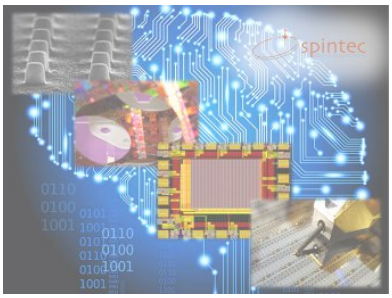
Open PostDoctoral position on Spin-Wave Spectroscopy by a Single Paramagnetic Center



SPINTEC

Positioned at the crossroad of science and technology, **SPINTEC** (**SPINtronique et TEchnologie des Composants**, https://www.spintec.fr) is one of the leading spintronics research laboratories worldwide. SPINTEC was created in 2002 and rapidly expanded to currently exceed 120 persons, of which 54 permanent staff from CEA, CNRS and Grenoble-Alpes University. The lab aims at bridging the gap between fundamental research and applications in spin electronics. As such, the outcome of the laboratory is not only scientific publications and communications at international conferences, but also a consistent patent portfolio and implementation of relevant functional demonstrators and device nanofabrication. The lab has launched six start-up companies in the past 20 years. This synergy has placed SPINTEC at the forefront of spintronics research, having actively contributed to the emergence in industry of spintronic memories called MRAM, on which the laboratory holds key patents and develops further exploiting magnetic tunnel junctions for various technologies.

SPINTEC benefits from an idea local environment with a large spectrum of opportunities:

- SPINTEC belongs with the Interdisciplinary Research Institute of Grenoble (IRIG), gathering 10 laboratories with of total of 1000 researchers, technicians, doctoral and post-doctoral students. IRIG covers interdisciplinary skills (physics, chemistry, biology), and provides access to cutting-edge scientific and technological platforms such as PTA cleanroom, and nano-characterization PFNC.
- The Giant Campus Site (also called Scientific Presqu'Île) offers an exceptional scientific environment with partners such as CEA-LETI, Néel Institute and major European facilities (ESRF and ILL on the EPN Campus).
- The entire Campus of Grenoble Alpes University, whose excellence was recently recognized by the national IDEX award, bears a collective dynamics of research challenges in all fields of knowledge.

Grenoble is a cosmopolitan city at the heart of the French Alps. One out of five people living there works in the field of research, innovation or higher education. In addition, Grenoble offers various cultural and sportive opportunities all year round.

CONTEXT

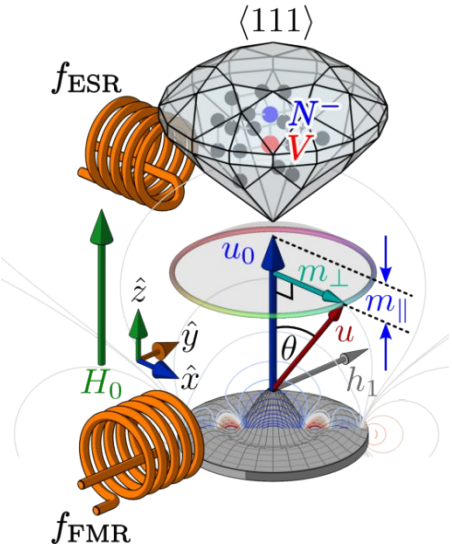
Context. The extensively studied notion of conservation of spin angular momentum by conduction electrons in solids is only a restricted part of a much larger story. According to Noether's theorem, angular momentum conservation is a fundamental property that emerges directly from rotational invariance; meaning it applies equally to other particles such as photons, phonons, and magnons, which can be classically represented as circularly polarized vector fields propagating with helical or rotational wavefronts. For photons, this topic has already attracted considerable attention due to its implications for telecommunications. This additional degree of freedom makes it possible to increase the maximum information transfer rate, for instance through mode-division multiplexing: different modes carrying different angular momentum propagate independently, without significant interference, owing to their orthogonality. These modes can therefore be modulated independently, increasing the maximum transfer rate in proportion to the number of modes used. In the quantum

regime, angular momentum can be used to encode arbitrarily large $n_J\hbar$-quanta within a single state. While the total angular momentum can, in certain cases, be separated into spin and orbital components, most work has so far focused on the spin component, which reflects the circularly polarized character of vector fields ($n_S = \pm 1$), while the orbital component has remained largely unexplored: a knowledge gap stemming from the broader difficulty of coupling directly to azimuthal waves with large orbital indices.

Context at SPINTEC. The goal of this opening is to study these hidden azimuthal modes using a scanning NV-microscope, which provides exquisite spatio-temporal resolution. Our long-term objective is to develop a high-performance orbital-angular-momentum transducer between photons, magnons, and phonons, using a micron-sized, cylindrically shaped magnetic garnet crystal.
Bibliography: T. Valet et al., PRB 113, L100410 (2026) and PRB 113, 104437 (2026)

POSITION

The candidate will work on a home-built NV-center microscope, specifically optimized for spin-wave spectroscopy. Three patents have been filed on the original design, and the setup has already demonstrated unsurpassed spectral resolution. This project is particularly well suited to tech-savvy applicants who enjoy a hands-on, "nuts and bolts" approach to experimental physics. The position involves the use of a broad range of experimental skills spanning optics, microwave technology, magnetic resonance, mechanics, analog electronics, and computer interfacing in Python.



Profile: The successful candidate will hold a PhD in Solid State Physics, Quantum Physics, or Applied Physics. Candidates with a strong instrumentation background and a demonstrated ability to design, build, and troubleshoot experimental setups from the ground up are particularly encouraged to apply. Experience in one or more of the following areas is desirable: microwave engineering, confocal microscopy, scanning probe microscopy, magnetic resonance spectroscopy, and scientific programming in Python. Prior experience with hardware electronics such as Raspberry Pi, Arduino, or FPGA will be considered an asset.

How to apply: The Applicants should submit a CV with publications, including research interests and motivation (2 pages maximum), up to 2 recommendation letters (from academic supervisors or collaborators), and academic transcripts (PhD certificate and reports).

Application materials can be submitted in English or French via email to Olivier Klein (oklein@cea.fr) with the subject line clearly marked as “Postdoctoral Application – Insulatronic”. The selection process will involve a deadline for submissions (15/10/2027), after which shortlisted candidates will be invited for an online interview to discuss their technical expertise and alignment with the project. The successful candidate is expected to start a CEA contract position by 01/01/2027, with some flexibility.