Chrysanthe Preza

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Education

Washington University in St. Louis, St. Louis, MO:

- Doctor of Science in Electrical Engineering, August 1998. Dissertation title: "Phase Estimation Using Rotational Diversity for Differential Interference Contrast Microscopy." Advisor: Donald L. Snyder. Master of Science in Computer Science, August 1991. Focus on artificial intelligence, digital image processing, computer systems organization, and formal concepts in computer science.
- Master of Science in Electrical Engineering, August 1990. Thesis title: "A Regularized Linear-Reconstruction Method for Optical Sectioning Microscopy." Advisor: Michael I. Miller.
- Bachelor of Science in Computer Science, cum laude, May 1987.
- Bachelor of Science in Electrical Engineering, cum laude, May 1987.

Professional Experience

Conducting research in information-theoretic computational imaging applied to light microscopy and spectroscopy, and teaching a variety of electrical and computer engineering courses. Extensive experience in developing physics-based imaging models and processing methods for real imaging applications and implementation and testing of the methods via software engineering. Development and evaluation of optical systems and computational methods using the computational optical sensing and imaging (COSI) paradigm for different applications. Projects include: a) three-dimensional computational imaging microscopy for two different modalities: fluorescence, and phase imaging using computational differential interference contrast (DIC); b) instrument development of an adaptive multimodal microscope system suitable for high-resolution thick sample imaging; c) development of a novel structured-illumination module integrated with computational methods for super resolution microscopy with reduced data; and d) development of physics-guided neural networks for computational imaging. Founder and principal investigator of the Computational Imaging Research Laboratory. Research advisor and mentor to several post-docs, graduate (PhD and MS) and undergraduate students training in computational imaging. Instructor of a variety of electrical and computer engineering undergraduate and graduate courses. Developer of special topic graduate courses in Fourier Optics, Fourier Methods in Imaging, Computational Optical Imaging, Image Processing, and Computational Methods for Inverse Problems in Imaging.

Summary of Appointments

2017 – Present	**Professor and Chair**, The University of Memphis, Dept. of Electrical and Computer Engineering (primary)
2017 – Present	**Professor**, The University of Memphis, Dept. of Biomedical Engineering
2010 – 2017	**Associate Professor**, The University of Memphis, Dept. of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering
2006 – 2010	**Assistant Professor**, The University of Memphis, Dept. of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering
2006 – Present	**Adjunct Faculty,** The University of Tennessee Health Science Center, Orthopedic Surgery and Biomedical Engineering
2000 - 2006	**Research Associate**, Washington University, Electronic Signals and Systems Research Laboratory, Dept. of Elect. and System Engineering
2000 - 2006	**Instructor**, Washington University, Dept. of Electrical and System Engineering
2003 - 2004	**Visiting Assistant Professor**, University of Cyprus, Dept. of Electrical and Computer Engineering
1998 - 2000	**Research Associate,** Washington University, Institute for Biomedical Computing (IBC)
1987 - 1998	**Research Assistant,** Washington University, IBC

External Research Support

The external funding from the NSF for which I am the principal investigator (PI) to date totals **$2,227,704**.

1. Title: *"Understanding the Role of Undergraduate Research and Mentoring in the Self-Efficacy, Identity, and Success of Engineering Undergraduate Students"*, PI: C. Preza; co-PIs: S. Ivey and C. Steward. NSF-IUSE, 10/01/2021-09/30/2024; Funds: **$ 299,998**

    Adapt and develop a modified Vertically Integrated Projects (VIP) program at the University of Memphis to engage students at all academic years in team-based research for credit. The VIP program will also expose students to initiatives that promote diversity and inclusion. Results will contribute to knowledge about STEM identity and self-efficacy gained from research experience and tiered mentoring and the impact of an inclusive culture on engineering student retention.

2. Title: "*IDBR TYPE A - Improving 3D resolution and reducing sensitivity to spherical aberration in live, thick sample cellular imaging using novel methods in optical sectioning microscopy*", PI: C. Preza; co-PI: O. Skalli, Univ. of Memphis; Collaborators: G. Saavedra and M. Martinez-Coral, Univ. of Valencia, Spain; C. Waters, Univ. of Tennessee Health Science Center (UTHSC). NSF, 09/01/14 - 08/31/19; Funds: **$ 750,096**

    The goal of this project was to develop a robust and flexible computational optical system with improved 3D resolution and reduced sensitivity to depth-induced aberrations that will greatly extend the capabilities of optical-sectioning microscopy for use in a wide range of biological applications.

3. Title: "*CAREER: Integrated computational optical framework for quantitative space-variant imaging in live-cell fluorescence microscopy*", PI: Chrysanthe Preza, Collaborators: C. Waters, Univ. of Tennessee Health Science Center, O. Skalli, Univ. of Memphis. NSF; 03/01/09 - 2/28/15; Funds: **$ 791,402**

    The goal of this project was to develop new computational methods to account for aberrations due to "thick" biological specimens. The methods developed were integrated with a novel optical non-scanning imaging system design to enable fast live-cell fluorescence microscopy imaging with high, isotropic 3D resolution.

4. Title: "*Collaborative Research: Multimode adaptive 3D microscopy for quantitative analysis of live-cellular dynamic processes in thick samples*", PI: Chrysanthe Preza, PI at University of Colorado at Boulder (leading institution): R. Piestun. Collaborators: C. Waters, UTHSC, R. Fischer NBHL, NSF, 06/01/09 - 05/31/13; Funds: **$168,952**

    The goal of this project was to investigate, develop, and evaluate a multi-modal microscope with greatly enhanced three-dimensional resolution to enable visualization and measurement of live-cellular dynamic processes in thick samples that might otherwise go undetected.

