

SMeagol Simulated Microscopy - a tool against inverse crimes

Martin Lindén, Johan Elf

SINGLE MOLECULE tracking in living cells using fluorescence microscopy is a powerful method to study otherwise inaccessible aspects of intracellular kinetics. The development of accurate analysis methods for such data is however limited by the lack of ground truth reference data. I will present a computational tool that extends the capability of reaction diffusion simulation softwares to make physics based simulation of single molecule tracking experiments in living cells. Stochastic reaction diffusion models makes it possible to account for the influence of geometry, randomness and diffusion limitations in intracellular kinetics. In addition the new tool makes it possible to consider the photo-physics of the labeled molecules, the optics of the microscopy system and electronic properties of the camera. In combination this allows for optimization of experimental parameters and to testing and improving the data analysis methods.