University of Basel

Swiss Nanoscience Institute

Swiss Nanoscience Institute
Center of Excellence supported by the University of Basel and the Canton of Aargau

# Spin waves get a twist !

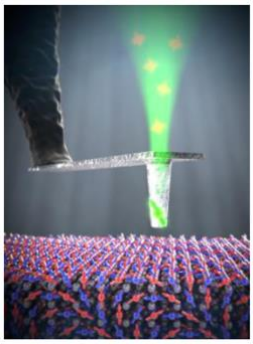
Dr. V. Scagnoli, Paul Scherrer Institute (PSI), Villigen
Prof. P. Maletinsky, University of Basel

**We are looking for** a PhD student for a joint research project of the Quantum Sensing Lab at the University of Basel led by Prof. P. Maletinsky (https://quantum-sensing.physik.unibas.ch) and Mesoscopic System Group at the ETH-PSI (https://mesosys.mat.ethz.ch/). The student will become a member of the Swiss Nanoscience Institute (SNI) PhD school in Basel and will benefit from its strongly interdisciplinary environment, stimulating internal SNI events, and the personal support and training offered by the PhD program. The position will ideally start January 2025.

## Project description

Today's information storage and computation technologies face challenges in power consumption, data handling efficiency, and storage density. Our project aims to develop proof-of-concept novel magnetic nanodevices using spin waves for energy-efficient computation.

Spin waves transfer information through spin angular momentum, avoiding dissipative charge transport. Using spin waves for information processing offers key advantages, including Joule-heating-free propagation, making them ideal for low-power computing devices. However, for practical applications, spin wave propagation should be directional and guided – a challenge that requires significant further research, to which we propose to contribute here.



Our team aims to experimentally achieve directional spin wave propagation using magnetic multilayers composed of cobalt, platinum, and yttrium iron garnet. Recent simulations indicate that this combination of materials can efficiently realize directional spin wave propagation. Within the scope of the PhD, the student will be guided in developing the expertise in preparing suitable sample and to characterize them with standard laboratory methods (sputtering, magnetization measurements, magnetic force microscopy) and more advanced imaging methods such as nitrogen vacancy spectroscopy and X-ray microscopy.

## Your Profile

For this project, we are seeking to expand our team with a candidate who has a strong academic scientific background with a Master in physics or material science and a keen interest in sample fabrication, magnetic materials, and the development and application of advanced measurement methodologies. Good teamwork and communication skills are required, with a proactive approach to drive forward research performed in collaboration within our groups.