5. Title: "Collaborative Research: Quantitative DIC Microscope for Measuring 3-Dimensional Cell Attributes", PI: Chrysanthe Preza; PI at University of Colorado Boulder, C. Cogswell. NSF; 09/01/05 –08/31/09; Funds: **$ 217,256**

    Goal: This project developed an integrated optical and digital system that greatly extends the capabilities of differential interference contrast (DIC) microscopy for use in a wide range of biological applications.

Academic Honors

- Elected Fellow of the Optical Society of America (OSA) professional society, for outstanding and sustained research contributions in the field of computational imaging applied to microscopy, 2020.
- Elected Fellow of the SPIE professional society, 2019.
- Featured in the ECEDHA newsletter *Source*, January 2019.
- Recipient of the Ravi and Eleanor Kanuri Professorship, The University of Memphis, 2018 -
- Recipient of the Ralph Faudree Professorship, The University of Memphis, 2015-2017.
- Herff Outstanding Faculty Research Award, Herff College of Eng., the Univ. of Memphis, 2010 & 2015.
- University of Memphis PI Millionaire, 2014.
- NSF CAREER Award, 2009.
- Featured in the OSA's 2017 Women in Optics Monthly Planner
- Minorities and Women in Science Interview Series, OSA, April 2012.
- Ring Faculty Award, Herff College of Engineering, 2011-2013.
- Best Poster Award, *Memphis BioImaging Symposium*, 2009.
- Journal of the Optical Society of America Publications Award, July 1999.
- B.S.E.E. cum laude, B.S.C.S. cum laude, 1987.
- Tau Beta Pi and Eta Kappa Nu, Engineering Honoraries, 1986.
- Undergraduate Studies Scholarship, the Cyprus-America Scholarship Program (CASP) of the Cyprus Fulbright Commission, providing full tuition at Washington University in St. Louis and monthly stipend, 1983-1987.

Additional Professional Activities

- Co-Chair, *Data Analysis Program Subcommittee, Quantitative BioImaging,* Cambridge, UK*,* Jan. 6-9, 2020.
- Co-Chair, *Workshop on Computational Optical Imaging*, at the *2020 IEEE International Symposium on Biomedical Imaging (ISBI 2020)* Iowa City, Iowa, April 3-7, 2020.

- Co-Chair (2020) and Program Committee Member, *Computational Imaging*, SPIE Defense and Commercial Sensing (DCS), Commercial and Scientific Sensing and Imaging, 2017 - present
- Executive Editor for *Biological Imaging, Cambridge University Press*, 2020 -
- Associate Editor for *IEEE Transactions on Computational Imaging (TCI)*, 2018 – present.
- Topical Editor for OSA's *Applied Optics*, 2016 – present.
- Feature Editor, feature issue on *"Artificial Intelligence/Machine Learning in Optical Information Processing"* in *Applied Optics,* 2021-2022.
- Lead Guest Editor, feature issue on *"Modern Imaging"* in *Applied Optics,* 2016-2017.
- Member, *External Advisory Board* of the Electrical and Systems Engineering Department, Washington University, St. Louis, 2020 – 2022.
- External Reviewer for Promotion Case of Research Scientist at the Marine Biological Laboratory, Woods Hole, MA, 2021.
- Invited Participant, *NSF Workshop on Enabling Biological Discovery Through Innovations in Imaging and Computation,* Marine Biological Laboratory, Woods Hole, MA, Nov. 26-28, 2018.
- Instructor, Tutorial on "Digital Imaging Principles", *Optical Microscopy and Imaging in Biomedical Sciences Course* at the Marine Biological Laboratory, Woods Hole, MA, 2016 & 2017.
- Discussion Leader, *Gordon Research Conference (GRC) on Image Science,* June 17 -22, Stonehill College in Easton, MA, 2018.
- Co-Chair (2015 and 2016) and Program Committee Member, *Computational Optical Sensing and Imaging,* part of the Optical Society of America (OSA), Imaging and Applied Optics Congress, 2011, 2014 – 2017.
- Program Committee Member, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing*, BiOS, SPIE Photonics West, 2003, 2008, 2010– present
- Invited Participant, *IEEE Engineering in Medicine and Biology Society (EMBS) Forum on Grand Challenges in Biomedical Imaging*, March 1-2, Bethesda, Maryland, 2012.
- Program Committee Member, *IEEE International Conference of Electro/Information Technology,* IUPUI, Indianapolis, May 6-8, 2012.
- Invited Participant, *Workshop on Computationally Enhanced Optical Imaging*, Northeastern University, Boston, MA, Aug. 30, 2011.
- Invited Lecturer on *Computational Imaging*, *I-CAMP 2011 School*, Argentina-Uruguay, May 28-June 17, 2011.
- Conference Session Chair, *Medical Image Processing I*, Digital Image Processing and Analysis (DIPA), OSA Imaging and Applied Optics Congress, Tucson, Arizona, 2010.
- Program Committee Member, *International Conference on Computational Photography* (*ICCP*), IEEE, 2010.
- Conference Session Chair, *Confocal, Multiphoton, and Nonlinear Microscopic Imaging*, European Conferences on Biomedical Optics, OSA and SPIE, Munich, 2007.
- Scientific and Organizing Committee Member, *Memphis BioImaging Symposium* (*MemBIS*), 2007 – 2013; Conference Co-Chair, 2011-2013; Scientific Program Chair, 2010; Pre-conference Workshop Chair, 2009; Student Program co-Chair, 2008.
- Participant, *National Effective Teaching Institute* (NETI-1B), Tampa, FL, January 4-6, 2013.
- Invited Participant, *NSF ADVANCE Community Building Workshop for Junior Women Faculty in Engineering*, Virginia Beach, VA, July 21 – 24, 2009.
- **Scientific Reviewer/Participation in Proposal Review Panels** for the following:

