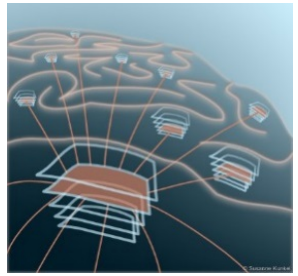
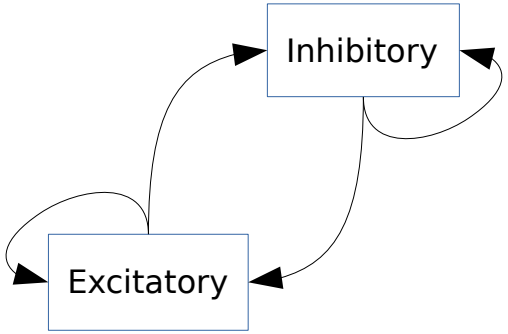
# NEST PROJECT – EITN FALL SCHOOL



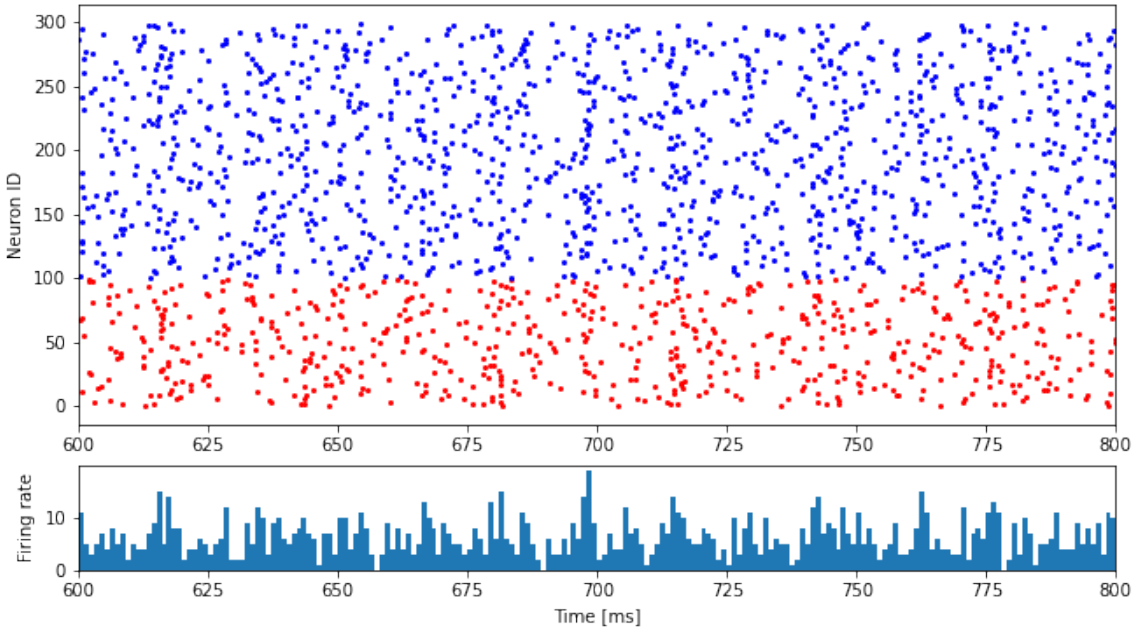
Human Brain Project

JÜLICH
Forschungszentrum

# INTRODUCTION

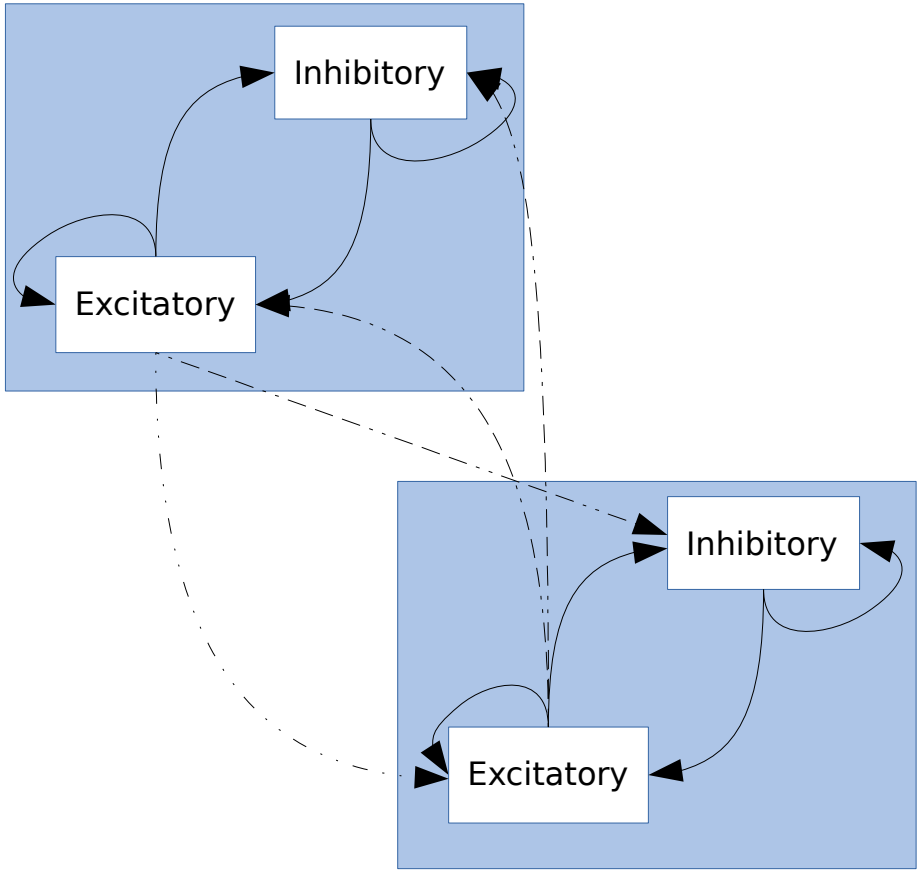



- Brunel-network model as simple model of a cortical circuit or even area
- Depending on parameters can exhibit different dynamical states
  - asynchronous irregular state
  - oscillatory states
- Guided example of building the model with NEST
  - Review/learn some basic functionality of NEST
  - Investigate dynamical features of classical model and some extensions

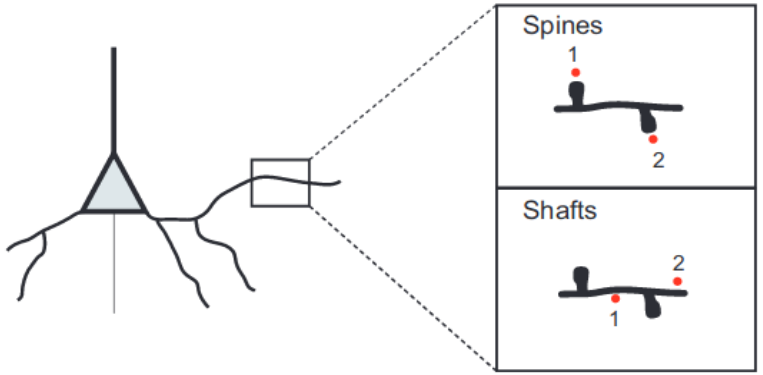


# PROJECT I

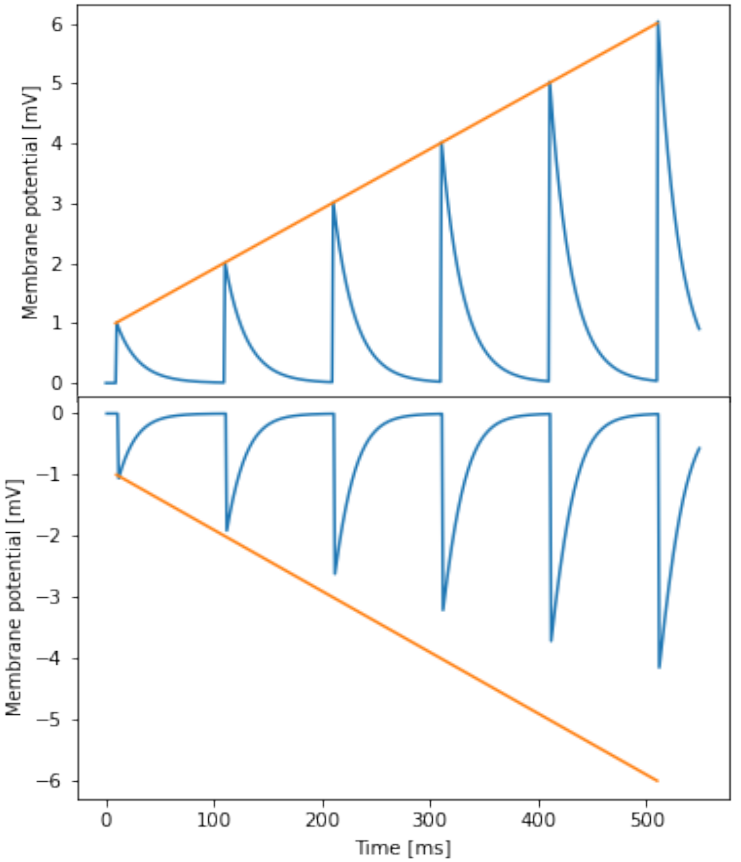
- Take balanced random network and use it as building block for more complicated models
- Investigate dynamics of simple multi-area model – coupled balanced random networks
  - Inter-area connections are excitatory → exploding activity
  - Coupled networks in different dynamical states
  - Sensitivity towards perturbation and chaos, propagation of external drive



# PROJECT II




- Take balanced random network and modify used neuron model
- Locally incoming spikes act conductance-based
- Evidence that uncaged potentials on spines add linearly
  - potentials on shafts **do not**
- Toy model:
  - Current-based excitatory synapses (linear summation)
  - Conductance-based inhibitory synapses (sub-linear summation)
  - Implement it via NESTML and use for simulation
- Study influence of dynamics and refine model



# GETTING STARTED

- **Install NEST / NESTML**
  - Instructions: https://www.nest-simulator.org/documentation/
  - On Windows use a virtual machine!
  - On Ubuntu/Mac OS you may use conda or docker images!
- **More info**
  - https://github.com/zbarni/eitn_22