



Graduate School Event

Thesis Defense: Dissecting gap junction biology using the *C. elegans* nervous system

Michaela Misova (de Bono Group)

de Bono Group

Host: Johann Danzl

Neurons communicate with each other via chemical and electrical synapses. While much attention has been devoted to understanding the molecular players involved in chemical neurotransmission, the biology of gap junctions mediating electrical communication is understudied. This imbalance is not for their lack of significance – electrical synapses make up about 20% of neuronal connections in different species from invertebrates to vertebrates, but rather reflects technical constraints and investigator bias. Many regard electrical synapses as simple channels, and much of what is known about them comes from studies on cell culture models. Insights into their *in vivo* biology are just starting to emerge. The channels of electrical synapses in most animals are formed by innexins. Chordates are an exception: their electrical synapses consist of connexins. Even though at the level of primary sequence innexins and connexins appear to be unrelated, structurally and functionally they have much in common. The nematode *Caenorhabditis elegans* is a promising model to study the biology of electrical synapses. This animal offers a powerful toolbox to study neuron function at the molecular, cell biological and physiological levels. It also offers a detailed connectome map of all of its 302 neurons. The implications from studies of molecular pathways in *C. elegans* go beyond this organism, since ~80% of the nematode's proteins have human homologs. This work aims to enhance our understanding of the *in vivo* biology of gap junctions using *C. elegans* as a model. Using a proximity labeling approach, we profiled the interactomes of two innexins that are expressed predominantly in neurons: UNC-7 and UNC-9. We identified scores of proteins that may have important roles for these innexins and their electrical synapses. Using localization and functional assays to validate and further probe our findings, both at the whole organism and the single-cell level, we found that gap junctions have heterogeneous protein compositions. Our findings imply that electrical synapses are sophisticated, molecularly diverse structures.

Tuesday, September 23, 2025 01:00pm - 02:00pm

Central Bldg / O1 / Mondi 2b (I01.O1.008) and Zoom



This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.
Please find a schedule of the ISTA Shuttle on our webpage:
<https://ista.ac.at/en/campus/how-to-get-here/> The ISTA Shuttle bus is marked ISTA Shuttle
(#142) and has the Institute Logo printed on the side.

www.ista.ac.at | Institute of Science and Technology Austria | Am Campus 1 | 3400 Klosterneuburg