    Journal of the Optical Society of America, Applied Optics, Optics Express; IEEE Transactions on Image Processing; Journal of Microscopy; Central European Journal of Physics; IEEE International Symposium on Biomedical Imaging, 2011, 2012*; NSF Proposals in Infrastructure Innovation for Biological Research* 2019*; NSF Proposals in Instrument Development for Biological Research* 2014, 2015*; NSF Proposals in Advances in Bio Informatics* 2010*; NIH Proposals in Enabling Bioanalytical & Imaging Technologies* 2011, 2013

- **Professional Affiliations** (Current and Past)
    Fellow, International Society for Optical Engineering (SPIE)
    Fellow, Optical Society of America (OSA)
    Member, Institute of Electrical and Electronics Engineers (IEEE)
    Member, IEEE Women in Engineering
    Member, The Society of Women Engineers (SWE)
    Member, American Society for Engineering Education (ASEE)
    Member, Microscopical Society of America

Patent

Preza, C., Doblas, A., Martínez-Corral, M., Saavedra, G., and Barreiro, J. C., "Multi-focal light-sheet structured illumination

fluorescence microscopy system," US utility Patent No. 62/527,232 (2018).

Publications

Invited Book Chapter
Preza, C., King, S. V., Dragomir, N. M., Cogswell, C. J., "Phase Imaging Microscopy – Beyond Darkfield, Phase and Differential Interference Contrast (DIC) Microscopy," in *Handbook of Biomedical Optics*, Boas, D. A., Pitris C., and Ramanujam, N., eds., Taylor and Francis Books, 2011.

Journal Publications

1. Shabani, H., Doblas, A., Saavedra, G. and **Preza, C., "**Optical transfer function engineering for a tunable 3D structured illumination microscope," Optics Letters, **44**(7), 1560-1563, 2019.
2. Doblas, A., Bedoya, S., and **Preza, C.**, "Wollaston prism-based structured illumination microscope with tunable-frequency," *Applied Optics*, **58**(7), B1-B8, 2019.
3. Doblas, A., Shabani, H., Saavedra, G. and **Preza, C., "**Tunable-frequency three-dimensional structured illumination microscopy with reduced data acquisition," *Optics Express*, **26**(23), 30476-30491, 2018.
4. King, S. V., Yuan, S. and **Preza C.**, "Performance evaluation of extended depth of field microscopy in the presence of spherical aberration and noise", *J. Biomed. Opt.,* 23(3) 036016 2018.
5. Patwary, N., Doblas, A., and **Preza, C.**, "Image restoration approach to address reduced modulation contrast in structured illumination microscopy," *Biomed. Opt. Express* **9**(4), 1630-1647, 2018.
6. Shabani, H., Doblas, A., Saavedra, G., **Preza, C.**, "Improvement of two-dimensional structured illumination microscopy with an incoherent illumination pattern of tunable frequency," *Applied Optics,* **57**(7), B92-B101, 2018.
7. Patwary, N., Shabani, H., Doblas, A., Saavedra, G., and **Preza, C.,**" Experimental validation of a customized phase mask designed to enable efficient computational optical sectioning microscopy through wavefront encoding," *Applied Optics, Modern Imaging feature,* **56**(9)*,* D14-D23, doi: 10.1364/AO.56.000D14, 2017.
8. Patwary, N., King, S. V., Saavedra, G., and **Preza, C.**, Reducing effects of aberration in 3D fluorescence imaging using wavefront coding with a radially symmetric phase mask", *Optics Express*, 24(12), 12905-12921, doi: 10.1364/OE.24.012905, 2016.
9. Ghosh, S. and Preza, C., "Three-Dimensional Block-Based Restoration Integrated with Wide-field Fluorescence Microscopy for the Investigation of Thick Specimens with Spatially Variant Refractive Index," *J. Biomed. Opt.,* 21(4), 046010, doi: 10.1117/1.JBO.21.4.046010, 2016.
10. King, S. V., Doblas, A., Patwary, N., Saavedra, G., Martinez-Corral, M. and **Preza, C.**, "Spatial light modulator phase mask implementation of wavefront encoded 3D computational-optical microscopy", *Applied Optics*, 54(29), 8587-8595, doi: 10.1364/AO.54.008587, 2015.
11. Patwary, N., and **Preza, C.**, "Image restoration for three-dimensional fluorescence microscopy using an orthonormal basis for efficient representation of depth-variant point-spread functions", *Biomed. Opt. Express* **6**(10), 3826-3841*,* doi: 10.1364/BOE.6.003826*,* 2015.
12. Ghosh, S. and **Preza, C.**, "Fluorescence microscopy point spread function model accounting for aberrations due to refractive index variability within a specimen," *J. Biomed. Opt.*, **20**(7), 075003, doi: 10.1117/1.JBO.20.7.075003, 2015.
13. Ghosh, S. and **Preza, C.**, "Characterization of a 3D DH-PSF for fluorescence microscopy in the presence of spherical aberration," *Journal of Biomedical Optics,* 18(3):036010, doi: 10.1117/1.JBO.18.3.036010, 2013.
14. Furxhi, O., Jacobs, E. L. and **Preza, C.,** "Image plane coded aperture for Terahertz imaging," *Optical Engineering*, 51(9), doi:10.1117/1.OE.51.9.091612, 091612-1, 2012.
15. Yuan, S. and **Preza, C.**, "Point-spread function engineering to reduce the impact of spherical aberration on 3D computational fluorescence microscopy imaging," *Optics Express,* 19(23), 23298-23314, doi: 10.1364/OE.19.023298, 2011.
16. King, S. V., Libertun, A. R., Piestun, R., Cogswell, C. J., **Preza, C.**, "Quantitative phase microscopy through differential interference imaging," *Journal of Biomedical Optics*, Vol. **13**(2), 024020, doi: 10.1117/1.2907328, 2008.
17. Fox, D. J. Jr., Tysver Velde, H., **Preza, C.**, O'Sullivan, J. A., Smith, W. H., and Woolsey, T. A., "Computational hyperspectral interferometry for studies of brain function: proof of concept," *Applied Optics*, Vol. 45, No. 13, 3009-3021, doi: 10.1364/AO.45.003009, 2006.
18. Preza, C. and Conchello, J.-A. "Depth-Variant Maximum-Likelihood Restoration for Three-Dimensional Fluorescence Microscopy," *Journal of the Optical Society of America A*, Vol. 21, No. 9, 1593-1601, September, 2004.
19. Fuhrmann, D. R., **Preza, C.**, O'Sullivan, J. A., Snyder, D. L., and Smith, W.H., "Spectrum Estimation from Quantum-Limited Interferograms," *IEEE Transactions on Signal Processing,* 52(4), 950-961, April, 2004.
20. Homem, M. R. P., Mascarenhas, N. D. A., Costa, L. F., and **Preza C.**, "Biological Image Restoration in Optical-Sectioning Microscopy Using Prototype Image Constraints," *Real Time Imaging*, special issue on *Imaging in Bioinformatics*, 8(6), 475-490, 2002.
21. Preza, C., "Rotational-diversity phase estimation from differential-interference-contrast microscopy images," *Journal of the Optical Society of America A,* 17(3), 415-424, 2000.
22. Preza, C., Snyder, D. L., and Conchello, J.-A. "Theoretical development and experimental evaluation of imaging models for differential-interference-contrast microscopy," *Journal of the Optical Society of America A,* 16(9), 2185-2199, 1999.
23. McNally, J. G., **Preza, C**., Conchello, J.-A. and Thomas, Jr., L. J., "Artifacts in Computational Optical-Sectioning Microscopy," *Journal of the Optical Society of America A,* 11(3):1056-1067, 1994.
24. Preza, C., Ollinger, J. M., McNally, J. G., and Thomas, Jr., L. J., "Point-Spread Sensitivity Analysis for Computational Optical-Sectioning Microscopy," *Micron and Microscopica Acta*, Special issue, 23(4):501-513, 1992. (Invited paper).
25. Preza, C., Miller, M. I., Thomas, Jr., L. J., and McNally, J. G., "Regularized Linear Method for Reconstruction of Three-Dimensional Microscopic Objects from Optical Sections," *Journal of the Optical Society of America A*, 9(2):219-228, 1992.

