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POSTDOCTORAL FELLOWSHIP IN HUMAN PHOTOBIOLOGICAL MODELLING

A postdoctoral fellowship in human photobiology is available to study human physiological reponses to light under daylight conditions in the laboratory of **Dr Katharina Wulff at the Department of Radiation Sciences at Umeå university**. The project combines new sensor technology and chronobiological rhythm monitoring with the goal of modelling the impact of light on neuronal and hormonal feedback systems in humans. The studies should increase our understanding of functional contribution of photoreceptors in relying daylight to brain-body hormonal circuitries that drive a wide range of behaviours from photoentrainment, sleep and mood to vision.

The ideal candidate is at core an experimentalist trainend in computational mathematical engineering, electrophysics or related fields, who wants to expand into human physiology and chronobiology. The candidate is excited about research involving human participants, wearable technologies and applied statistical mathematics and machine learning.

A full-time, tax-free postdoctoral fellowship over 2 years (at first instance) is available for the project described below. Intended start date at November 1, 2019, or later by agreement.

More information about the daylight research program can be found under http://www.katlab.org/
Enquiries about the project, shortlisting and interview to: Katharina Wulff, katharina.wulff@umu.se

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RESEARCH TOPIC

Daylight research requires exposure to natural light. We have a purpose-build all-glass house (The Photon Space) with controllable electrical lighting for study participants to live comfortably under natural daylight conditions for several days all year round. Indoor climate, ambient light spectral power distribution and sensory, physiological and behavioural measurements are taken simultaneously in real-time. The lab uses advanced, high-resolution sensors and ambulatory sampling machines, and collaborates with labs specialised in ultra-sensitive assays to detect small changes in sensitivity of multiple biomolecules measured in parallel, whose dynamics cannot be understand by studying each component in isolation.

PROJECT DESCRIPTION

We are committed to a multidisciplinary approach, where you will join an international team of experts (Universities of Umea, Oxford & Bristol UK, Groningen, NL and Massey, NZ) and benefit from their expertise spanning chronobiology, psychophysics, endocrinology and mental health. You will operate equippment for spectral radiometry, pupil and eye tracking, electrophysiology and wearables to pursue questions concerning light-dependent control of biological adaptive processes. Variable weather condition are part of the design to increase sensory stimulation, whose responses you will quantify to determine the sensitivity of the regulatory systems. The goal of this project is to determine the temporal-spatial dependencies in humans to daylight, which cannot be tested in existing laboratories anywhere in the world.

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Methods of data analysis concern mathematical models from simultaneous, repetitive measurements to characterise environmental, physiological and behavioural interactions. Machine learning is envisaged to detect dynamics in temporal-spatial interaction at different time scales, e.g. coupling of strong environmental-dependent photoreception with hormone synthesis, which has not been possible with previous techniques. Daylight is known to divide into two components, the direct sunlight with rays of the sun projected sharply and almost paralell, and the diffuse daylight, which is scattered diffusely by particles in the atmosphere. Both components have contrary temporal colour dynamics. **Our aim is to quantify these alternating dynamics and how physiology is responding, to better explain desired and undesired impact of daylight changes on our brain's ability to regulate sleep, mood and cognition.**

WORK ENVIRONMENT

The work environment is either inside an office, a research facility or home setting and the base locations are Umeå university and Granö Beckasin. A highly motivated and skilled research nurse will assist with the care and supervision of the volunteers and data collection. Umeå University is dedicated to provide creative environments for learning and work. It offers a wide variety of courses and programs, world leading research, and excellent innovation and collaboration opportunities. 4 000 employees and nearly 34 000 students have already chosen Umeå University.

QUALIFICATIONS

The successful candidate should have a PhD in mathematics, electrophysics, engineering, biophysics, or a related field, or a degree that is deemed equivalent. A thorough theoretical and practical grounding in mathematical statistics and computational modeling is essential as well as the ability to plan, choose methods for and carry out investigations using algorithmic tools and programming languages. Practical experience with technologies and tools for the study of biological systems, psychophysics and radiometry would be helpful but is not a necessity. Good oral and writing skills in both English and Swedish are necessary qualifications. The successful candidate must work well with co-workers and understand study participants and their needs in order to collect multidimensional, time-sensitive data.

To apply for this position, please submit a PDF (max 5 pages) containing:

- A letter explaining your interest, motivation and reason for your desire in this position
- CV including experience in research environments, certificates and methods in which the applicant has expertise
- Names and e-mail addresses of two references with stated professional relationship with the applicant

The call for applications is open until the position is filled. Please submit your application as PDF to katharina.wulff@umu.se
For more detailed information about the project and the research visit our website http://www.katlab.org/ and feel free to contact Katharina Wulff, katharina.wulff@umu.se

We are looking forward to receiving your application!