e-Conference

October 3rd 2018

1pm-5pm GMT+2 (in France)

Co-organized by:

UNITWIN Complex Systems-Digital Campus http://www.cs-dc.org/

MSCA ITN ImageInLife http://imageinlife.eu/

Please connect to our virtual room:

http://meeting.cs-dc.org/live/join/ImageInLife

Conferences will be live streamed worldwide and recorded

The Complex Systems Digital Campus advertising the event has more than 120 partner institutions in five continents.

20 to 40 minute talks (at the speaker's convenience) + discussion prepared by ITN students

Chair Nadine Peyriéras & Paul Bourgine – Co-chair ITN PhD students

1 pm Caterina La Porta http://www.oncolab.unimi.it/ (Italy local time 1 pm)

Tackling cell plasticity in Cancer

Facing metastasis is the most pressing challenge of cancer research. Our group has studied extensively phenotypic plasticity of cancer cells, highlighting the kinetics of cancer stem cell and the role of the epithelial mesenchymal transition for metastasis. To disentangle the complexity of environmentally induced phenotypic transitions, there is a growing need for novel advanced algorithms as those proposed in our recent work combining single cell data analysis and numerical simulations of gene regulatory networks. All together our results open interesting new applications to a personalized cancer treatment.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 721537

2 pm Hidde Ploegh faculty-and-research/hidde-ploegh (Children's Hospital Boston US local time 8am)

Exploiting Nanobodies' Singular Traits.

The unique class of heavy chain-only antibodies, present in Camelidae, can be shrunk to just the variable region of the heavy chain to yield VHHs, also called nanobodies. About one-tenth the size of their full-size counterparts, nanobodies can serve in applications similar to those for conventional antibodies, but they come with a number of signature advantages that find increasing application in biology. They not only function as crystallization chaperones but also can be expressed inside cells as such, or fused to other proteins to perturb the function of their targets, for example, by enforcing their localization or degradation. Their small size also affords advantages when applied in vivo, for example, in imaging applications. Here we review such applications, with particular emphasis on those areas where conventional antibodies would face a more challenging environment.

3 pm Manu Forero Shelton https://biofisica.uniandes.edu.co/index.php/en/ (Colombia local time 8 am)

Light Sheet Microscopy and Zebrafish as a model for understanding diseases

Chagas disease is a parasitic infection caused by Trypanosoma cruzi, whose motility is not only important for localization, but also for cellular binding and invasion. Current animal models for the study of T. cruzi allow limited observation of parasites *in vivo*, representing a challenge for understanding parasite behavior during the initial stages of infection in humans. This protozoan has a flagellar stage in both vector and mammalian hosts, but there are no studies describing its motility *in vivo*. We established a live vertebrate zebrafish model to evaluate T. cruzi motility in the vascular system.

4 pm Ashley Bruce http://labs.csb.utoronto.ca/bruce/ (Toronto Canada local time 10 am)

A cargo model of yolk syncytial nuclear migration during zebrafish gastrulation

In teleost fish, the yolk syncytial layer is a multinucleate syncytium that functions as an extraembryonic signaling center to pattern the mesendoderm, coordinate morphogenesis and supply nutrients to the embryo. The external yolk syncytial nuclei undergo microtubule dependent movements that distribute the nuclei over the large yolk mass during gastrulation. How e-YSN migration proceeds, and what role the elaborate longitudinal network of yolk microtubules plays is not understood. From our live imaging studies of yolk nuclear migration, we propose a cargo model for yolk syncytial nuclear transport in which motor proteins directly carry yolk syncytial nuclei along microtubules towards the vegetal pole.

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MSCA ITN ImageInLife

The long-term goal of any initiative to image biological processes, is reaching cellular or subcellular resolution in a complete organism. This is now possible using vertebrate embryos as models and the most recent technological advances as tools. ImageInLife is an Innovative Training Network funded by European Union whose ESRs will be trained by addressing the following scientific bottlenecks and challenges:

- Preparing vertebrate embryos (rodent & zebrafish) for optimal imaging
- Fine-tuning sensors, reporters and actuators to track cell types, cellular processes and behaviours in living organisms
- Developing and implementing new imaging instruments
- Analysing complex sets of big-data images to extract relevant information
- Using processed images to design computational and mathematical models of development and pathologies
- Comparing these models with experimental data and create a feedback loop improving the whole work chain from sample preparation to instrumentation and analysis.

CS-DC UNESCO UniTwin

The Complex Systems Digital Campus is a world wide network of individuals and institutions working together and sharing resources to promote research and education in complex systems science and in integrative sciences. This large scale collaborative work will embody social intelligent strategies towards new scientific and educational practices, dealing with the difficult scientific, societal and environmental challenges of an increasingly interconnected world.

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