Superresolution Imaging Using Active Control of Single Molecules

- A single, isolated emitter is localized with high precision.
- But many closely spaced emitters cannot be distinguished.

The solution:
1. Sequentially activate sparse subsets of a denser ensemble.
2. Reconstitute a final image from these subsets.

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Time-Lapse Superresolution Images of Cell-Cycle-Dependent MreB Structures in Live Caulobacter Cells

The commonly used, monomeric EYFP enables imaging of intracellular protein structures beyond the optical resolution limit (‘superresolution imaging’) in living cells.

By combining photoinduced activation of single EYFP fusions and time-lapse imaging, we obtained sub-40-nm resolution images of the filamentous superstructure of the bacterial actin protein MreB in live Caulobacter crescentus cells.

These studies demonstrate that EYFP is a useful emitter for in vivo superresolution imaging.

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Reactivation of Single EYFP-MreB Molecules in Live Caulobacter Cells

Scale bar: 1 μm

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Scale bar: 300 nm