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【208】 Cubic response of 2-dimensional charge layers

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Nonlinear nanoscale optics, a success story driven by ultra-short laser pulses of immense power, commonly invokes surface plasmons, highly sensitive to details of the tightly confined electric field. Intrinsically 2D materials like graphene or so-called TMDs additionally offer gate-tunability of their nonlinear response. We develop the spectral representation of n th order response functions in general, then focus on the cubic longitudinal density response of charge carriers in semiconductor heterostructures. Depending on the perturbing signal, collective and single-particle modes give a rich spectrum displaying multifaceted frequency mixing. We further discuss spin-/valley-polarized systems, relevant in plasmonics, and give preliminary results for graphene.

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