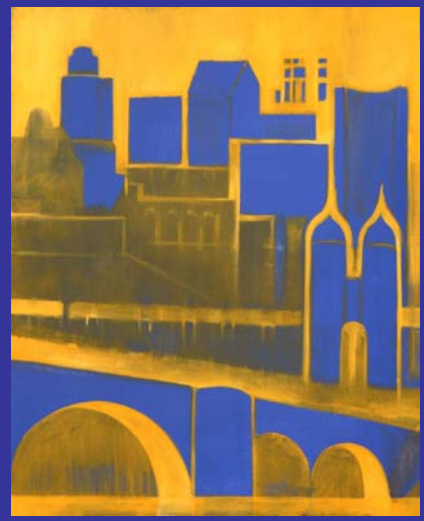
Jan 1, 2010



Letizia Mancino

Superresolution Light Microscopy 2010:

"Molecular Galaxies" of the Cell Nucleus*

C. Cremer

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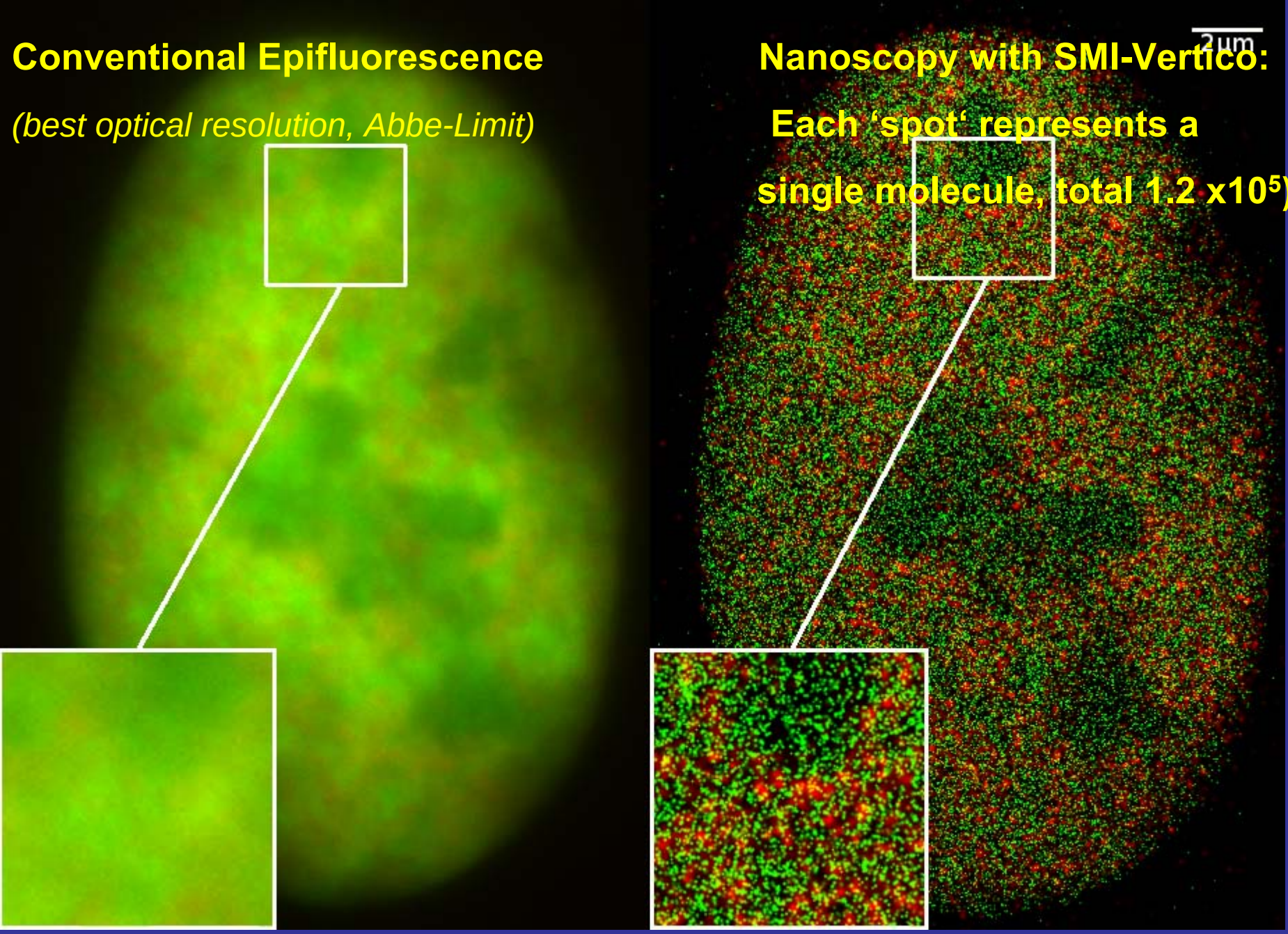
Institute for Molecular Biophysics/The Jackson Laboratory,ME

