

# **EOS Topical Meeting on Diffractive Optics 2017**

Joensuu, Finland  
4-7 September 2017

## **Editors:**

**Tero Setälä  
Frank Wyrowski  
Lasse-Petteri Leppänen**

**Jari Turunen  
Kimmo Saastamoinen**

ISBN: 978-1-5108-4795-8

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2017) by European Optical Society (EOS)  
All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact European Optical Society (EOS)  
at the address below.

European Optical Society (EOS)  
c/o Elina Koistinen  
Länsikatu 15  
FI-80110 Joensuu  
Finland

Phone: 358 50 592 4693  
Fax: 358 13 2637 111

koistinen@myeos.org

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: curran@proceedings.com  
Web: www.proceedings.com

## Contents

<b>Welcome reception on Monday</b>	<b>1</b>
<b>A Journey in the Wonderland of Optics in India. (Plenary)</b>	
<u>L. Hazra</u> (India) . . . . .	1
<b>Session 1: Tuesday 9:10–10:40</b>	<b>3</b>
<b>1. Some recent progress in grating theory. (Invited)</b>	
<u>L. Li</u> (China) . . . . .	3
<b>2. How do we live with effective media?</b>	
<u>H. Ichikawa</u> (Japan) . . . . .	5
<b>3. Super- and subluminal propagation of structured light pulses.</b>	
P. Piksarv, A. Valdmann, H. Valtna-Lukner, and <u>P. Saari</u> (Estonia) . . . . .	7
<b>4. Optical emission in spatially dispersive metamaterials.</b>	
<u>M. Nyman</u> , V. Kivijärvi, A. Shevchenko, and M. Kaivola (Finland) . . . . .	9
<b>Session 2: Tuesday 11:00–12:30</b>	<b>11</b>
<b>5. High-repetition-rate frequency combs. (Invited)</b>	
<u>V. Torres-Company</u> (Sweden) . . . . .	11
<b>6. Physical-optics modeling of waveguide devices for virtual and mixed reality.</b>	
<u>F. Wyrowski</u> and Ch. Hellmann (Germany) . . . . .	12
<b>7. Influence of illumination on Bessel beam propagation.</b>	
<u>H. A. Müller</u> and J. Jahns (Germany) . . . . .	14
<b>8. The optimal sampling point distribution for bandlimited functions with arbitrary band shape.</b>	
<u>B. J. Hoenders</u> (The Netherlands) . . . . .	16
<b>Session 3: Tuesday 14:00–15:20</b>	<b>17</b>
<b>9. Overcoming practical limitations of even order missing gratings and diffractive optical elements to improve diffraction pattern fidelity and contrast in machine vision applications.</b>	
<u>J. Le Meur</u> , B. Fracasso, and K. Heggarty (France) . . . . .	17
<b>10. Laser mirrors based on the fibre facet gratings.</b>	
M. Vanek, J. Vanis, J. Mrazek, I. Barton, and <u>P. Honzatko</u> (Czech Republic) . . . . .	19
<b>11. Modes manipulation within subwavelength metallic gratings.</b>	
P. Li, F. Wang, F. Li, and <u>G. Kang</u> (China) . . . . .	21
<b>12. High mode count rigorous simulation of diffractive optical elements by an iterative solution approach.</b>	
<u>A. Junker</u> and K.-H. Brenner (Germany) . . . . .	23

