

Advanced Microscopy Techniques 2024/2025 – Dan Cojoc

Allocated time for presentation 15 min: principle of the technique, main characteristics, one application specifying importance in the bio application presented from the respective paper.

The paper can be freely chosen by the student. Note that beside the questions on the presentation there will be also questions from other topics discussed during the course. This means that the student should study all the matter not just that referred to the presentation.

List of papers for the exam:

1. Gigli, L.; Braidotti, N.; Lima, M.A.d.R.B.F.; Ciubotaru, C.D.; Cojoc, D. Label-Free Analysis of Urine Samples with In-Flow Digital Holographic Microscopy. *Biosensors* **2023**, *13*, 789. <https://doi.org/10.3390/bios13080789>
2. Elisa D'Este, Dirk Kamin, Fabian Göttfert, Ahmed El-Hady, Stefan W. Hell, STED Nanoscopy Reveals the Ubiquity of Subcortical Cytoskeleton Periodicity in Living Neurons, *Cell Reports*, Volume 10, Issue 8, 2015, Pages 1246-1251, <https://doi.org/10.1016/j.celrep.2015.02.007>
3. Ilaria Testa, Nicolai T. Urban, Stefan Jakobs, Christian Eggeling, Katrin I. Willig, Stefan W. Hell, Nanoscopy of Living Brain Slices with Low Light Levels, *Neuron*, vol 75, issue 6, pages 992-1000, 2012 DOI: [10.1016/j.neuron.2012.07.028](https://doi.org/10.1016/j.neuron.2012.07.028)
4. Eric Betzig, George H. Patterson, Rachid Sougrat, O. Wolf Lindwasser, Scott Olenych, Juan S. Bonifacio, Michael W. Davidson, Jennifer Lippincott-Schwartz, and Harald F. Hess, Imaging Intracellular Fluorescent Proteins at Nanometer Resolution, *Science* 2006, pg 1642-1645 DOI: [10.1126/science.1127344](https://doi.org/10.1126/science.1127344)
5. Francisco Balzarotti, ..., Stefan Hell, Nanometer resolution imaging and tracking of fluorescent molecules with minimal photon fluxes, *Science*. 2017 Feb 10;355(6325):606-612. doi: [10.1126/science.aak9913](https://doi.org/10.1126/science.aak9913). Epub 2016 Dec 22
6. Reinhardt, S.C.M., Masullo, L.A., Baudrexel, I. et al. Ångström-resolution fluorescence microscopy, *Nature* 617, 711–716 (2023). <https://doi.org/10.1038/s41586-023-05925-9>
7. L. V. Wang and Song Hu, Photoacoustic Tomography: In vivo from organelles to organs, *Science* 2012, 23: 335(6075)
8. Hillman EM: Optical brain imaging in vivo: techniques and applications from animal to man. *J Biomed Opt* 2007, 12(5):051402
9. S. Witte et al Label-free live brain imaging and targeted patching with third-harmonic generation microscopy, *Proc. Natl. Acad. Sci. U.S.A.* 108 (15) 5970-5975, <https://doi.org/10.1073/pnas.1018743108> (2011).
10. C.H Camp Jr et al, High-speed coherent Raman fingerprint imaging of biological tissues *Nat Photon* 2014, DOI: [10.1038/nphoton.2014.145](https://doi.org/10.1038/nphoton.2014.145)
11. Pascolo et al Calcium micro-depositions in jugular truncular venous malformations revealed by Synchrotron-based XRF imaging, <https://doi.org/10.1038/srep06540>
12. Ladan Amin¹, Xuan T. A. Nguyen¹, Irene Giulia Rolle¹, Elisa D'Este², Gabriele Giachin^{1,*}, Thanh Hoa Tran¹, Vladka Ćurin Serbec³, Dan Cojoc^{4,‡} and Giuseppe Legname^{1,‡}, Characterization of prion protein function by focal neurite stimulation, *Journal of Cell Science* (2016) 129, 3878-3891 doi:10.1242/jcs.183137
13. Federico Iseppon¹, Luisa M. R. Napolitano^{1, 2}, Vincent Torre^{1*} and Dan Cojoc^{3*} Iseppon, Cdc42 and RhoA reveal different spatio-temporal dynamics upon local stimulation with Semaphorin-3A, *Frontiers in Cellular Neuroscience*, 2015, doi: [10.3389/fncel.2015.00333](https://doi.org/10.3389/fncel.2015.00333)
14. F. Falleroni, V. Torre, D. Cojoc, Cell Mechanotransduction With Piconewton Forces Applied by Optical Tweezers, *Front. Cell. Neurosci.*, 2018, Volume 12 <https://doi.org/10.3389/fncel.2018.00130>
15. Aubin-Tam et al, Adhesion through single peptide aptamers [dx.doi.org/10.1021/jp1031493](https://doi.org/10.1021/jp1031493), *J. Phys. Chem. A* 2011
16. Cryo Electron Microscopy (one) application to cellular and structural studies of eukaryotic cells, from review paper Weber MS, Wojtynek M, Medalia O. Cellular and Structural Studies of Eukaryotic Cells by Cryo-Electron Tomography. *Cells*. 2019 Jan 16;8(1):57. doi: [10.3390/cells8010057](https://doi.org/10.3390/cells8010057).