ISPM Institute of Social and Preventive Medicine
BIHAM Berner Institut für Hausarztmedizin
DCR Department of Clinical Research

UNIVERSITÄT BERN

The Bern Lectures

Brice-Olivier Demory is ERC Professor of Astrophysics at the Centre for Space and Habitability of the University of Bern. He obtained his MSc in physics from EPFL and PhD from the University of Geneva. He then spent three years at MIT (USA) to work on NASA space missions and three others at the University of Cambridge (UK). He leads in Bern an interdisciplinary research group focusing on 1) novel instrumentation for medical applications, 2) the search for life in our solar system and 3) the detection of Earth-like exoplanets. He is striving to develop societal applications through his research, from cancer research to education in developing countries. Brice-Olivier Demory is recipient of the Royal Society and Rutherford Research Fellowships.

«Bringing space research into the operating room»

What does brain cancer surgery and the search for extra-terrestrial life have in common? They are both limited by the very same challenge: characterising the nature and probing the structure of living tissues. For many tumour types, visual differentiation of tumours, infiltration zones and healthy tissues is difficult during surgery, if not impossible due to the lack of obvious visual differences. This limitation translates into an incomplete surgical resection, leaving residual tumour tissue and increasing the likelihood of resurgence. The search for living organisms beyond the Earth essentially relies on the detection of atmospheric biomarkers, such as oxygen, methane and ozone that are produced by biotic activity. However, these compounds can also be produced abiotically, complicating the unequivocal attribution to living processes. Identifying more robust biomarkers, with near-zero false-positive scenarios is thus paramount.

Most optical applications in medicine and astrophysics only leverage the intensity and wavelength of a wave of light. However, its polarisation state (spatial orientation of the wave's electrical field) is seldom used. A key characteristic of the polarisation state of a wave of light is to carry information about its interaction with matter, whether it is aerosols, living tissues or any other medium. In this talk, I will detail how accurately measuring polarisation induced by the interaction of a wave of light with matter provides a remote, non-invasive means to investigate the spatial structure of a material of interest. Besides astrophysics and medicine, other applications include geology, climate, food and agriculture research. Light polarisation is ubiquitous in nature and so fundamental that applications are endless.

Join the lecture on Thursday, 23rd May 2024 at 4:00 pm (CET)

on-site at Mittelstrasse 43, room 320 or on zoom

https://unibe-ch.zoom.us/j/65756520612?pwd=SGdvQ214RVFJUkkvOE8vQm1SU3RvZz09

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