



UNIVERSITY
OF WARSAW



Doctoral School of
Exact and Natural
Sciences

Competition notice

Project title: Layered magnetic materials in extreme conditions

Research project manager: dr hab. Maciej Molas, prof. ucz.

E-mail: maciej.molas@fuw.edu.pl

Project description

In this Phd project, it is planned to modify the magnetic properties and explore the full phase diagram of bulk and thin layers of selected layered magnetic materials (LMMs) by tuning the interlayer distance. The optical, vibrational, and magnetic properties of individual magnetic van der Waals (vdW) materials, e.g. CrSBr, will be investigated. The innovative aspect of the project lies in the combination of various optical experimental techniques, such as photoluminescence (PL), reflectance contrast (RC), and Raman scattering (RS), with different extreme perturbation conditions, namely temperature, pressure, and magnetic field. The choice of materials is motivated by the current state-of-the-art in the research of LMMs, which allows us to make educated predictions of potential scientific findings.

The main experimental techniques used in the project will be PL, RC, and RS, which will be employed to investigate optical, vibrational, and magnetic properties of LMMs structures in a wide range of external conditions, i.e. from room to liquid helium temperatures, in external magnetic fields up to 30 T, and in external pressure up to 50 GPa. The most unique aspect of the project is the possibility to combine different techniques (e.g. PL and RS) and various extreme conditions (e.g. $T=5$ K, $B=30$ T, $P=10$ GPa) during a single study shot, which will be available within planned collaboration with the National High Magnetic Field Laboratory (NHMFL) in Grenoble, France.

Requirement

The call is open to all those who are not PhD holders and are not students at the doctoral schools. Additionally, the Candidate:

- will hold a master's degree (or equivalent) obtained in the field of physics, chemistry, optoelectronics, or a related field, obtained before October 1, 2024.
- have experience in experimental spectroscopic research, e.g., photoluminescence, Raman scattering. Having experience in low-temperature measurements, e.g., at the temperature of liquid helium or nitrogen, will be an additional advantage.
- will have proficiency in the English language enabling free communication, independent reading of scientific literature, writing publications, and presenting results at international conferences.
- will be capable of independently conducting planned experiments, demonstrating good work organization, consistency, and diligence.
- will be strongly motivated for scientific work and working in an international team.
- The doctoral student will be required to apply for an intership (up to 6 months) funded by the National Agency for Academic Exchange to the National High Magnetic Field Laboratory in Grenoble, France.

Discipline: physical sciences

Admission limit: 1

Recruitment schedule

- registration in the Internet Registration of Candidates, referred to as “IRK”, submitting an application to the IRK: May 27 - June 17, 2024
- qualification procedure: June 24 – 28, 2024
- announcement of the ranking list: until July 5, 2024
- accepting documents from qualified candidates: July 2 - September 23, 2024, until 14.00
- announcement of the list of accepted candidates: until 30 September 2023

Recruitment fee

200 PLN

Form of the qualification proceedings

Qualification proceedings include the assessment of the following items:

- 1) the candidate's scientific activity, based on their CV or Resume, documented by scans of materials attached to the application for admission to the School;
- 2) an interview with the candidate;
- 3) other achievements.

Language of the selection process, including the interview

The interview shall be carried out in Polish or English – in accordance with the candidate's preferences presented in IRK. If the Polish language is selected, the interview may include parts in English.

Required documents

The candidate shall submit a School admission application only through the IRK. The application shall include the following:

- 1) indication of the selected discipline in which the candidate plans to pursue education or in the case of applying for the Interdisciplinary Doctoral School – fields of science with the specification of the leading field (and where there is no leading field – at least two equivalent disciplines), PESEL number or passport number, nationality, contact information (residence address, e-mail address, telephone number), information whether the candidate agrees to receive administrative decisions by means of electronic communication, consent for processing of personal data for the purposes of the admissions procedure;
- 2) a scan of the graduation diploma of uniform master's degree or postgraduate studies or an equivalent diploma obtained under separate regulations. In the case of a diploma equivalent to a uniform master's degree or postgraduate studies graduation diploma, a candidate shall justify such equivalence. In case the diploma was issued in a language other than Polish or English, the candidate shall attach its certified translation;
- 3) a resume or CV outlining the candidate's scientific activity, including scholarly interests and achievements during the five calendar years preceding the application (if a candidate became a parent during this time, as evidenced by a scan of the child's birth certificate attached to the application, this period shall be extended by two years for each child), including, but not limited to:
 - publications,
 - research and organizational work at student research groups,
 - participation in scientific conferences,
 - participation in research projects,
 - awards and honorable mentions,
 - research internships,
 - research skills training programs completed,
 - activities promoting science,

- activity in science movement representative bodies,
 - average of their university grades,
 - professional career,
 - level of proficiency in foreign languages;
- 4) scans of materials evidencing scientific activity mentioned in their CV and/or resume;
 - 5) a document confirming at least B2 proficiency level in English or a declaration of the level of proficiency in English allowing education at the School;
 - 6) the scan of a declaration by the planned supervisor, confirming their agreement to undertake the duties of a supervisor and of the number of doctoral students, for whom they perform the duties a designated supervisor, in accordance with the template constituting Appendix no.4 to the Resolution no. 17 of the Senate of the University of Warsaw of 20th January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2023, item 43), the candidate may also attach a scan of their planned supervisor's opinion and opinions of other academics about the candidate and their scientific activity and/or proposed research project;
 - 7) the photograph of a candidate's face that allows for their identification;
 - 8) a declaration confirming whether the candidate was or is a doctoral student or a participant of doctoral studies or whether they have initiated a doctoral dissertation process or whether proceedings to award them a doctoral degree have been initiated – and if yes, the title of their doctoral dissertation or the research project prepared by a candidate, including the name and last name of the candidate's tutor or supervisor;
 - 9) a declaration confirming that they have reviewed the Resolution no. 17 of the Senate of the University of Warsaw of 20th January 2021 on rules of admission to doctoral schools at the University of Warsaw (the University of Warsaw Monitor of 2023, item 43) and Articles 40 and 41 of the Code of Administrative Procedure;
 - 10) scanned transcripts of records of the graduate and postgraduate studies or the uniform Master's degree studies, or equivalent documents (e.g. diploma supplement);
 - 11) abstract of the master's thesis or master's project in English (up to 3,000 characters with spaces);

Evaluation criteria

- a) competencies to perform specific tasks in a research project (70% of the final score)
 - 3 points - very good
 - 2 points – good
 - 1 point – poor
 - 0 points - no competencies
- b) publication track record, including publications in renowned scientific papers / magazines (30% of the final score)
 - 4 points – prominent
 - 3 points - very good
 - 2 points – good
 - 1 point – poor
 - 0 points - no publication track record

Education program

The education lasts 4 years. It includes obligatory classes (no more than 300 hours in total during the whole period of education) and the implementation of an individual research program, carried out under the supervision of a supervisor. Beginning of education – October 1, 2024.

Scholarships

PRELUDIUM BIS doctoral scholarships shall amount to:

- PLN 4266.00 gross per month, until the month in which a PhD student's mid-term evaluation is performed at the doctoral school and
- PLN 5119.00 gross per month, after the month in which a PhD student's mid-term evaluation is performed at the doctoral school and

shall be awarded pursuant to the Act on Higher Education and Science of 20 July 2018.