**Tampereen yliopisto**
Tampere University

Coronal Workshop on the Bioelectromagnetic Signals of the Brain, Frenckell, Tampere, Thursday, July 29th, 2021 – Methods and Software to Model, Invert and Manipulate Brain Activity

This informal workshop will focus on the development of methods and software to model, invert, and manipulate brain activity, especially, on coupling advanced forward and inverse modelling techniques, which is of first-hand importance in studies investigating and utilizing the electromagnetic fields generated by the brain. As computers of today enable fully realistic 3D modelling of those fields, volumetric multi-compartment head models can be harnessed in computer simulations, giving arise to various new mathematical approaches, such as the use of multiple resolution levels in source localization and adapting the forward solvers into the detailed tissue and equipment structures, e.g., the skull and contact electrodes, which is possible via the Finite Element Method (FEM). The goal of this workshop will be to develop open software tools. In particular, the open Zeffiro interface and Duneuro packages developed in the Tampere University and University of Münster will be discussed. Participation will be possible both in-person or on-line (**Zoom ID: Meeting ID: 610 4504 2520, Passcode: 524642**).

Venue: Restaurant Frenckell Piha & Sali is situated right next to the central market square, the epicentre of Tampere. It belongs to the Frenckell building complex on the other side of which flows the rapids of Tampere that together with the old red-brick industrial buildings forms one of the National landscapes of Finland.
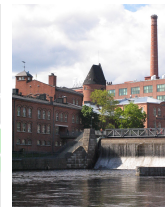
Program:

9:00 Meeting at Frenckell: Coffee & discussions

9:15 Session I

Sampsa Pursiainen: Opening words

Carsten Wolters: *New non-invasive multimodal neuroimaging and neurostimulation methods for improved diagnosis and therapy in refractory focal epilepsy*

Narayan Subramaniyam: *Causal coupling inference from multivariate time series based on ordinal partition transition networks*

Tim Erdbrügger: *CutFEM forward modeling for geometries with touching surfaces in bioelectromagnetism*

11:30 Lunch

12:30 Session II

Fernando Galaz Prieto: *Sparse optimized and regularized stimulus in Zeffiro Interface for Multi-Channel Transcranial Electric Stimulation (using Metaheuristic objectives)*

Frank Neugebauer: *Comparison of different methods for localizing the epileptic spikes*

Dao Nguyen: *Design of semi-automatic Transcranial Magnetic Stimulation using Robot Arm*

14:00 Coffee & Discussions

14:30 Session III

Malte Höltershinken: *Efficient Computation of Transfer Matrices using the Block Conjugate Gradient Method*

Atena Rezaei: *Multi subject study of reconstructiong sequential subcortical and cortical activity of SEP measurement via Inverse modeling methods*

15:45 Ending

Organizer: Sampsa Pursiainen, Computing Sciences, Tampere University.

Tentative list of participants: Carsten H. Wolters, University of Münster, **Sampsa Pursiainen**, Tampere University, **Narayan Subramaniyam**, Tampere University, **Dao Nguyen**, University of Eastern Finland**, Frank Neugebauer**, University of Münster/Tampere University, **Atena Rezaei**, Tampere University, **Joonas Lahtinen**, Tampere University, **Fernando Galaz Prieto**, Tampere University, **Alexander Frank**, University of Münster, **Tim Erdbrügger**, University of Münster, **Malte Höltershinken**, University of Münster.