PhD position
Experimental Condensed Matter Physics
High-Temperature Superconductivity in Hydrogen Compounds

Project: This position offers to study record superconductors as part of a 5 year ERC research grant. We are investigating the properties of hydrogen-compound superconductors including H$_2$S and LaH$_{10}$. Both are superconductors at very high pressures above 100 GPa (1 million bar). We are also probing new hydrogen-rich compounds for high-temperature superconductivity.

Superconductivity in hydrogen sulphide and lanthanum hydride were discovered recently with maximum transition temperatures of 205K and 260K, respectively$^{1-3}$. This project is part of a research program supported by the ERC which aims to study the mechanism leading to such a high transition temperature.

The project will focus on transport measurements to characterise the superconductivity. This will include resistivity, Hall effect, quantum oscillation, and tunnelling studies. These will allow to map the phase diagram, and to study the normal and superconducting properties as a function of pressure. This insight will be important to understand and improve high-Tc superconductivity.

High pressures are generated with diamond anvil pressure cells which are available. The project is also supported by two postdocs (Takaki Muramatsu) with more than 10 years experience in high-pressure research.

The work will be mostly carried out in the laboratories in Bristol. Some measurements – usually a week or two – will take place at national and international facilities like the European High Magnetic Field lab in Nijmegen, NL.


Requirements: Candidates should hold a first degree in physics or a related subject, normally at a level equivalent to at least UK honours 2:1 level, or a relevant postgraduate Master's
qualifications. Please see our prospectus for full details about international equivalents. A good background in solid state physics including superconductivity is desirable. Good oral and written skills in English language and strong motivation, the ability to work independently and in a team are required. Experience in experimental physics and manipulation of small samples is beneficial.

**Bristol:** The successful candidate will work in the Correlated Electrons Systems group at the University of Bristol which is world-leading in the field of correlated materials and superconductivity. Strong support for the PhD student is provided through postdocs and researchers with more than 10 years experience in low-temperature and high-pressure studies. You will find it a stimulating environment covering a wide expertise from theory via sample synthesis to bulk measurements and microscopic probes as well as high-pressure. The University of Bristol is a research intensive elite university in the vibrant city of Bristol in the beautiful West of England.

**Starting Date:** The position is available to start October 2019 for a period of 3.5 years.

**Funding:** The School of Physics is strongly supported by EPSRC with PhD studentships. For the 2018-19 academic year, EPSRC paid UK students a tax-free stipend of approximately £14,800 per annum, for 3.5 years as well as paying university fees. We expect at least the same level of support for the year 2019-2020.

**Informal enquiries:** You are encouraged to contact Sven Friedemann for more details
Dr Sven Friedemann ([Sven.Friedemann@bristol.ac.uk](mailto:Sven.Friedemann@bristol.ac.uk))
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**Application:** If you are interested in pursuing your Physics postgraduate study in Bristol please complete our online application form [http://www.bristol.ac.uk/study/postgraduate/apply/](http://www.bristol.ac.uk/study/postgraduate/apply/) by Wednesday the 28th of February 2019.
Please choose “Physics PhD” as course and mention “High-pressure superconductivity” as corresponding studentship advert and “Sven Friedemann” as contact person. Applications should include a Curriculum Vitae, contact information for two potential referees and a short letter outlining the applicant’s scientific interests and motivation to work on high-pressure superconductors.