<b>Session 4: Tuesday 15:40–17:00</b>	<b>25</b>
<b>13. A model-independent noise-robust extension of ptychography.</b> S. Konijnenberg, W. Coene, and P. Urbach (The Netherlands) . . . . .	25
<b>14. Direction cosine space approach to period and alignment measurement for high speed optical metrology of gratings.</b> R. Hornby, C. W. Jones, and D. O’Connor (United Kingdom) . . . . .	27
<b>15. Metasurfaces for tunable directional excitation and wavefront shaping of surface plasmon polaritons.</b> B. Bai and O. You (China) . . . . .	29
<b>16. Fano resonance in nonlinear subwavelength plasmonic structure for multispectral optical switching and bandwidth tuning.</b> S. Paul and M. Ray (India) . . . . .	31
<b>Session 5: Wednesday 9:00–10:10</b>	<b>33</b>
<b>17. High-end e-beam-lithography for advanced optical applications. (Invited)</b> E.-B. Kley and U. D. Zeitner (Germany) . . . . .	33
<b>18. High power polarization shaping utilizing sub-<math>\lambda</math>-grating structures.</b> C. Pruss, C. M. Mateo, O. Schwanke, T. Dietrich, M. Rumpel, M. Abdou Ahmed, T. Graf, and W. Osten (Germany) . . . . .	34
<b>20. Computer-generated Fourier holograms of colored 3D objects.</b> M. A. Golub and M. Parchomovsky (Israel) . . . . .	36
<b>Session 6: Wednesday 10:30–12:00</b>	<b>38</b>
<b>21. Spectroscopic concepts and gratings for lab and field applications. (Invited)</b> R. Brunner, R. Brüning, T. Hönle, M. Kraus, E. Förster, V. Bagusat, and D. Thomae (Germany) . . . . .	38
<b>22. Generating OAM beams with incomplete amplitude CGH.</b> N. A. F. Zambale, G. H. Doblado N. Hermosa (Philippines) . . . . .	39
<b>23. Limits of precision glass molding for diffractive optical elements.</b> K. Prater, J. Dukwen, T. Scharf, H. P. Herzig, S. Plöger, and A. Hermer-schmidt (Switzerland & Germany) . . . . .	41
<b>24. Generation of optimized intensity profile by diffractive elements for high power laser welding applications.</b> Y. Bourgin, R. Kleindienst, F. Nagel, J. P. Bergmann, and S. Sinzinger (Germany) . . . . .	43

<b>Session 7: Thursday 9:00–10:30</b>	<b>45</b>
<b>25. Harnessing surface plasmon polaritons with structured surfaces and structured light. (Invited)</b>	
<u>L. X.-C. Yuan</u> (China) . . . . .	45
<b>26. Ultrafast imaging in time-resolved digital holographic microscopy.</b>	
<u>C.-J. Cheng</u> , <u>L.-C. Lin</u> , and <u>Y.-C. Lin</u> (Taiwan) . . . . .	47
<b>27. Optical design of UV echelle spectrograph for a next generation space mission.</b>	
<u>E. R. Muslimov</u> , <u>S. Vives</u> , <u>E. Hugot</u> , <u>J.-C. Bouret</u> , and <u>M. Ferrari</u> (France & Russia) . . . . .	49
<b>28. Laser holographic projection for full-color augmented reality head-up displays.</b>	
<u>G.-N. Nguyen</u> and <u>R. Sigrist</u> (Germany & France) . . . . .	51
<b>Session 8: Thursday 10:50–12:20</b>	<b>53</b>
<b>29. Fast physical optics by semi-analytical and geometric Fourier transform. (Invited)</b>	
<u>Z. Wang</u> , <u>S. Zhang</u> , <u>Ch. Hellmann</u> , and <u>F. Wyrowski</u> (Germany) . . . . .	53
<b>30. Structured illumination of hollow waveguide arrays using the Talbot self-imaging.</b>	
<u>S. Helfert</u> and <u>J. Jahns</u> (Germany) . . . . .	55
<b>31. Novel gratings of high dispersion and high efficiency.</b>	
<u>N. Ebizuka</u> , <u>T. Okamoto</u> , <u>M. Takeda</u> , <u>T. Hosobata</u> , <u>Y. Yamagata</u> , <u>M. Sasaki</u> , <u>I. Tanaka</u> , <u>T. Hattori</u> , <u>S. Ozaki</u> , and <u>W. Aoki</u> (Japan & USA) . . . . .	57
<b>32. Highly-efficient grating waveguide mirror enabling kW-class intracavity frequency-doubled thin-disk laser.</b>	
<u>T. Dietrich</u> , <u>S. Piehler</u> , <u>M. Rumpel</u> , <u>P. Villeval</u> , <u>D. Lupinski</u> , <u>M. Abdou Ahmed</u> , and <u>T. Graf</u> (Germany & France) . . . . .	59
<b>Session 9: Thursday 13:40–15:00</b>	<b>61</b>
<b>33. Diamond coronagraphs for direct detection of extrasolar planets.</b>	
<u>M. Karlsson</u> , <u>E. Vargas Catálan</u> , <u>P. Piron</u> , <u>E. Huby</u> , <u>B. Carlomagno</u> , <u>A. Jolivet</u> , <u>O. Absil</u> , <u>P. Baudoz</u> , <u>I. Vartiainen</u> , <u>M. Kuittinen</u> , and <u>D. Mawet</u> (Sweden, Belgium, France, Finland & USA) . . . . .	61
<b>34. Wavefront compensation in high-speed single-pixel digital holography.</b>	
<u>H. González</u> , <u>L. Martínez-León</u> , <u>F. Soldevila</u> , <u>P. Clemente</u> , <u>M. Araiza-Esquivel</u> , <u>E. Tajahuerce</u> , and <u>J. Lancis</u> (Spain & Mexico) . . . . .	63
<b>35. Modeling and fabrication of complex 2D gratings by interference lithography.</b>	
<u>M. Bichotte</u> , <u>A. Shcherbakov</u> , <u>J. Ibrahim</u> , <u>T. Kampfe</u> , and <u>Y. Jourlin</u> (France & Russia) . . . . .	65
<b>36. Spatial light modulator used as a diffractive element in shearing interferometry for form characterization of optics.</b>	
<u>J.-H. Hagemann</u> , <u>C. Falldorf</u> , <u>G. Ehret</u> , and <u>R. B. Bergmann</u> (Germany) . . . . .	67

