



Walther-Meißner-Seminar

Walther-Meißner-Institute, Seminar Room 143

Date: **Friday, 10 December 2021, 11:15 h (hybrid)**
(Zoom conference: [686 3710 1650](https://www.zoom.us/j/68637101650); PW: WMISeminar)

Speaker: **Akashdeep Kamra**

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Title: **Magnonics: unique opportunities for classical and quantum information sciences**

Abstract:

Contemporary technologies and condensed matter physics research focus heavily on electrons - the most widely known fermionic quasiparticles. At the same time, photons being at the core of quantum mechanics tests (e.g., Bell's inequality violation) are prominent bosonic excitations. Overall, electronics and quantum optics are two of the most impactful fields in contemporary physics.

In this talk, I will present some recent developments (biased towards my own contributions) in the field of magnonics, the study of spin excitations in ordered magnets. I will try to emphasize the unique opportunities offered and challenges posed by magnonics in comparison with quantum optics and electronics.

Being bosonic excitations, magnons can embody several phenomena known in the field of quantum optics. At the same time, due to their solid state host, they act like electrons in various transport phenomena. In carrying out this general discussion, I will discuss two main examples. First, the equilibrium magnon squeezing and how it can be exploited in, for example, generating entangled 3-qubit GHZ states. Second, I will discuss magnonic spin transport, contrasting the phenomena with electronic charge and spin transport.

The talk will be in a discussion/tutorial format and will be at the level of a physics graduate. A prior familiarity with the fields is not necessary.