UPPSALA
UNIVERSITET

2016 CELSIUS-LINNÉ SYMPOSIUM

February 19th 2016 in the Siegbahn Hall, the Ångström Laboratory, Uppsala University

Winter Light

A Multi-Disciplinary Symposium

09:30	INTRODUCTION
09:35	LENE VESTERGAARD HAU (Linné Lecturer) *The Art of Taming Light: What We Can Learn from a Bacterium*
10:25	ELI YABLONOVITCH (Celsius Lecturer) *What Does the Clock Speed of My Computer Have to do with the Fundamental Constants of Nature, ħ, c, q, m?*
11:15	PIA LINDBERG, UPPSALA UNIVERSITY *Solar-Powered Biotechnology with Cyanobacteria*
11:50	LUNCH BREAK
12:50	DAN-ERIC NILSSON, LUND UNIVERSITY *Seeing the Light: How Animals Came to Harvest a Rich Source of Information*
13:40	MIKAEL KARLSSON, UPPSALA UNIVERSITY *Seeing the Light through Diamonds: How to find Extrasolar Planets*
14:15	SOFIA RAMSTEDT, UPPSALA UNIVERSITY *Light from the Dark Side: Exploring the Cool Universe*
14:50	CONCLUDING DISCUSSION
15:10	COFFEE AND CAKE

MALLINCKRODT PROFESSOR **LENE VESTERGAARD-HAU**,
PHYSICS AND APPLIED PHYSICS, HARVARD UNIVERSITY, USA

The Art of Taming Light: What We Can Learn from a Bacterium

This talk will describe a new research program, at the interface of the fields of light-matter interactions, nanoscience, and molecular and synthetic biology, that we have embarked on quite recently. The new research will involve fundamental studies of light-driven photosynthetic proteins coupled to engineered, inorganic nano-scale structures, and encompasses both natural and gene-engineered proteins. The research may have applications, for example, for the development of new schemes for biofuel production.

PROFESSOR **ELI YABLONOVITCH**,
DEPT. OF ELECTRICAL ENGINEERING & COMPUTER SCIENCES, UC BERKELEY, USA

What Does the Clock Speed of My Computer Have to Do with the Fundamental Constants of Nature, ħ, c, q, m?

What limits speed? It could be the clock speed of a computer, or the speed with which we can detect a single electric charge, or we could ask the same question of many other high speed functions. One view is that the greater the resources poured into the effort, energy, money, etc., the greater the speed. The other view is that there is a fundamental speed limit that is controlled by the constants of nature, ħ, c, q, m. In this talk, the clock speed of your computer will be deduced from physics.

PIA LINDBERG, SENIOR LECTURER AT DEPARTMENT OF CHEMISTRY – ÅNGSTRÖM LABORATORY, MOLECULAR BIOMIMETICS; MICROBIAL CHEMISTRY, UPPSALA UNIVERSITY

Solar-Powered Biotechnology with Cyanobacteria

Cyanobacteria are photosynthetic microorganisms, able to grow using only water, carbon dioxide and energy from the sun. Due to this ability they have attracted increasing interest regarding their potential for use in biotechnology, providing a fossil free alternative for production of fuels and chemicals. Many model cyanobacteria are easy to engineer genetically, but using them as host organisms for biotechnological applications is still a work in progress.

PROFESSOR **DAN-ERIC NILSSON,** DEPARTMENT OF BIOLOGY,
FACULTY OF SCIENCE, LUND UNIVERSITY

Seeing the Light: How Animals Came to Harvest a Rich Source of Information

Every second, the human eye provides the brain with some 20 million separate intensity readings. We use this continuous flood of visual information to guide nearly everything we do. But how did this sophisticated sensory system evolve? The lecture will trace the evolution of vision from the first light sensitivity in a primitive Precambrian ancestor to the various types of eyes and vision in different corners of the animal kingdom.

MIKAEL KARLSSON, RESEARCHER AT DEPARTMENT OF ENGINEERING SCIENCES, APPLIED MATERIALS SCIENCE, UPPSALA UNIVERSITY

Seeing the Light through Diamonds: How to Find Extrasolar Planets

During the last 15 years we have been working with structuring diamond on the micro- and nanometer scale for a wide range of optical applications. Here an ongoing project developing an advanced diamond optical component for use in astrophysical applications will be presented.The main goal of this project is to develop, test, and validate the diamond component (a type of coronagraph) and observing techniques that could enable the characterization of Earth-like planets in the habitable zone of nearby stars. Future space-based missions will include the search for life outside our solar system.

SOFIA RAMSTEDT, RESEARCHER AT DEPARTMENT OF PHYSICS AND ASTRONOMY, ASTRONOMY AND SPACE PHYSICS, UPPSALA UNIVERSITY

Light from the Dark Side: Exploring the Cool Universe

The progress in astronomical research is driven by new technologies to collect more light and distinguish finer details. At radio wavelengths, probing the cool Universe, a kilometer-size telescope is required to reach the same resolution as current adaptive-optics optical telescopes. The advanced design of the Atacama Large Millimeter/submillimeter Array (ALMA) allows the 66 antennas to work together as one giant telescope. ALMA has during its first years of operation studied cool and distant astronomical objects with unprecedented sensitivity and resolution.