

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Fluorescence correlation spectroscopy enumerate the number of nanoparticles in optical confinement YI HU, XUAN-HONG CHENG, H. DANIEL OU-YANG, Lehigh University — In the presence of an optical trap, both the concentration and diffusion dynamics of the nanoparticles near the center of the laser focus are affected. This phenomenon could affect the interpretation of the result from fluorescence correlation spectroscopy (FCS) where highly focused laser is often used. A recent Monte Carlo simulation study shows, for non-interacting particles under trapping energy up to $2 kT$, the zero-time autocorrelation function $G(0)$ can be used to enumerate the mean number of particles N in the trap. It is not clear, however, how particle interactions or higher trapping will affect this prediction. To address these issues, we conducted FCS experiments to examine $G(0)$ as a function of trapping energy and particle interaction strength. We discovered that $G(0) = 1/N$ is true up to $6 kT$ as long as the particle interactions are negligible. As the particle interaction is increased, the validity of the above relation quickly breaks down. We interpret our experimental finding based on the consideration of Poisson statistics.

Yi Hu
Lehigh University

Date submitted: 10 Nov 2011

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