Single-Molecule studies of atypical transcriptional activators

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This project aims to understand fundamental (yet unknown) regulatory mechanisms, which allow soil-predatory bacteria (e.g. *Myxococcus xanthus*) to survive (e.g. forming fruiting bodies in response to starvation) and colonize their environment (e.g. producing a large number of secondary metabolites with potential antibiotic activities). Because transcriptional regulation plays a pivotal role in the regulation of genes, we will determine and characterize rate-limiting steps involved in the initiation of transcription and investigate a new type of transcriptional activators, which have not yet been reported.

To address these questions, we propose to use an *in vitro* approach based on purified components and perform state-of the-art single-molecule (SM) experiments. By looking at individual molecules (enzymes), SM allows to parse out properties, which are not resolvable in bulk assays (e.g. probability density function of waiting times versus averaged waiting time). We already have established the purification methods of all the required components and have built a (state-of-the-art) highly-parallel MT device, which operates at high spatiotemporal-resolutions (allowing to follow tens (hundreds) of beads in parallel and capable of detecting sub-nm movements at a few tens of Hz bandwidth)

Knowledge of biology is not required but the successful candidate should show a strong interest for molecular biology and biochemistry (part of the biological samples will be obtained in collaboration).