



Seminar/Talk

Non-reciprocal quantum materials

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Host: Maksym Serbyn

The ability to differentiate between forward and backward flows (non-reciprocity) is a critical device function. Non-reciprocity is often effected by using a magnetic field. I will describe a different, field-free, and non-classical paradigm that exploits the intricate winding of electronic wavefunctions in quantum materials (captured by topology and quantum geometry). Using plasmonics as an illustrative (but not exclusive) example, I will detail how the Berry curvature and the quantum metric (quantum geometric quantities) enable intrinsically non-reciprocal plasmons in anomalous Hall and antiferromagnetic metals. Interestingly, this quantum non-reciprocity can be pushed to the extreme limit: when a non-magnetic metal such as graphene is driven by linearly polarized light, it can spontaneously magnetize exhibiting a dynamical ferromagnetic state sustained by a self-induced (self-Floquet) Berry flux. Such quantum non-reciprocity demonstrates how the geometry of wavefunctions can be used as a versatile quantum resource to engineer chiral quantum matter.

Friday, June 23, 2023 11:00am - 12:00pm

Office Bldg West / Ground floor / Heinzl Seminar Room (I21.EG.101)



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