Project 8: Slow Dynamics and High Variability in Networks with Clustered Connections

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Introduction

- Most real-world networks are not uniform

- Most simulated networks are uniform

- Need more complicated architecture

- Clusters!

Uniform network

- Integrate-and-fire neurons
- 4000 excitatory neurons
- 1000 inhibitory neurons
- Inhibitory connections probability 0.5
- Excitatory-to-excitatory connections probability 0.2

Asynchronous behaviour of the uniform network
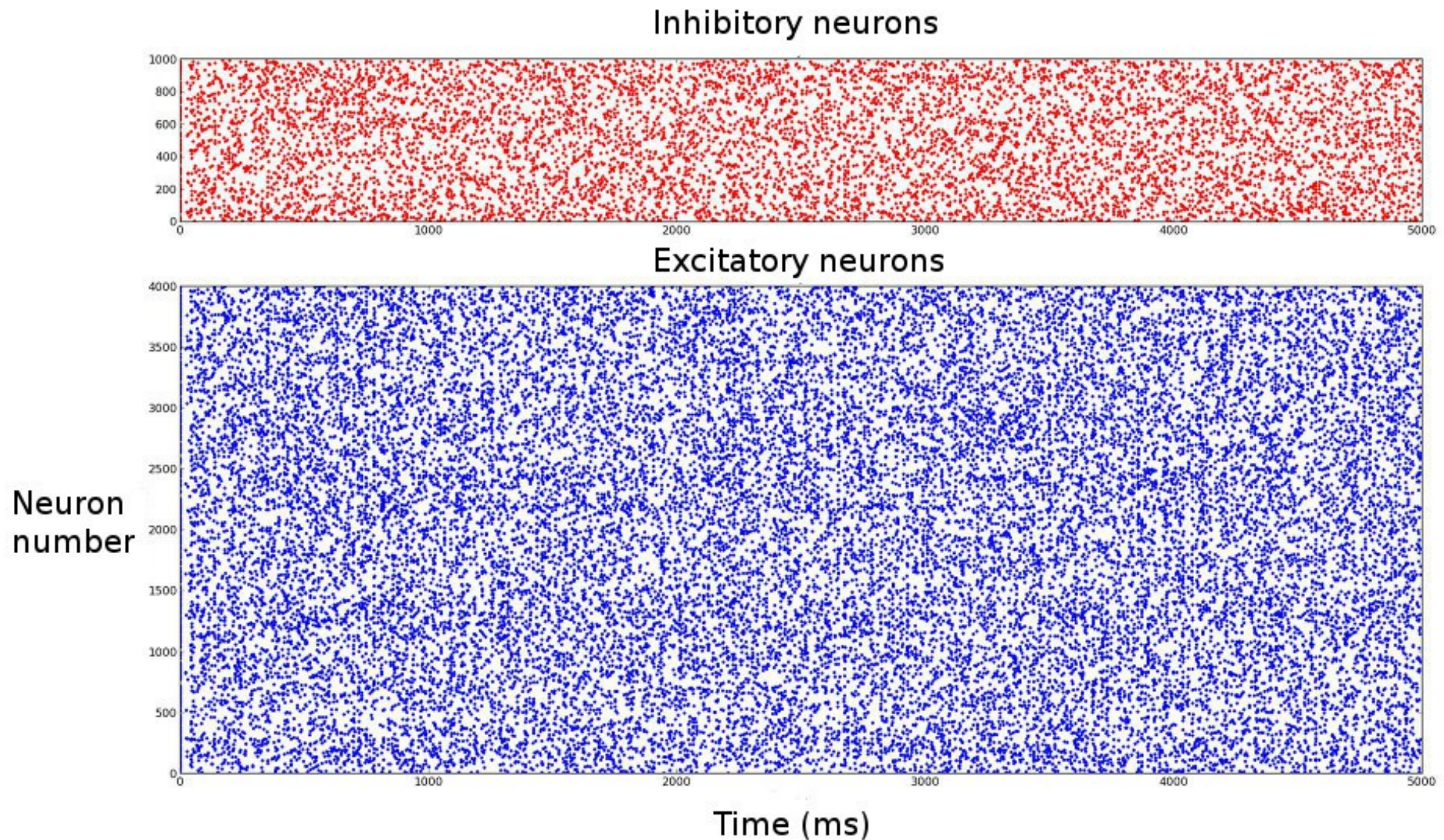
Clustered network

