

Efficient information usage by cells – and cell biologists



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Organisms acquire and use sensory information to guide their behaviors. Likewise, scientists acquire and use the information contained in experimental data to better understand systems of interest. In both cases, the amounts of information available are usually limited, so using it efficiently is critical. In this seminar, I will discuss two aspects of efficient information usage. First, I explore information usage by cells, describing how we have discovered that motile *Escherichia coli* cells (arguably the simplest model of biological behavior) acquire very little information but use it highly efficiently. Second, I examine information usage by scientists, elaborating on how faced with noisy fluorescence data from single *E. coli* cells, we developed a method to extract relevant signals from raw data with theoretically maximal efficiency. Finally, I examine similarities between these two processes.

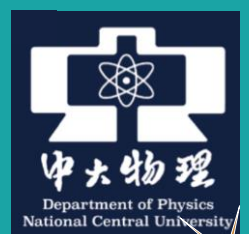
References:

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2. Mattingly*, H. H., Kamino*, K., Machta, B. B., & Emonet, T. (2021). *Escherichia coli* chemotaxis is information limited. *Nature Physics*, 17(12), 1426-1431. (*Equal contribution)
3. Kamino*, K., Kadakia, N., Aoki, K., Shimizu, T. S., & Emonet*, T. (2022). Optimal inference of molecular interaction dynamics in FRET microscopy. *In revision in PNAS* (*Corresponding authors)

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Colloquium