<b>Poster presentations: Tuesday 17:00–20:00</b>	<b>69</b>
<b>1. Optical nanomaterials with designed spatial dispersion.</b>	
V. Kivijärvi, A. Shevchenko, M. Nyman, and M. Kaivola (Finland) . . . . .	69
<b>2. Multiple optical vortex beams.</b>	
J. Jahns, S. Supp, and T. Seiler (Germany) . . . . .	71
<b>3. Axial superposition of Bessel beams with discretized axicons.</b>	
S. Supp and J. Jahns (Germany) . . . . .	73
<b>4. Unequal phase levels in diffractive optical elements.</b>	
E. I. Scarlat, M. Mihăilescu, I. A. Paun, M. Popa, A. Ion, and M. Pelteacu (Romania) . . . . .	75
<b>5. Beam shaping DOE for controlled laser tracking in indoor free-space optical communications.</b>	
J.-B. Lamour, B. Fracasso, K. Heggarty, and E. Daniel (France) . . . . .	77
<b>6. Iterative design of diffractive elements made of lossy materials.</b>	
A. D. Verhoeven, J. Turunen, and F. Wyrowski (Finland & Germany) . . . . .	79
<b>7. Exploiting optical Kerr effect in subwavelength gratings.</b>	
S. Bej, J. Tervo, Y. P. Svirko, and J. Turunen (Finland) . . . . .	81
<b>8. Coherence of bulk generated supercontinuum.</b>	
A. Halder, M. Koivurova, H. Partanen, and J. Turunen (Finland) . . . . .	83
<b>9. Time dependent spectral phase modulation for pulse train coherence control.</b>	
C. Ding, M. Koivurova, A. D. Verhoeven, J. Turunen, T. Setälä, and A. T. Friberg (Finland & China) . . . . .	85
<b>10. Classical ghost-imaging spectral ellipsometer.</b>	
A. Hannonen, A. T. Friberg, and T. Setälä (Finland) . . . . .	87
<b>11. Alternative method for multiple laser beam generation using a 2D spatial light modulator.</b>	
L. E. Ionel and M. Mihăilescu (Romania) . . . . .	89
<b>12. Spectrally resolving digital micromirror based coherence measurement system.</b>	
H. Partanen and J. Turunen (Finland) . . . . .	91
<b>13. Hyperfine structure on cylindrical Fresnel lenses for separated wavelength control steering.</b>	
M. Mihăilescu, E. I. Scarlat, I. A. Paun, A. Craciun, A. Ion, M. Popa, M. Pelteacu, and G. Bostan (Romania) . . . . .	93
<b>14. Measuring the spatial coherence of optical beams with nanoparticles.</b>	
K. Saastamoinen, L.-P. Leppänen, I. Vartiainen, A. T. Friberg, and T. Setälä (Finland) . . . . .	95
<b>15. Large-area pulse compression gratings with high efficiency and high damage threshold.</b>	
T. Dietrich, L. Mueller, M. Rumpel, M. Moeller, L. Gallais, C. Hoenninger, M. Delaigue, M. Abdou Ahmed, and T. Graf (Germany & France) . . . . .	97

