Walther-Meißner-Institut

Bayerische Akademie der Wissenschaften

Walther-Meißner-Seminar

Walther-Meißner-Institut, Seminar Room 143

Date: **Friday, 20 April 2018, 13:30 h**

Speaker: **Dr. Timo Kuschel**

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Title: **Experimental determination of the magnon spin diffusion length by the local and nonlocal spin Seebeck effect**

Abstract:

The magnon spin diffusion length λ is a key parameter in spintronics and magnonics. It describes the distance that spin information can be carried in solid states by magnons, the quanta of spin waves. This value has recently been experimentally determined in magnetic insulators by the spin Seebeck effect (SSE), the thermal generation of magnon spin currents [1-4]. Here, two different measurement geometries should be discussed. In the local SSE measurements, the increase and saturation of the local SSE voltage with increasing sample thickness is used to extract λ [1,2,5], while for the nonlocal SSE geometry, the injector-detector distance is varied to obtain λ from the exponentially decaying nonlocal SSE voltage [3,4,6-10]. So far, the determined λ values vary over decades from hundreds of nm to tens or even hundreds of µm depending on the geometry used and on the material under investigation.

Here, we present both geometries to obtain λ by the SSE in magnetic insulators and discuss advantages and disadvantages. We discuss the impact of using either the temperature gradient or heat flux normalization for the local SSE analysis [11-14]. Furthermore, we explain the pitfalls in the nonlocal SSE analysis that can lead to incorrect λ values [9]. Finally, we discuss how the magnon spin diffusion length could be determined for magnetic metals [12].

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