- Integrate-and-fire neurons

- 4000 excitatory neurons

- 1000 inhibitory neurons

- 50 clusters of 80 excitatory neurons each

- Increased connection probability in the cluster

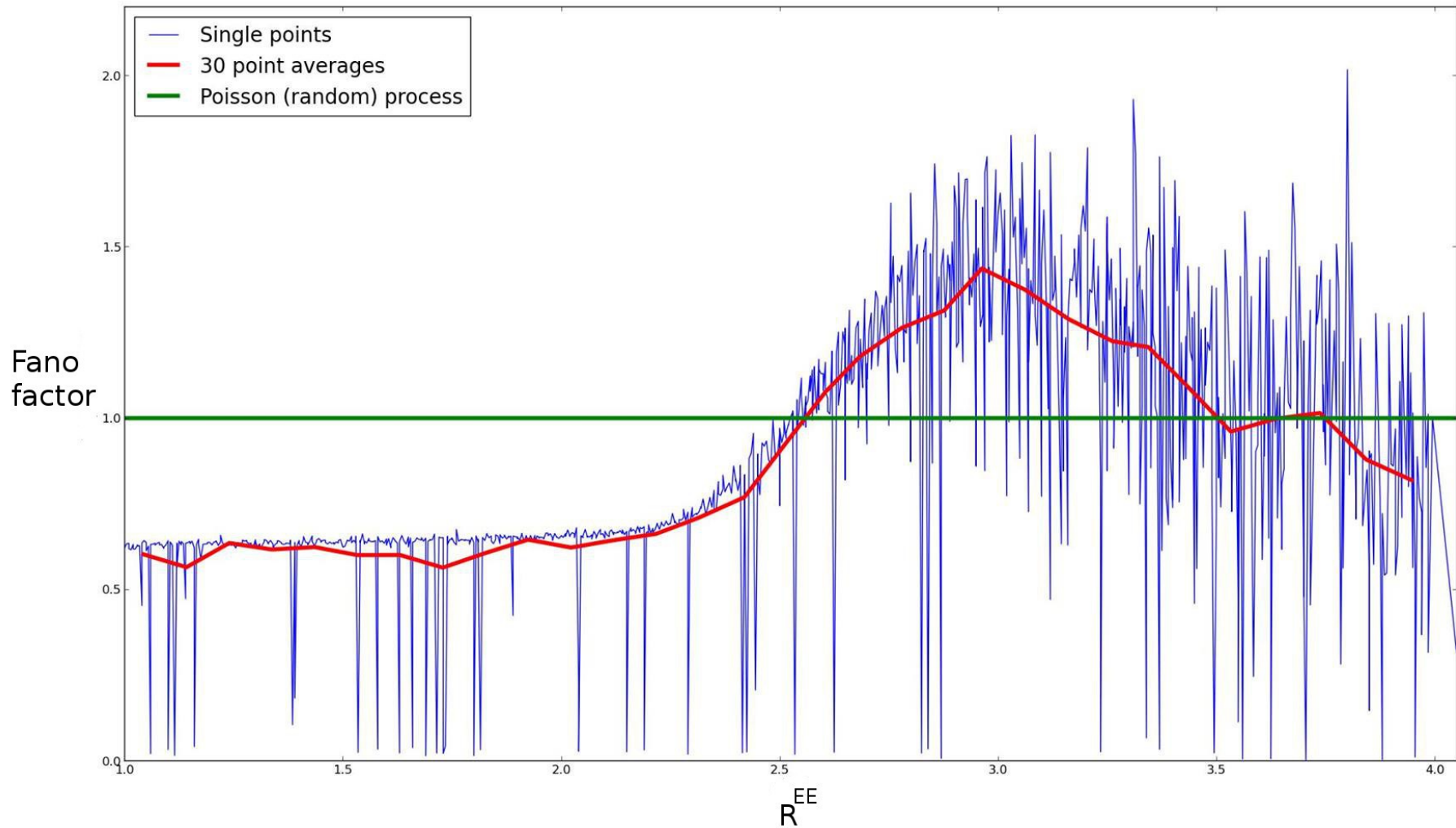- R^{EE} is the ratio controlling neuronal clustering

