

## New Methods for Fast and Gentle Live Cell Imaging in 3D

Joseph Huff, PhD  
Application Development for Life Sciences  
Carl Zeiss Microscopy GmbH  
Carl-Zeiss-Promenade 10, 07745 Jena, Germany  
E-mail : [joseph.huff@zeiss.com](mailto:joseph.huff@zeiss.com)

**KEY WORDS:** gentle live cell imaging, 4D-imaging, photon efficiency, optical sectioning, Lattice SIM, Airyscan, LSM, GRIN Lens

### 1. ABSTRACT

Researchers often need to image the smallest structures, catch the faintest signal or track the fastest processes – or do all of that at once. When it comes to getting accurate data from live cells or other weakly-labeled samples, there is no such thing as too much sensitivity, resolution or speed. Each photon of emission light is precious. At ZEISS Microscopy, we constantly strive to develop light efficient imaging technologies. ZEISS Airyscan and Lattice SIM allow researchers in facilities and single labs to get as much information about their challenging samples as possible. Our presentation will give an overview about new developments in the field of gentle and fast optical sectioning techniques with superresolution. A number of challenging application examples will be presented and discussed.

### 2. FIGURES AND REFERENCES

Figure 1: [https://p.widencdn.net/tndnoj/Elyra-7\\_Lattice-SIM\\_vs\\_widefield\\_Phalloidin?download=true](https://p.widencdn.net/tndnoj/Elyra-7_Lattice-SIM_vs_widefield_Phalloidin?download=true)

Follows are the example of references;

[1] A. Author; B. Coauthor, and C.C. Collaborator, "Title of the paper cited in the main text," *J. in Italic*, **1**, 123-456 (1999).

[2] S. Kawata, Book title underlined, Chapter 1. (Publisher, City, 1999).

[1] J. Huff, "The Airyscan detector from ZEISS: confocal imaging with improved signal-to-noise ratio and super-resolution," *Nat. Methods*, **12**, 1205 (2015)

[2] J. Huff, "The Fast mode for ZEISS LSM 880 with Airyscan: highspeed confocal imaging with super-resolution and improved signal-to-noise ratio," *Nat. Methods*, **13**, 958 (2016)

[3] J. Huff, "The new 2D Superresolution mode for ZEISS Airyscan," *Nat. Methods*, **14**, 1223 (2017)

[4] J. Huff; I. Kleppe; A. Naumann; R. Nitschke, "Airyscan detection in multiphoton microscopy: super-resolution and improved signal-to-noise ratio beyond the confocal depth limit," *Nat. Methods*, **14**, 1223 (2017)

[5] J. Huff, Advanced Optical Methods for Brain Imaging, Chapter 4. (Springer, Singapore, 2019).