Journal Publications under Review/Revision

1. Rahman, Md J., Morshed, B. I. and **Preza, C.**, "A Smart Health (sHealth) Centric Method Toward Estimation of Sleep Deficiency Severity from Wearable Sensor Data Fusion," *BioMed Informatics Journal*, submitted June 2021. – *under review*
2. Zaman, Md S., Morshed, B. I. and **Preza, C.**, "Improving Accuracy of Beat-wise Classification of ECG using Concatenated Machine Learning Algorithms," IEEE Transactions on Biomedical Engineering (TBME), submitted July 2021. – *under review*
3. Van, C. T. S., and **Preza, C.**, "Axial super resolution in structured illumination microscopy using 3D model-based restoration", *submitted in August 2021.*

Peer-Reviewed Conference Publications

1. Van, C. T. S. and **Preza**, **C.**, "3D model-based restoration for structured illumination microscopy based on a 3D illumination pattern," *Imaging and Applied Optics Congress 2021, OSA Technical Digest (Optical Society of America, 2021),* paper *in press,* 2021.
2. Mohammed, J., Van, C. T. S., and **Preza**, **C.**, "Evaluation of different illumination designs for tunable 3D structured illumination microscopy through model-based restoration," Proc. SPIE 11649, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVIII,* 116490M, https://doi.org/10.1117/12.2586217, 2021.
3. Kessler, E., Braasch, L. G., Tollefsen, D., and **Preza, C.**, "Assessing Epistemic Beliefs Regarding the Co-construction of Knowledge: Implications for Team Science," *ISLS Annual Meeting 2021, accepted, in press.*
4. Van, C. T. S., Shabani, H., and Preza, C., "Experimental Verification of 3D Model-Based Restoration for 3D-SIM with Data Reduction," in *Imaging and Applied Optics 2020* (COSI) of OSA Technical Digest Series (Optical Society of America, 2020), paper CF4C.3, 2020.
5. Van, C. T. S., Shabani, H., and **Preza, C**., "Improved resolution in structured illumination microscopy with 3D model-based restoration," *Computational Optical Imaging workshop* at the *2020 IEEE International Symposium on Biomedical Imaging (ISBI 2020)*, Iowa City, Iowa, April 3, 2020.
6. Shabani, H., Labouesse, S., Sentenac, A. and **Preza**, **C.**, "Three-dimensional deconvolution based on axial-scanning model for structured illumination microscopy," *2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI 2019)*, Venice, Italy, pp. 552-555, 2019.
7. Doblas, A., Shabani, H., Saavedra, G., and **Preza**, **C.**, "Recent advances in tunable 3D structured illumination microscopy," 2018 20th *International Conference on Transparent Optical Networks ICTON*, Bucharest, Romania, 2018, pp. 1-4*,* doi: 10.1109/ICTON.2018.8473675.
8. Bedoya, S., Doblas, A., Saavedra, G., and **Preza**, **C.**, "Tunable structured illumination system based on a Wollaston prism," *Imaging and Applied Optics Congress 2018 (IS), OSA Technical Digest (Optical Society of America, 2018),* paper ITu2B.3, 2018.
9. Sola-Pikabea, J., Doblas, A., Saavedra, G., Martinez-Corral, M., and **Preza**, **C.**, "Optimal design of incoherent tunable-frequency structured illumination microscope scheme," *2018 IEEE 15th International Symposium on Biomedical Imaging (ISBI 2018)*, 10.1109/ISBI.2018.8363613*,* 2018.
10. Doblas, A., Dutta, A., Saavedra, G. and **Preza**, **C.**, "Tradeoff between insensitivity to depth-induced spherical aberration and resolution of 3D fluorescence imaging due to the use of wavefront encoding with a radially symmetric phase mask," Proc. SPIE 10499, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV,* 104990F, 2018.
11. Shabani, H., Doblas, A., Saavedra, G. and **Preza**, **C.**, "Preprocessing method to correct illumination pattern in sinusoidal-based structured illumination microscopy," Proc. SPIE 10499, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV,* 104991Z, 2018.
12. Shabani, H., Doblas, A., Saavedra, G. and **Preza**, **C.**, "3D structured illumination microscopy using an incoherent illumination system based on a Fresnel biprism," Proc. SPIE 10499, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV,* 1049903, 2018.
13. Patwary, N., Doblas, A., Saavedra, G. and **Preza**, **C.**, "Evaluation of the use of wavefront encoding to reduce depth-induced aberration in structured illumination microscopy" Proc. SPIE 10499, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV,* 104991A, 2018.
