

SEMINAR

MoNaLISA: a faster and gentler super resolution approach for 3D-4D live imaging

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Fri 29 Sep 2017, 13:15-14:15

Venue:

2nd Floor Seminar Room (#A207)
iCeMS Main Building (#77), Kyoto University

Abstract:

The formidable ability of fluorescent nanoscopy to image features closer than half the wavelength of light often comes at the expense of time and increased dose of energy for recording. We developed a gentle fluorescent nanoscope based on the reversible switch of fluorescent proteins, capable of resolving cellular structures within the whole cell at spatial resolutions down to between 40–60 nm using minimal light intensities (50-500 W/cm²). Our approach, named MoNaLISA for molecular nanoscale long term imaging with sectioning ability, is based on thousands of focal spots that switch and read-out the fluorescence signal emitted by reversible switchable fluorescent proteins. MoNaLISA illumination scheme happens in three steps and it is highly parallelized enabling acquisition time in the order of the 0.2–2Hz for large fields of view (50µm). The spatially modulated illuminations in ON-switching and read-out lead to images with tenfold enhanced contrast and intrinsic optical sectioning. MoNaLISA imaging is extendable to the whole range of reversible switchable fluorescent proteins without compromising image contrast. We demonstrate the general use of MoNaLISA in living cells and tissues such as human fibroblast, hippocampal neurons, colonies of mouse embryonic stem cells and organotypic slice culture.

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Cosponsored by

"Interplay of developmental clock and extracellular environment in brain formation"
Grant-in-Aid for Scientific Research on Innovative Areas