The brain is a formidable computing device, outperforming our smartest algorithms in flexibility and efficiency. Understanding its key principles will enable both fundamental insights, novel treatments and technological applications.

In the Computational Neuroscience lab we try to discover some of these principles using a combination of computational and neurophysiological tools. Specifically we are interested in developing and applying advanced analysis to complex, real-world conditions. Examples include multisensory integration, statistically defined stimuli ('Textures') and complex, naturalistic stimuli. We perform experiments in mice (Large scale neuronal recordings + behavior) and humans (EEG + behavior), but also perform computational analysis on other large scale datasets from collaborators, e.g. whole-brain recordings from zebrafish.

We are welcoming B.Sc./Master project applications for the following topics (contact b.englitz@donders.ru.nl for more information):

CONTACT

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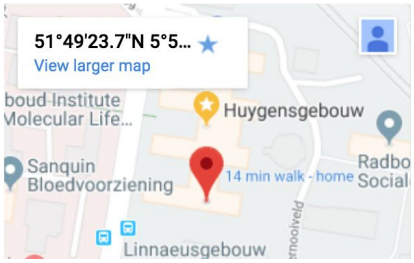

- **Using Neural Principles to Optimize Speech Recognition under Natural Noise**
  In particular we are interested in improving algorithms in hearing aids using insights from brain processing, in particular statistical estimation and predictive coding.
  This project *enables* you to understand current theories of the brain and apply their consequences to the real world problem of understanding speech in noise. Deep learning and GPU computation will be an integral part of this project.
  This project requires strong analytical and programming skills and will be conducted in Python.

- **Analysis of Whole-Brain Recordings from Zebrafish (60000 neurons!)**
  In particular non-linear quantification of the ensemble dynamics using latest dimension-reduction and network estimation techniques and dynamical modeling.
  This project *enables* you to understand neural codes in large neural networks and perform large-scale data analysis and high-performance data visualization.
  This project *requires* strong analytical and programming skills and will be conducted in Python.

- **Analysis of Large-Scale Neural Recordings from Auditory Cortex in Mice (~100 neurons)**
  In particular decoding of ensemble activity from auditory cortex while the mouse perceives complex acoustic stimuli.
  This project *enables* you to understand neural codes in the mammalian cortex underlying the representation of sounds during behavior, and perform medium-scale data-analysis.
  This project *requires* strong analytical and programming skills and would preferentially be conducted in MATLAB (Python also possible).

You will be working in a dynamic team of doctoral students, a post-doc and the PI. All of the projects above aim at publishable results at the end of your internship, as we have successfully done multiple times before, see here. If you have related project idea, also contact me for a lunch discussion.