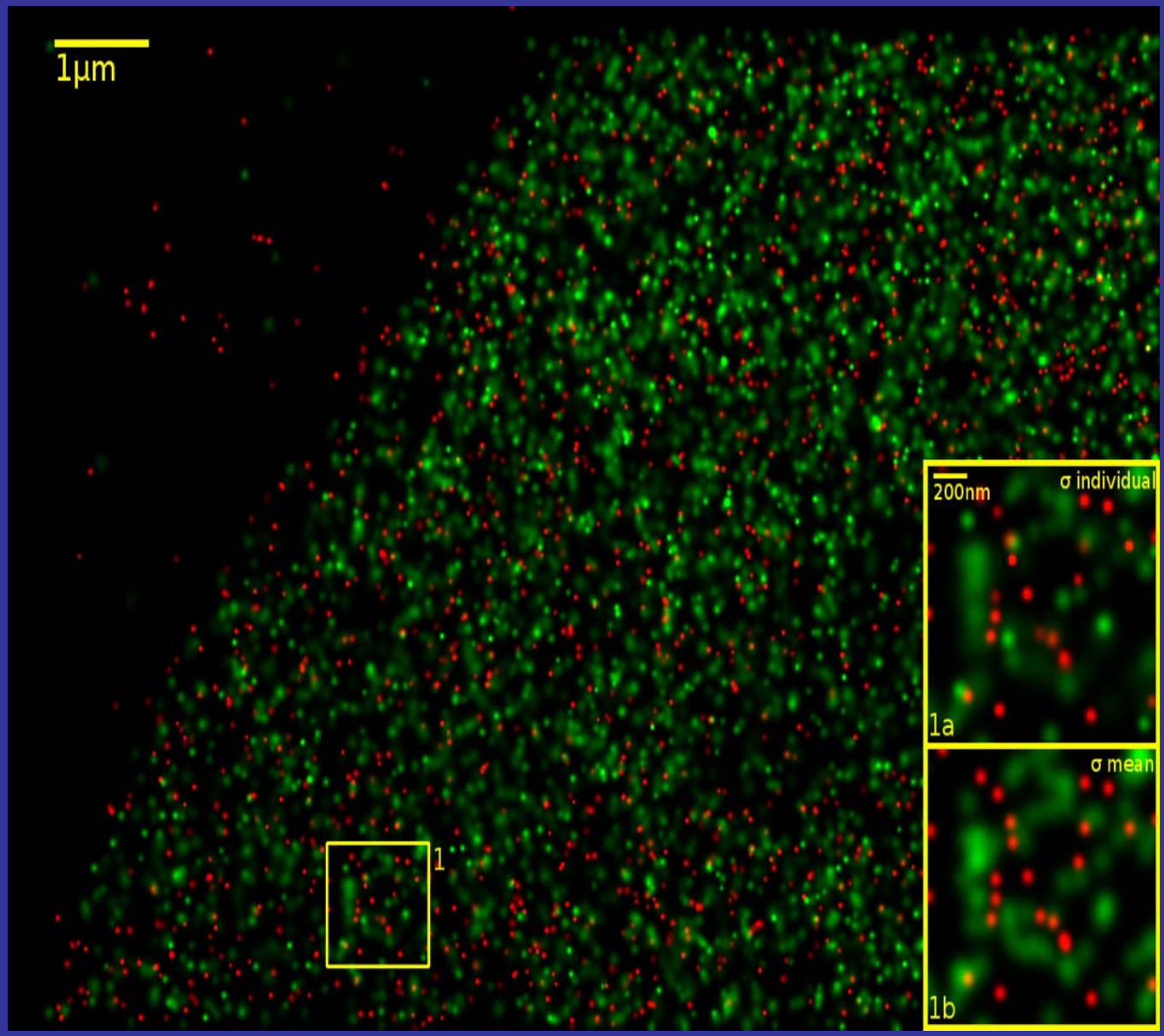
**seen with the KIP Nanoscope ("SMI Vertico")*



Red: H2A proteins; Green: Snf2H proteins (green)

