

Project 8: Predictive coding

- 1) Implement the predictive coding model described in Boerlin et al. (2013). Simulate a version of the integration/tracking network shown in Figure 1. How do the results change when you adjust the leak and cost function parameters?
- 2) Test the robustness of the network to lesioning a subset of neurons. Discuss how this might account for robustness following transient inactivation (e.g., Li et al., 2016).
- 3) Explain how excitation-inhibition balance and Poisson-like firing statistics arise in this framework.

References:

- Boerlin, M., Machens, C. K., & Denève, S. (2013). Predictive coding of dynamical variables in balanced spiking networks. *PLoS Computational Biology*, 9, e1003258.
- Li, N., Daie, K., Svoboda, K., & Druckmann, S. (2016). Robust neuronal dynamics in premotor cortex during motor planning. *Nature*, 532, 459-464.