



STER WORKSHOP FOR DOCTORAL CANDIDATES!

„Doctoral candidates meet distinguished professors”

Date: January 26th (Thursday), 2023, 12:00-14:30

Venue, N. Copernicus University, **Faculty of Physics, Astronomy and Informatics**,
Grudziadzka 5 street,

Room: 26, left wing, 1st floor

Idea:

The mankind faces numerous problems, and one of the most serious are vector borne diseases. During this mini-workshop we will have a unique possibility to learn about techniques related to biology and electrophysiology which bring new fundamental data on interactions of certain chemicals with nervous system elements. Another topic will be related with the problem of information storage. Spintronics, based on magnetic properties of matter, is a big hope for a new breakthrough in computer technology. We will see that the path from basic science to extremely useful applications might be shorter then anticipated. PhD candidates will have an opportunity to discuss both biological and physical problems related to big challenges in modern science. At the same time we will have a general discussion about qualities which are necessary for starting successful international academic career.

Program (room 26):

12:00 – Coffee & cookies/snack, lobby at room 26

12:30 Prof. dr hab. Katarzyna Hryniewicz, Head of NAWA/STER PhD@NCU project – Welcome (TBC)

12:33 Prof. dr hab. Ireneusz Grabowski, Director of the Institute of Physics - Introduction to “Kolokwium Czwartkowe”

12:35 Prof. Bruno Lapied, Laboratoire Signalisation Fonctionnelle des Canaux Ioniques et des Récepteurs, University of Angers, France



“ Neuronal membrane ion channels : The selective gateways to living organisms”

Prof. Bruno Lapied works at the border between biology and neuroscience. Using such techniques as patch-clamp electrophysiology, calcium imaging and molecular biology methods he studies processes in neurons of insects, in particular in ion channels. His research has a great meaning in control of mosquito borne diseases such as malaria that affect millions of people every year.

Abstract: The biophysical basis of neuronal excitability is the voltage-dependent and ion-selective permeability of the cell membrane. Experimental evidence indicates that these two properties do not apply to the entire membrane surface, but are restricted to specific sites known as channels. These are proteic structures spanning the entire lipid bilayer, and randomly distributed within it. Since the development of the electrophysiological patch-clamp technique, the ionic channels involved in the generation of neuronal electrical activity can be studied individually, and their properties, such as conductance, selectivity, voltage dependence, activation and inactivation can be characterized under current-clamp and/or voltage-clamp conditions. To gain further insights into the electrophysiological and firing characteristics of neuronal cells, the patch-clamp technique has been developed and adapted to single adult Dorsal Unpaired Median (DUM) neurones isolated from the dorsal midline of the terminal abdominal ganglion of the central nervous system of the cockroach *Periplaneta americana*. Isolated adult DUM neurone cell bodies are capable of generating spontaneous electrical activity, like beating pacemaker neurones. Using this new electrophysiological approach, current-clamp and voltage-clamp investigations of the ionic currents underlying DUM neurone electrical activity have been greatly advanced in recent years. Patch-clamp studies, adapted for dissociated fully differentiated adult DUM neurones, have revealed an unexpected diversity of ionic channels. Most of the channels detected have been characterized with respect to their biophysical and pharmacological properties. The results obtained reveal the complexity of neuronal membrane properties and demonstrate that DUM neurones have a high degree of specialization in the central nervous system

13:45 Prof. Igor Di Marco, Uppsala University, Sweden; Group Leader at the Asia Pacific Center for Theoretical Physics, South Korea, Laureate of NCN Polonez Bis Fellowship

“Spintronics, or how to make a successful international academic carrier”



Prof. I. Di Marco research interests are focused on computational physics and on the study of materials with strong electronic correlations. He is an expert in the development of computational methods to determine the electronic, structural and magnetic properties of solids, surfaces and clusters. The materials belong to following classes: transition metals compounds, lanthanides, complex oxides, dilute magnetic semiconductors and doped topological insulators.

Q&A – around 10 min

14:15 Summary: A general and panel discussion

Here we will have a discussion between foreign lecturers, director of AST NCU doctoral school prof. W. Nowak and other regarding advantages of having good contacts in international laboratories, ways to apply for travel fellowships and opportunities in finding funding in foreign countries. What is important and what is not....