



University

PhD thesis announcement

"Synthesis and characterization of magnetoelectric Spin Triangles"

A PhD position for a **synthetic physical chemist** is open: **Location:** Institut de Chimie de Strasbourg (<u>UMR7177</u>), Strasbourg, France **Starting date:** As soon as possible (duration: 36 months) **Group:** Propriétés Optiques et Magnétiques des Architectures Moléculaires (<u>POMAM</u>) **Supervisor:** Dr. Athanassios K. Boudalis (<u>bountalis@unistra.fr</u>) **Funding:** Agence Nationale de la Recherche



Research project

Spin triangles are magnetic molecules predicted to display **spin chirality**, **magnetoelectricity** and **protected quantum degrees of freedom**. These characteristics could allow electric spin control and long spin coherence properties.¹⁻³ In the past we have confirmed the magnetoelectric couplings in these molecules using Electron Paramagnetic Resonance spectroscopy under electric fields,^{4,5} and we recently demonstrated spin-electric excitations through magneto-FIR spectroscopy.⁶

To expand the range and depth of these observations, we are looking to develop new molecules and study the effect of synthetic parameters and sample state (bulk, surface-deposited) on these properties. We are therefore looking for a doctoral candidate to undertake this project.

The principal part of the work will entail synthesis of new triangles and their characterization with a large array of physical techniques, such as SQUID magnetometry, various spectroscopies (EPR, magneto-FIR, magneto-optic Kerr effect, ⁵⁷Fe Mössbauer), microscopies (AFM, STM, STM-EPR) etc. The candidate will closely interact with specialists of these techniques that are members of the project consortium (Institut de Chimie de Strasbourg, Institut de Physique de Matáriaux de Strasbourg-IPCMS, Institut de Matériaux Magnétiques de Mans-IMMM, Laboratoire National de Champs Magnétiques Intenses-LNCMI, and CNR Nano, Italy). The main work will be localized in strasbourg, between the Institute of Chemistry and the IPCMS.

Candidate profile: The candidate should possess synthetic knowledge in coordination chemistry, ideally including inertatmosphere techniques (glovebox, Schlenk line). Also, an aptitude for physicochemical study of the synthesized compounds and good bases in quantum theory. Knowledge of modelling languages and environments (Python, Matlab) will be particularly appreciated.

Gross salary: ~2200 €/month

Application documents (to be sent via e-mail at <u>bountalis@unistra.fr</u>)

- CV of the candidate (as attached pdf)
- Brief motivation letter (in email body)
- Two contacts for recommendations (in email body)
- Final grades transcript of Master 1 and, if possible, of the 1st semester of Master 2 (as attached pdf)

Evaluations will start immediately (deadline end of July 2025) and will entail an interview of the shortlisted candidates.

References

- (1) Trif, M. et al. Phys. Rev. Lett. 2008, 101, 217201. https://doi.org/10.1103/PhysRevLett.101.217201.
- (2) Trif, M. et al. Phys. Rev. B 2010, 82, 045429. https://doi.org/10.1103/PhysRevB.82.045429.
- (3) Troiani, F. et al. Phys. Rev. B 2012, 86, 161409(R). https://doi.org/10.1103/PhysRevB.86.161409.
- (4) Boudalis, A. K. et al. Chem. Eur. J. **2018**, 24, 14896–14900. https://doi.org/10.1002/chem.201803038.
- (5) Robert, J. et al. J. Am. Chem. Soc. 2019, 141, 19765–19775. https://doi.org/10.1021/jacs.9b09101.
- (6) Le Mardelé, F. et al. Nat. Commun. 2025, 16, 1198. https://doi.org/10.1038/s41467-025-56453-1.