

## NTNU - kunnskap for en bedre verden

Ved NTNU, Norges teknisk-naturvitenskapelige universitet, skapes kunnskap for en bedre verden og løsninger som kan forandre hverdagen.

Faculty of Natural Sciences  
Department of Physics

# PhD position in experimental materials physics: CuttingEdge

The PhD position is available at the Department of Physics, NTNU. The appointment has a duration of 3 years with the possibility of until one year extension with 25% teaching duties in agreement with the Department. The position is financed by the Research Council of Norway.

## Information about the Department

Currently, there are about 27 professors, 10 associate professors, 7 adjunct professors, 70 PhD research fellows and 24 postdoctoral researchers appointed at the Department of Physics.

The research at the Department spans a broad spectrum of natural sciences and technology, which in turn allows offering an education that provides a solid basis for future careers. Physics research is carried out in experimental as well as theoretical fields, and often through external collaborations across conventional boundaries between disciplines. The department's central research areas are biophysics, nanoscience, surface physics, optics, astrophysics, solar energy, materials science, soft/complex matter science, and medical technology. Research staff at the Department makes a special effort to increase the awareness and understanding of the importance and impact of physics in society.

Further information is available at: <http://www.ntnu.edu/physics>

## Job description

This PhD project will explore the use of nano- and microscale techniques to characterize rock formations in order to improve geophysical models. Many of the important processes in rocks like fracturing and the permeation of liquids and gases depend on porous features. There is a huge interest across many fields, ranging from the petroleum industry via geophysics to environmental science, in better understanding the properties of rocks, perhaps in particular to their fluid permeability properties. In this project, we will focus on *shales* (Norwegian: skifer), which is a relatively impermeable capping rock containing a complex network of nanoscale pores. A main aim is to better understand the structure-property relations in shales by developing and performing nanoscale geochemical and mechanical testing combined with advanced microscopy. We are thus planning to use a wide range of experimental techniques, with particular emphasis on in-situ time-resolved X-ray tomography ("4D CT"), also with diffraction contrast, in combination with micromechanics and microfluidics.

The research work will involve designing, constructing and using state-of-the-art experimental setups, both in home laboratories and at synchrotrons. Sophisticated analysis and modelling of large datasets, also using statistical and machine learning methods, will be an integral part of the work. The main research objective of the PhD project is to better understand the mechanical and fluid-mechanical properties of shales through advanced in situ microscopy techniques under realistic conditions of high temperature and pressure. In addition, the candidate is expected to participate actively in the research group activities, including mentoring and co-supervision of master students.

The *CuttingEdge* project is funded by the Norwegian Research Council and is a collaboration between SINTEF (project leader Dr. Ringstad, Dr. Cerasi), the Norwegian University of Science and Technology (NTNU; Prof. Breiby), and University of Le Mans (Prof. Gibaud). The project partners are well positioned for this demanding project with an excellent knowledge base and access to outstanding research infrastructure. The PhD student will be placed in the group of Prof. Breiby at NTNU (Trondheim). Extended stays abroad are planned including active participation to synchrotron experiments.

## Qualifications

The successful candidate should hold a master's degree in physics. In exceptional cases, applicants with a background in related fields like nanotechnology, structural (rock) mechanics, fluid mechanics, geophysics or materials science can be considered. The position requires a strong interest in experimental science and data analysis. Experience with nanostructural studies, in particular using scattering or microscopy methods, would be considered advantageous. Good computer programming skills (in e.g. Matlab, Python or C) are desired.

The successful candidate is creative, ambitious and enthusiastic, with a strong ability to work independently and goal-oriented. Experience with scientific writing and good oral presentation skills are requested. He/she should enjoy interdisciplinary research and take keen interest in learning and working in teams, which is of particular importance in this multidisciplinary project.

The position requires spoken and written fluency in English.

## Contact persons:

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The regulations for entry in the PhD programs at NTNU requires a MSc degree or equivalent with at least 5 years of studies. An average grade of A or B for the two last years of the MSc is required (scale of A-E for passing grades where A is best). Candidates from universities outside Norway are kindly requested to send a Diploma Supplement or a similar document, which describes in detail the study and grade system and the rights for further studies associated with the obtained degree: [http://ec.europa.eu/education/tools/diploma-supplement\\_en.htm](http://ec.europa.eu/education/tools/diploma-supplement_en.htm)

Detailed information on the NTNU Physics PhD programs is found at: <https://www.ntnu.edu/nv/phd>

#### **Terms of employment**

The appointment of the PhD fellows will be made according to Norwegian guidelines for universities and university colleges and to the general regulations regarding university employees. Applicants must agree to participate in organized doctoral study programs within the period of the appointment and have to be qualified for the PhD-study.

NTNU's personnel policy objective is that the staff must reflect the composition of the population to the greatest possible extent.

The position as PhD is remunerated according to the Norwegian State salary scale. There is a 2% deduction for superannuation contribution.

#### **The application**

Application with CV, certificates from both Bachelor and Master, possible publications and other scientific works, copies of transcripts, (copies of documentation on English language proficiency test) and reference letters should be submitted. The Application must be submitted electronically through [www.jobbnorge.no](http://www.jobbnorge.no)

Application submitted elsewhere will not be considered.

The reference number of the position is: NV-77/18

**Application deadline:** June 24, 2018.

Jobbnorge-ID: 154043, Søknadsfrist: Avsluttet