area of interest is in the optical response of solid state systems, where dissipation is introduced phenomenologically through the relaxation time approximation and its effects are usually gauged perturbatively . Here, we obtain the analytical solution for a general single-band tight binding system under the influence of a generic uniform, time-dependent electric field under the relaxation time approximation. We explore the effects of dissipation in two limiting cases: A monochromatic field, where we analytically deduce the effect of dissipation on High Harmonic Generation, and a constant electric field, where a generalization for the Esaki-Tsu equation is presented for any single-band tight-binding system. We apply the results to a two-dimensional tilted square lattice with nearest-neighbours. The validity of perturbation theory results for vanishing dissipation is also analyzed against our exact result. We conclude that divergences present in first order current response are purely artifacts of perturbation theory and do not reflect physical behaviour.

Which topic best fits your talk?

Condensed Matter Physics and Nanomaterials

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