



Joachim Rädler
Ludwig-Maximilians-University Munich
Germany

Talk 1:

Heterogeneous timing of gene induction in E.coli

The arabinose utilization system of *Escherichia coli* displays a stochastic all-or-nothing response at intermediate levels of arabinose, where the population divides into a fraction catabolizing the sugar at a high rate (on-state) and a fraction not utilizing arabinose (off-state). Here we study this decision process in individual cells, focusing on the dynamics of the transition from the off- to the on-state. Using quantitative time-lapse microscopy, we determine the time delay between inducer addition and fluorescence onset of a GFP reporter. Through independent characterization of the GFP maturation process, we can separate the lag time caused by the reporter from the intrinsic activation time of the arabinose system. The resulting distribution of intrinsic time delays scales inversely with the external arabinose concentration, and is compatible with a simple stochastic model for arabinose uptake. Our findings support the idea that the heterogeneous timing of gene induction is causally related to a broad distribution of uptake proteins at the time of sugar addition.

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[2] Fritz, G., Megerle, J. A., Westermayer, S. A., Brick, D., Heermann, R., Jung, K., et al. (2014). Single Cell Kinetics of Phenotypic Switching in the Arabinose Utilization System of *E. coli*. *Plos One*, 9(2), e89532. doi:10.1371/journal.pone.0089532.s018

[3] Meyer, A., Megerle, J. A., Kuttler, C., Müller, J., Aguilar, C., Eberl, L., et al. (2012). Dynamics of AHL mediated quorum sensing under flow and non-flow conditions. *Physical Biology*, 9(2), 026007.