14. Shabani, H., Doblas, A. and **Preza, C.**, "Simultaneous optical sectioning and super resolution in 2D-SIM using tunable structured illumination," in *Imaging and Applied Optics 2017* (COSI) of OSA Technical Digest Series (Optical Society of America, 2017), paper CW4B, 2017.
15. Doblas, A. and **Preza, C.**, "Incoherent-based tunable frequency structured illumination microscopy," in *Imaging and Applied Optics 2017* (IS) of OSA Technical Digest Series (Optical Society of America, 2017), paper ITh4, 2017.
16. Patwary, N., Doblas, A., and **Preza, C.**, "Computational approach to address reduced modulation contrast in structured-illumination microscopy," in *Imaging and Applied Optics 2017* (COSI) of OSA Technical Digest Series (Optical Society of America, 2017), paper JTu5A, 2017.
17. King S. V., Taylor, C. A., Doblas, A., Shabani, H., Patwary, N., Saavedra, G. and **Preza, C.**, "Implementation of an incoherent 3-D patterned illumination design in a Structured Illumination Microscope," Proc. SPIE 10070, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIV*, 1007004, doi:10.1117/12.2252910, 2017.
18. Shabani, H., Patwary, N., Doblas, A., Saavedra, G. and **Preza, C.**, "Comparison of two structured illumination techniques based on different 3D illumination patterns," Proc. SPIE 10070, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIV,* 1007013, doi:10.1117/12.2253199, *2*017.
19. Doblas, A., Saavedra, G. and **Preza, C.**, "Comparison of 3D structured patterns with tunable frequency for use in Structured Illumination Microscopy," Proc. SPIE 10070, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIV,* 100700H, doi:10.1117/12.2252109, 2017.
20. Patwary, N., King, S. V., Shabani Hasti and **Preza, C.**, "Experimental Implementation of Wavefront Encoding in 3D Widefield Fluorescence Microscopy Using a Fabricated Phase Mask Designed to Reduce System Depth Variability," *Imaging and Applied Optics*

Congress, Computational Optical Sensing and Imaging (*COSI*), OSA Technical Digest (online) paper CW2D.3, doi: 10.1364/COSI.2016.CW2D.3, 2016.

21. Ghosh, S. and **Preza, C.**, "Block-Based Restoration Method for Wide-field Microscopy of Samples with Variable Refractive Index," *Imaging and Applied Optics Congress, Computational Optical Sensing and Imaging* (*COSI*), OSA Technical Digest (online) paper CM3D.3, doi: 10.1364/COSI.2016.CM3D.3, 2016.

22. Patwary, N. and **Preza, C.**, "Reducing restoration artifacts in 3D computational microscopy using wavefront encoding," in *Computational Imaging XIV*, IS&T International Symposium on Electronic Imaging,1-6(6), doi: 10.2352/ISSN.2470-1173.2016.19.COIMG-157, 2016.

23. Shabani, H., Sánchez-Ortiga, E., **Preza, C.**, "Investigating the performance of reconstruction methods used in structured illumination microscopy as a function of the illumination pattern's modulation frequency," Proc. SPIE 9713, Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIII, 9713, 971305, doi: 10.1117/12.2213411, 2016.

24. Patwary, N. and **Preza, C.**, "Wavefront encoded computational optical sectioning microscopy reduces depth variability in 3D imaging," *Imaging and Applied Optics Congress, Computational Optical Sensing and Imaging* (*COSI*) Conference, OSA Technical Digest (online) paper CM2E.4, doi:10.1364/COSI.2015.CM2E.4, 2015.

25. King, S. V., Hossain, Md S., and **Preza, C.**, "Dual acquisition of fluorescence and quantitative phase microscopy with high-speed switchable optics for DIC," Optics in the Life Sciences, OSA Technical Digest (online), Novel Techniques in Microscopy, paper NW3C.4., doi:10.1364/NTM.2015.NW3C.4, 2015.

26. Ghosh, S., and **Preza, C.**, "Space-Variant Image Formation for 3D Fluorescence Microscopy Using a Computationally Efficient Block-Based Model," 2015 IEEE 12th International Symposium on Biomedical Imaging (ISBI) From Nano to Macro, 7163990, 789-792, doi: 10.1109/ISBI.2015.7163990, 2015.

27. Ghosh, S., and **Preza, C.**, "A block-based forward imaging model for improved sample volume representation in computational optical sectioning microscopy," Proc. SPIE 9330, Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXII, 93300T, doi:10.1117/12.2077001, 2015.

28. Patwary, N., King, S. V. and **Preza, C.**, "3D microscope imaging robust to restoration artifacts introduced by optically thick specimens," Proc. SPIE 9330, Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXII, 93300O, doi:10.1117/12.2077845, 2015.

