

## Surfing on protein waves: proteophoresis as a mechanism for bacterial genome partitioning

Efficient bacterial chromosome segregation typically requires the coordinated action of a three-component, ATP-fueled machinery called the partition complex. We present a phenomenological model accounting for the dynamic activity of this system. The model is obtained by coupling simple linear reaction-diffusion equations with a *proteophoresis*, or “volumetric” chemophoresis, force field that arises from protein-protein interactions and provides a physically viable mechanism for complex translocation. This minimal description captures most known experimental observations: dynamic oscillations of complex components, complex separation and subsequent symmetrical positioning. The predictions of our model are in phenomenological agreement with and provide substantial insight into recent experiments. From a non-linear physics view point, this system explores the active separation of matter at micrometric scales with a dynamical instability between static positioning and travelling wave regime.

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