

## BEP Project

Disentangling the Brain's Chatter - Identifying single neurons from electrophysiological recordings

### Description

Electrophysiological recordings are the backbone of neuroscience, enabling to listen to the electrical signals that constitute our brain activity at a single cell resolution. Novel hardware developments put electrophysiological recordings at a brink of revolution, enabling the simultaneous recording from hundreds of neurons rather than less than 10. These developments stir up neuroscience as they potentially enable the detailed understanding of neural circuits by listening to each individual neuron.

In collaboration with colleagues at Stanford University we developed techniques to disentangle single neurons from such ensemble recordings in real time. This enables to perform close loop experiments, where the brain information is used as neurofeedback. However, the resolution of the neuronal information is still sensitive to parameter tuning. In this project we will optimize a cutting edge real-time algorithm on GPU hardware for robust isolation of single cell signals from recordings of hundreds of neurons.

### Goals & Steps

1. Familiarize yourself with the theory of compressed sensing based decoding and the resulting algorithm for real time neuron identification
2. Simulate data containing spikes of isolated neurons and verify the decoding
3. Benchmark the neuron decoding of real-time algorithms against offline processing on real neuronal recordings in awake behaving animals

### Contact

Please find all information about our lab on [www.mars-lab.eu](http://www.mars-lab.eu) and don't hesitate to get in contact if you are interested in MRI research.

**Supervisors:** Sebastian Weingärtner ([S.Weingartner@tudelft.nl](mailto:S.Weingartner@tudelft.nl))