Behaviour of the clustered network
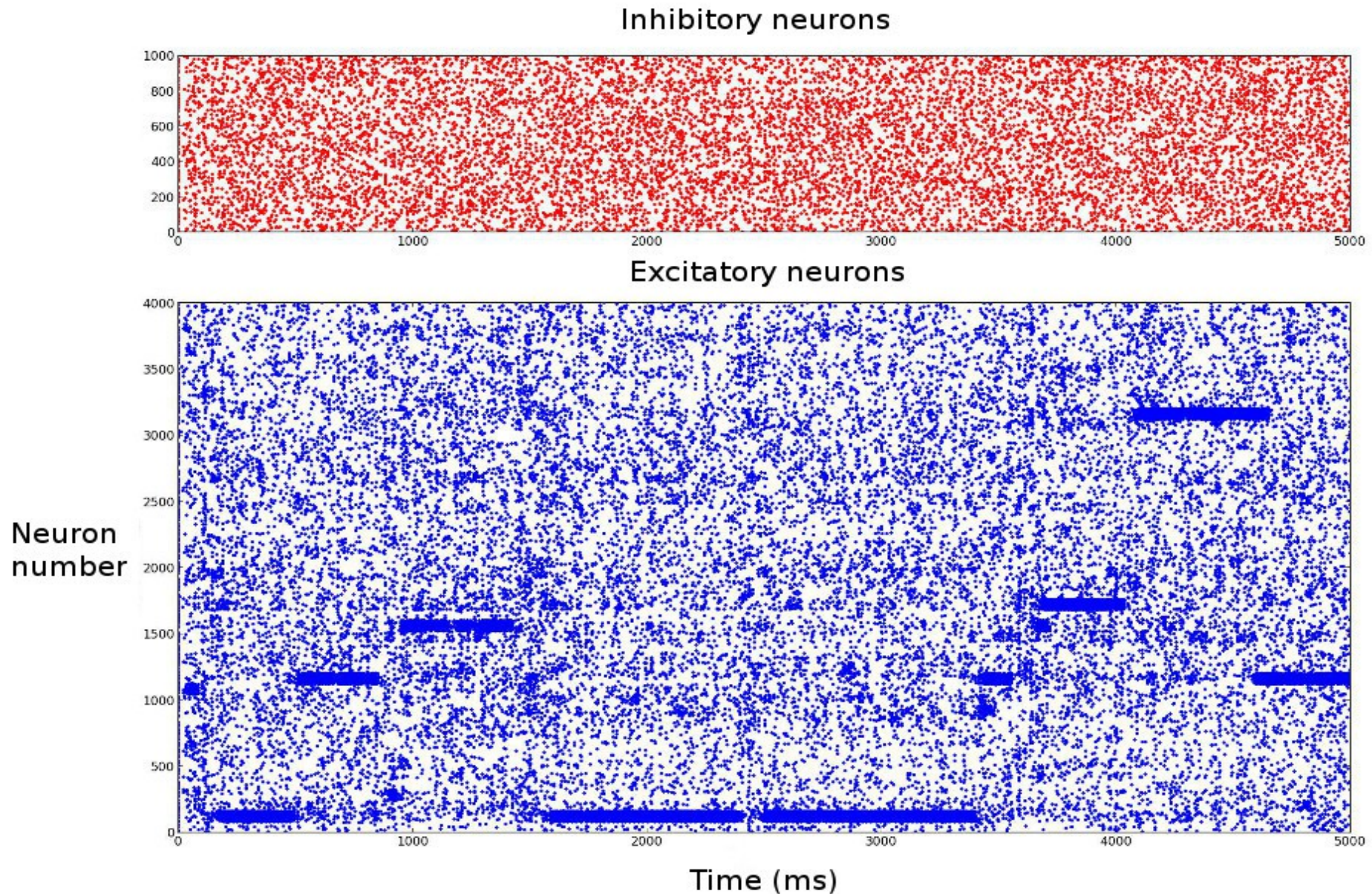
Fano factor

- $$F_i(t, t+\Delta t) = \frac{Var(N_i(t, t+\Delta t))}{\langle N_i(t, t+\Delta t) \rangle}$$

- Expectations are over repeated trials of the same network with random initial conditions

- Computed over 100 ms time window

Fano factor over R^{EE}

Thanks for your attention!