29. Hossain, Md S., King, S. V. and **Preza, C.**, "An integrated approach to determine prior information for improved wide-field imaging models from computational interference microscopy," SPIE 9330, Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXII, 933014, doi:10.1117/12.2077322, 2015.

30. Patwary, N. and **Preza**, C., "Computationally tractable approach to PCA-based depth-variant PSF representation for 3D microscopy image restoration," Classical Optics, OSA Technical Digest (online), Computational Optical Sensing and Imaging, paper CW1C.5, Optical Society of America, doi: 10.1364/COSI.2014.CW1C.5, 2014.

31. Preza, C., "Computational imaging for 3D fluorescence microscopy," Imaging and Applied Optics, OSA Technical Digest (online), Imaging Systems and Applications, paper IW2C, doi: 10.1364/ISA.2014.IW2C.1, 2014.

32. Hossain, Md S., King, S. V. and **Preza**, C., "Enhanced Extended Depth-of-Field Microscopy via modeling of SLM effects on the applied phase mask," Imaging and Applied Optics, OSA Technical Digest (online), Imaging Systems and Applications, paper IW4C.4, Optical Society of America, doi: 10.1364/ISA.2014.IW4C.4, 2014.

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Other Conference Publications and Presentations (selected)

1. Gimeno-Gomez, A., Yun, H., Van, C. T. S., **Preza**, **C.**, Barreiro-Hervas, J. C. and. Saavedra, G., "3D Structured Illumination Microscope with Tunable Frequency and Reduced Data Acquisition Based on a Wollaston Prism," *Focus on Microscopy,* 2021.
2. Van, C. T. S. and **Preza, C.**, "Improved Resolution in 3D structured illumination microscopy using 3D model-based restoration," *Focus on Microscopy,* March 28, 2021.
3. Gimeno-Gomez, A., Yun, H., Van, C. T. S., Shabani, H., **Preza, C.**, Barreiro-Hervas, J. C. and. Saavedra, G., "Flexible 3D structured illumination with reduced data acquisition by means of a Wollaston prism," *Focus on Microscopy,* published online, 2020.
4. Preza, C., "Recent Advances in 3D structured illumination microscopy with reduced data-acquisition", *Computational Imaging XVIII, Electronic Imaging 2020,* Burlingame, CA, January 27-28, 2020.
5. Van, C. T. S., Shabani, H. and **Preza, C.,** "3D model-based restoration methods for 3D-SIM," *Quantitative BioImaging (QBI) 2020*, Oxford, UK, January 6-9, 2020.
6. Shabani, H., Doblas, A., Saavedra, G., and **Preza**, **C.**, "Tunable 3D Structured Illumination Microscope Using a Fresnel Biprism: OTF Design," *Focus on Microscopy,* P2-B-1/20, London, England, April 16, 2019.
7. Shabani, H., Doblas, A., Saavedra, G., and **Preza**, **C.**, "Investigating the impact of structured illumination design on the synthetic optical transfer function's compact support", *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXVI, San Francisco, CA,* February 5, 2019.
8. Bedoya, S., Doblas, A., Saavedra, G. and **C. Preza**, "Tunable structured illumination system based on a Wollaston prism," *Image Science Gordon Research Conference*, Easton, MA, June 17-22, 2018.
9. Shabani, H., Doblas, A., Saavedra, G., and **Preza**, **C.**, "Novel structured illumination improves 3-D resolution in fluorescence microscopy," *Image Science Gordon Research Conference*, Easton, MA, June 17-22, 2018.
10. Doblas, A., Sola-Pikabea, J., Shabani, H., Saavedra, G., Martinez-Corral, M., and **Preza**, **C.**, "Incoherent structured illumination system with a tunable 3D pattern," *Computational Imaging III, SPIE Commercial & Scientific Sensing and Imaging,* talk 10669-12, Orlando, FL, 15 April 2018.
11. Shabani, H., Doblas, A., Saavedra, G., and **Preza**, **C.**, "3D Tunable structured illumination microscope using a Fresnel biprism," *Focus on Microscopy,*" Singapore, March 27, 2018.
12. Preza, C., "3D Image Restoration Using Multiple Space-Varying Point Spread Functions," in *Mathematics in Imaging Conference*, *Imaging and Applied Optics Congress*, Optical Society of America, *invited talk*, 2017.
13. Preza, C., Patwary, N., Shabani, H., Doblas, A., and Saavedra, G., "PSF engineering using a fabricated SQUBIC phase mask to reduce the effect of spherical aberration in 3D wide field fluorescence Imaging," *Focus on Microscopy, Bordeaux, France,* April 10 2017.
14. Doblas, A., Shabani, H., Saavedra, G., and **Preza**, **C**., "Improvement of 2D-SIM achieved based on tunable structured illumination," *Focus on Microscopy,*" *Bordeaux, France,* April 10 2017.
15. Shabani, H., Patwary, N., Doblas, A., Saavedra, G. and **Preza, C.,** "Investigating the effect of different 3D illumination patterns on structured illumination microscopy performance," *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
16. Patwary, N., Shababi, H., Doblas, A., Saavedra, G. and **Preza, C.,** "Implementation of PSF engineering using a fabricated phase mask to reduce the effect of spherical aberration in 3D wide field fluorescence microscopy," *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
17. Ghosh, G. and **Preza, C.,** "Imaging thick specimens using optical-sectioning microscopy coupled with block-based 3D image restoration," *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
18. Ghosh, G. and **Preza, C.,** "An *N*-Interface point spread function model suitable for wide-field fluorescence imaging of thick specimen with variable refractive index," *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
19. Ghosh, S. and **Preza, C.,** "Enabling imaging of optically thick samples using computational optical sectioning microscopy," *Image Science Gordon Research Conference*, Stonehill College, Easton, MA, June 5-10, 2016.
20. Shabani, H., Sánchez-Ortiga, E. and **Preza, C.,** "Assessing super-resolution and optical sectioning capability in structured illumination microscopy," *Image Science Gordon Research Conference*, Stonehill College, Easton, MA, June 5-10, 2016.
21. Ghosh, S. and **Preza, C.,** Imaging thick specimens using wide-field fluorescence microscopy coupled with block-based 3D image restoration," *Focus on Microscopy,* Taipei, Taiwan, 2016.
22. King, S. V., Patwary, N. and **Preza, C.,** "Quantitative wide-field fluorescence and phase microscopy using liquid crystal and display technology," *EMN Meeting on Liquid Crystal*, Orlando, Florida, 2016.
23. King, S. V., Skalli, O. and **Preza, C.,** "3D imaging suitable for cellular uptake of spherical nanoparticles by accounting for spherical aberration," *Focus on Microscopy*, Göttingen, Germany, 2015.
24. Patwary, N., King, S. V. and **Preza, C.,** "Improving 3D fluorescence imaging using a computational-optical approach to account for depth-induced aberrations," *Quantitative BioImaging 2015*, Institut Pasteur, Paris, France, 2015.