<b>16. Sub-micron metallic grating for condensation detection.</b> <u>J. Ibrahim</u> , C. Veillas, I. Verrier, F. Lefèvre, S. Cioulachtjian, M. Al Masri, O. Parriaux, and Y. Jourlin (France) . . . . .	99
<b>17. Dynamic tracking of the focus position in digital holographic microscopy for long-term living cell observation.</b> <u>L.-C. Lin</u> and C.-J. Cheng (Taiwan) . . . . .	101
<b>18. Degree of coherence of unpolarized light beams measured with Michelson's interferometer.</b> <u>L.-P. Leppänen</u> , K. Saastamoinen, A. T. Friberg, and T. Setälä (Finland)	103
<b>19. Static and dynamic elements in paraxial approximation propagation regime.</b> <u>V.-C. Palea</u> , L. Preda, and <u>M. Mihăilescu</u> (Romania) . . . . .	105
<b>20. Multi-wavelength filter in TiO<sub>2</sub> coated SOI platform.</b> <u>S. Paul</u> , T. Saastamoinen, S. Honkanen, M. Roussey, and M. Kuittinen (Finland) . . . . .	107
<b>21. Design and fabrication of a dielectric metasurface based 9 × 9 beam splitter operating at visible wavelength.</b> <u>A. B. M. K. Alam</u> , I. Vartiainen, and M. Kuittinen (Finland) . . . . .	109
<b>22. Femtosecond structured steel mold making for roll-to-roll self-cleaning applications.</b> <u>M. Silvennoinen</u> and P. Vahimaa (Finland) . . . . .	111
<b>23. Progress in 3D printing of freeform lenses for beam shaping.</b> <u>B. G. Assefa</u> , T. Saastamoinen, M. Kuittinen, J. Turunen, and J. Saarinen (Finland) . . . . .	113
<b>24. Control over aggregates of silver particles for Raman signal.</b> <u>S. Daniel</u> , A. Matikainen, T. Nuutinen, P. Vahimaa, and J. Turunen (Finland) . . . . .	115
<b>25. Spectroscopic ellipsometric characterization of thin ALD-TiO<sub>2</sub>-Al<sub>2</sub>O<sub>3</sub> bi-layer films.</b> <u>R. Ali</u> , M. R. Saleem, S. Honkanen, and J. Turunen (Finland & Pakistan)	117
<b>26. Direct measurement of complex-valued mutual coherence function and diffractive imaging.</b> <u>Y. Shao</u> , X. Lu, S. Konijnenberg, C. Zhao, and P. Urbach (The Netherlands & China) . . . . .	119
<b>27. Widely tunable single frequency laser to advance holography research and production.</b> K. Hens, J. Sperling, and <u>D. von Gegerfelt</u> (Germany) . . . . .	121
<b>Author index</b>	<b>122</b>