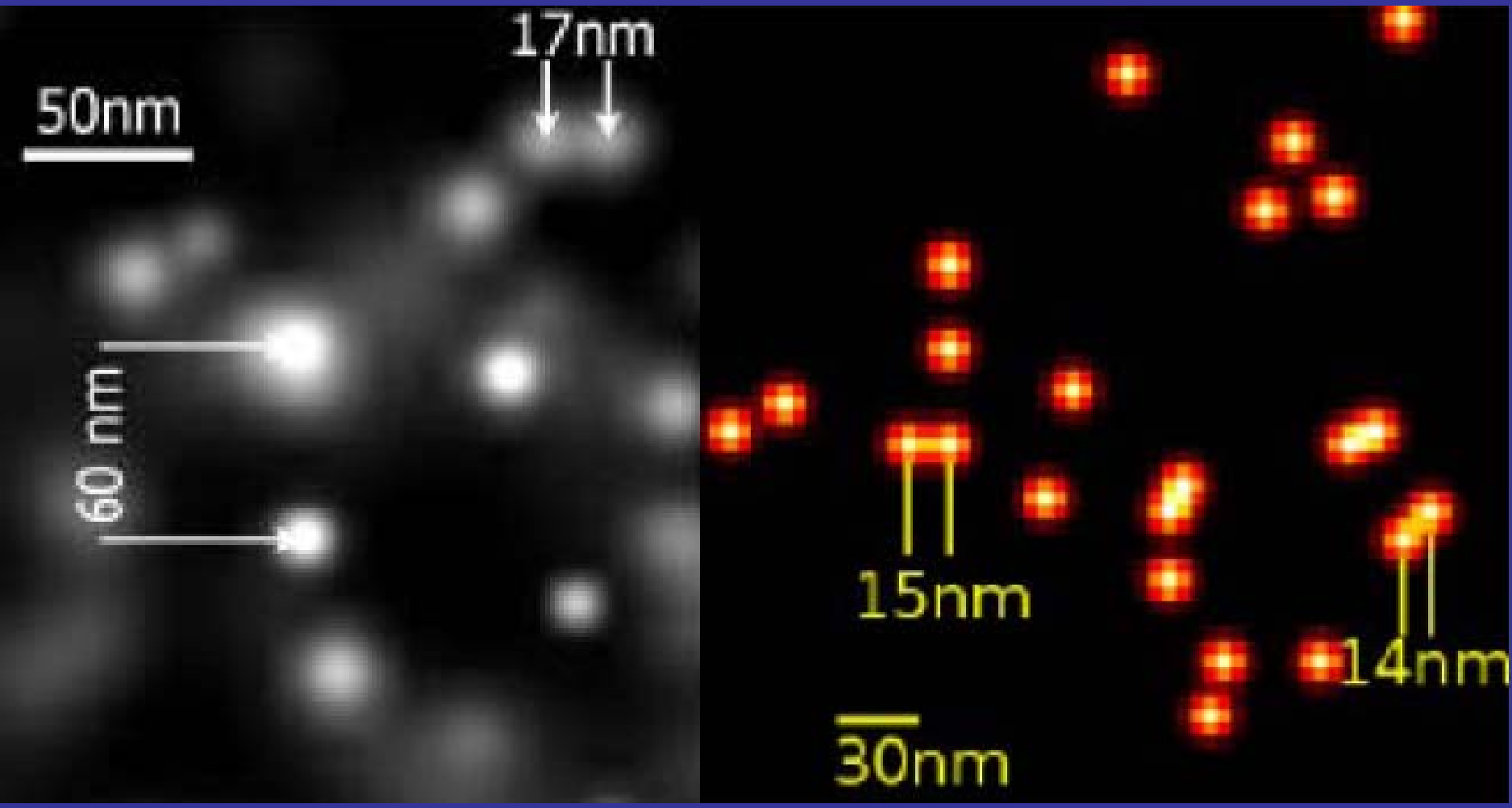
Gunkel et al. 2009

Nanoscopy (SMI-Vertico) of Nuclear Proteins labelled with two standard Fluorochromes (Detail)



M. Gunkel et al., 2009

A Deep Look into the Cellular Galaxy of Molecules



***Left:** SPDM of individual emGFP-histone (H2B) molecules in a human cell nucleus. **Right:** SPDM of individual YFP-protein molecules in a human cell membrane.* λ_{exc} *= 488 nm .*

R. Kaufmann, P. Lemmer/KIP

Comparison of Optical Resolution

Hubble Telescope:

Optimum conditions*: If Hubble looked at the Earth - from its orbit of approx. L= 600 km - this would in theory correspond to a resolved distance of Δs = 0.3 meter: $\alpha_{Hubble} = \Delta s/L = 5 \times 10^{-7}$ (0.1 arcsec)


Hubble Telescope

KIP-Nanoscope:

Optimum conditions: A distance of Δs =10 nm between 2 single molecules can be detected; This would correspond to a visual angle of $\alpha_{nano} = 1 \times 10^{-8} / 0.25 = 0.4 \times 10^{-7}$ (~ 0.01arcsec)

References

- *P. Lemmer et al. (2008) SPDM: Light microscopy with single-molecule resolution at the nanoscale. Applied Physics B **93**: 1-12*

- *P. Lemmer et al. (2009) Using Conventional Fluorescent Markers for Far-field Fluorescence Localization Nanoscopy allows Resolution in the 10 nm Regime. J. of Microscopy **235**: 163 – 171*

- *R. Kaufmann et al. (2009) SPDM – Single Molecule Superresolution of Cellular Nanostructures. Proc. SPIE 7180, 71850 –J – 71850J-19*

- *M. Gunkel et al. (2009) Dual Color Localization Microscopy of Cellular Nanostructures. Biotechnology J.**4**: 927 – 938.*