25. Preza, C., Patwary, N., Doblas, A., King, S.V., Saavedra, G. and Martinez-Coral, M., "Addressing Depth-Induced Spherical Aberration in Computational Optical Sectioning Microscopy Using Wavefront Coding," *Focus on Microscopy,* Sidney, Australia, April 13-16, 2014.

26. Preza, C., Schaefer, L. H., Schuster, D., Ghaffar, A.-U., Yuan, S., and Lobo, G. J., "Impact of Spherical Aberration on Structured-Illumination Microscopy", *Focus on Microscopy*, Singapore, April 1-4, 2012.

27. Preza, C. and Yuan, S., "Reducing the Impact of Spherical Aberration on Extended depth-of-field Microscopy Using PSF Engineering", *in Focus on Microscopy*, Singapore, April 1-4 2012.

28. Preza, C., Yuan, S., Sporer, M. H., Mukherjee, A., Crosby, L. M., and Waters, C. M., "Investigating the use of structured-illumination microscopy as implemented in the Zeiss ApoTome attachment to image thick lung tissue slices", *Focus on Microscopy*, Konstanz, Germany, April 2011.

29. Preza, C., Ghosh, S., Grover, G., Quirin, S., Piestun, R., "Extraction of depth information in the presence of spherical aberration using double-helix point spread function coding in 3D fluorescence microscopy imaging", *Focus on Microscopy*, Konstanz, Germany, April 2011.

30. Preza, C., Mukherjee, A., Myneni, V., Crosby, L. M., and Waters, C. M., "3D cell imaging with computational optical-sectioning microscopy and structured-illumination microscopy", *Focus on Microscopy,* Shanghai, China, March 2010.

31. Myneni, V. and **Preza, C.**, "Computational imaging for depth-variant fluorescence microscopy," *Focus on Microscopy,* Krakow, Poland, April 2009.

32. Preza, C., King S. V., Libertun, A. R., and Cogswell C. J., "Computational Imaging for DIC Microscopy: Current Use in Live-Cell Imaging", *Focus on Microscopy,* Osaka-Awaji, Japan, April 2008.

33. Cogswell C. J., King S. V., Libertun, A. R., Piestun, R., and **Preza, C.**, "Quantitative DIC Microscopy: Improving Versatility for Live-Cell Imaging," *Focus on Microscopy,* Valencia, Spain, April 2007.

Conference Publications under Preparation or Review

1. Van, C. T. S., and **Preza**, **C.**, "Image restoration in structured illumination microscopy using a physics-guided neural network," *under preparation.*

Selected Invited Presentations given by C. Preza

72. *"3D model-based restoration for structured illumination microscopy based on a 3D illumination pattern," Invited talk to be presented at the 3D Image Acquisition and Display: Technology, Perception and Applications conference of the OSA Imaging and Applied Optics Congress, Vancouver, BC Canada, (virtual) 19-23 July 2021.*

73. *"Model-based restoration for 3D structured illumination microscopy with reduced data," Invited talk presented at Computational Microscopy with Applications to Materials and other Scientific Problems, SIAM Conference on Imaging Sciences*, Toronto, Canada (virtual), July 13, 2020.

74. "Recent Advances in 3D structured illumination microscopy with reduced data-acquisition", *Invited talk presented at the Recent Progress in Computational Microscopy session of the Computational Imaging XVIII Conference*, Burlingame, CA, Jan 28, 2020.

75. "Recent advances in 3D structured illumination microscopy," *Invited talk presented at the Dept. of Physics Seminar Series, The University of Houston,* Houston, TX, November 13, 2018.

76. "Recent advances in tunable 3D structured illumination microscopy," *Invited talk presented at 20th Anniversary International Conference on Transparent Optical Networks ICTON 2018,* University Politehnica Bucharest, Bucharest, Romania, July 1-5, 2018.

77. "Computational and computational-optical approaches to improve 3D imaging in fluorescence microscopy," *Invited talk presented at SPIE Commercial & Scientific Sensing and Imaging,* Orlando, Florida, April 15-19, 2018.

78. "Computational 3D microscopy: beyond deconvolution microscopy," *Invited talk presented at the 25th Symposium of SPIE Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXV,* San Francisco, CA, January 29, 2018.

79. "3D Image Restoration Using Multiple Space-Varying Point Spread Functions," *Invited talk presented at Mathematics in Imaging of the OSA Imaging and Applied Optics Congress,* San Francisco, CA, June 26-29, 2017.

80. "Computational microscopy of optically thick samples," *Invited talk presented at the International Conference on Computational Photography* (ICCP) 2017, Stanford University, Palo Alto, CA, May 12-14, 2017.

