

Towards a synthetic neurobiology of hybrid neuronal circuits

Initiative: "Experiment!" (beendet)

Ausschreibung: Explorative Phase

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Laufzeit: 1 Jahre 6 Monate

While the physiology of the individual neurons is important for circuit function, it is probably the wiring diagram in an animal nervous system that essentially programs its operation. The wiring diagram of neuronal circuits, called connectome, is believed to determine their functioning as information-processing devices. If connectomes are in fact decisive, then thorough testing of the relationship between circuit structure and function will be key to understanding neuronal circuit design. For genes and proteins "engineering" approaches enable biological researchers to modify their biological structure and assess the resulting loss and gain of function. In the case of neuronal circuits, however, our capabilities of redesigning connectomes at present are very limited. Thus, the team wants to construct synthetic circuits composed of both simulated and living nerve cells, in which key features of the wiring diagram can be artificially designed, switched, and randomized on the fly. The ultimate aim is to lay the foundations of a synthetic neurobiology of hybrid neuronal circuits, allowing a transformative research approach for structure-function studies of neuronal circuit design.

Projektbeteiligte

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Ultrafast optogenetic stimulation of the auditory pathway by targeting-optimized Chronos.
Growing neuronal islands on multi-electrode arrays using an accurate positioning-mu CP device.