81. "Computational imaging for 3-D microscopy of thick samples," *Invited talk presented at the 14th Annual Advanced Imaging Methods (AIM) Workshop, University of California at Berkeley,* Berkeley, CA, January 24-27, 2017.

82. "Digital Imaging Principles," *Invited Lecture presented at the Optical Microscopy and Imaging in Biomedical Sciences course at the Marine Biology Laboratory,* Woods Hole, MA, September 12, 2016 and September 11, 2017.

83. "Advances in computational imaging for quantitative 3D fluorescence microscopy," *Invited talk presented at the Golden Jubilee Annual Meeting of the Israeli Society for Microscopy (ISM),* Haifa, Israel, May 2016.

84. "Computational imaging for quantitative 3D fluorescence microscopy," *Invited seminar organized by IEEE Kolkata Section and IET (UK) Kolkata Network,* Meghnad Saha Institute of Technology, Kolkata, India, December 19, 2015.

85. "Computational imaging for 3D fluorescence microscopy: beyond deconvolution microscopy," *Invited tutorial presentation at the Quantitative BioImaging 2015*, Institut Pasteur, Paris, France, 2015.

86. "Computational imaging for 3D fluorescence microscopy," *Invited talk at Imaging Systems and Applications*, of the Imaging and Applied Optics Congress, OSA, Seattle, 2014.

87. "Computational Imaging for 3D Fluorescence Microscopy," *Invited seminar given at the Seminar Series of the Physics Dept.,* Rhodes College, January 24, 2014.

88. "3D point spread function characterization for widefield fluorescence microscopy," *Invited tutorial presentation at the Quantitative BioImaging 2013*, University of New Mexico, Albuquerque, New Mexico, 2013.

89. "3D Fluorescence Microscopy Imaging Using Double-Helix Point-Spread Function Engineering," *Invited seminar given at the Optical Fibers and Signal Processing Group,* The Univ. of Valencia, Spain, July 5, 2012.

90. "New Computational Methods for Structured-Illumination Microscopy," *Invited seminar given at the Dept. of Optics,* The Univ. of Valencia, Spain, April 30, 2012.

91. "Computational Imaging Overview and Application to Microscopy," *Three invited lectures* given at the *I-CAMP 2011 School*, School of Engineering at the University of the Republic, Montevideo, Uruguay, May 28 - June 3, 2011.

92. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited seminar given at the Seminar Series of the Physics Dept.,* The Univ. of Mississippi, Oxford, April 26, 2011.

93. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited seminar given at the Seminar Series of the Department of Electrical and Computer Engineering, Purdue School of Engineering and Technology,* Indiana University / Purdue University at Indianapolis, December 9, 2010.

94. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited seminar given at the Seminar Series of the Department of Electrical and Computer Engineering,* The University of Alabama, Tuscaloosa, Alabama, November 19, 2010.

95. "Alternating Minimization Algorithm for Quantitative Differential-Interference Contrast (DIC) Microscopy," *Invited seminar given at the Computational Optical Imaging and Sensing Seminar Series of the Electrical & Comp. Eng. Dept.,* Univ. of Colorado, Boulder, October 13, 2008.

96. "Computational Imaging for Microscopy," *Invited seminar given at the Chemical Engineering Departmental Seminar Series,* Tennessee Technological University, Cookeville, Tennessee, September 30, 2008.

97. "Computational Optical Sectioning Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Departmental Seminar Series,* Univ. of Colorado, Boulder, Colorado, March 6, 2007.

98. "Computational Imaging for Light Microscopy," *Invited seminar given at the Joint Biomedical Engineering Program of The Univ. of Memphis & The Univ. of Tennessee, Health Science Center*, Memphis, Tennessee, September 8, 2006.

99. "Computational Imaging for Depth-Varying Fluorescence Microscopy," *Invited seminar given at CDM Optics, Inc.,* Boulder, Colorado, March 17, 2006.

100. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Dept.,* University of Colorado, Boulder, Colorado, March 14, 2006.

101. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Dept.,* Michigan Technological Univ., Houghton, Michigan, February 16, 2006.

102. "Computational Imaging," *Invited seminar given at the Electrical & Comp. Eng. Dept.,* Texas A&M University, College Station, Texas, Nov. 4, 2005.

103. "Computational Imaging for Fluorescence Microscopy," *Invited seminar at Ikonisys, Inc.,* New Haven, Connecticut, July 9, 2004.

104. "Computational Imaging," *Invited seminar given at the Electrical & Comp. Eng. Dept.,* Purdue University*,* West Lafayette, Indianapolis, May 5, 2003.

105. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical and Computer Engineering Department,* University of Cyprus*,* Nicosia, Cyprus, March, 2003.

106. "Phase Estimation Using Rotational Diversity for Differential Interference Contrast Microscopy," *Invited seminar given at the Electrical, Computer, & Systems Engineering Department,* Rensselaer Polytechnic Institute, Troy, New York, February 26, 1998."Computational Microscopy,"*Invited seminar at The Cyprus Institute of Neurology and Genetics,* Nicosia, Cyprus, Oct. 23, 1997."Imaging Models for Transmitted-Light DIC Microscopy", *Invited seminar given at the Center for Light Microscope Imaging and Biotechnology*, Carnegie Mellon University, Pittsburgh, Pennsylvania, July 10, 1996."Comparison of Image Restoration Algorithms," *Invited presentation given at the IBC's Tutorial on Image Restoration for Three-Dimensional Microscopy*, Institute for Biomedical Computing, Washington University, St. Louis, MO, April 26-27, 1996."Regularized Linear Method for Computational Optical-Sectioning Microscopy,"*Invited seminar given at the Center for Light Microscope Imaging and Biotechnology*, Carnegie Mellon University, Pittsburgh, Pennsylvania, April 2, 1992.