

# Scientific Publications X-Ray Optics Group past 10 years

Last updated: December 2017

## 2017:

1. M. Lebugle, G. Seniutinas, F. Marschall, V.A. Guzenko, D. Grolimund, and C. David  
*A tunable kinoform X ray beamsplitter*  
Optics Letters **42** (2017) p. 4327-4330
2. B. Rösner, F. Döring, P.R. Riberič, D. Gauthier, E. Principi, C. Masciovecchio, M. Zangrando, J. Vila-Comamala, G. De Nino, and C. David  
*High Resolution Beam Profiling of X-ray Free Electron Laser Radiation by Polymer Imprint Development*  
Optics Express **25** (2017) p. 30686-30695
3. F. Marschall, Z. Yin, J. Rehanek, M. Beye, F. Döring, K. Kubicek, D. Raiser, S. Thekku Veedu, J. Buck, A. Rothkirch, B. Rösner, V.A. Guzenko, J. Viehhaus, C. David, and S. Techert  
*Transmission zone plates as analyzers for efficient RIXS-mapping*  
Scientific Reports **7** (2017) p. 8849-7, DOI: 10.1038/s41598-017-09052-0
4. P.R. Riberič, B. Rösner, D. Gauthier, E. Allaria, F. Döring, L. Foglia, L. Giannessi, N. Mahne, M. Manfredda, C. Masciovecchio, R. Mincigrucci, N. Mirian, E. Principi, E. Roussel, A. Simoncig, S. Spampinati, C. David, G. De Nino  
*Extreme Ultraviolet Vortices from a Free Electron Laser*  
Physical Review X **7** (2017) p. 031036 - 9
5. M. Lebugle, M. Liebi, K. Wakonig, V. A. Guzenko, M. Holler, A. Menzel, M. Guizar-Sicairos, A. Diaz, and C. David  
*High-acceptance versatile microfocus module based on elliptical Fresnel zone plates for small angle X ray scattering*  
Optics Express **25** (2017) p. 21145-21158
6. F. Marschall, D. McNally, V.A. Guzenko, B. Rösner, M. Dantz, X. Lu, L. Nue, V. Strocov, T. Schmitt, and C. David  
*Zone plates as imaging analyzers for resonant inelastic x-ray scattering*  
Optics Express **25** (2017) p. 15624-9, DOI: 10.1364/OE.25.015624
7. I. Greving, M. Ogurreck, F. Marschall, A. Last, F. Wilde, T. Dose, H. Burmester, L. Lottermoser, M. Müller, C. David and F. Beckmann,  
*Nanotomography endstation at the P05 beamline: Status and perspectives*  
IOP Conf. Series: Journal of Physics: Conf. Series **849** (2017) p. 012056
8. M. Buzzi, M. Makita, L. Howald, A. Kleibert, B. Vodungbo, P. Maldonado, J. Raabe, N. Jaouen, H. Redlin, K. Tiedtke, P.M. Oppeneer, C. David, F. Nolting, J. Lüning  
*Single-shot Monitoring of Ultrafast Processes via X-ray Streaking at a Free Electron Laser*  
Scientific Reports **7** (2017) p. 7253, DOI: 10.1038/s41598-017-07069-z
9. N. Opara, S. Arnold, T. Braun, H. Stahlberg, M. Makita, C. David, and C. Padeste,  
*Direct protein crystallization on ultrathin membranes for diffraction measurements at X-ray free electron lasers*  
Journal of Applied Crystallography **50** (2017) p. 909-918, DOI: 10.1107/S1600576717005799
10. P. Roedig, H.M. Ginn, T. Pakendorf, G. Sutton, K. Harlos, T.S. Walter, J. Meyer, P. Fischer, R. Duman, I. Vartiainen, B. Reime, M. Warmer, A. Brewster, I.D. Young, T. Michels-Clark, N. Sauter, M. Sikorsky, S. Nelson, D.S. Damiani, R. Alonso-Mori, J. Ren., E.E. Fry, C. David, D.I. Stuart, A. Wagner, and A. Meents  
*High-speed fixed-target serial virus crystallography*  
Nature Methods **14** (2017) p. 805-813, DOI:10.1038/nmeth.4335
11. G. Seniutinas, A. Balcytis, I. Reklaitis, F. Chen, J. Davis, C. David, and S. Juodkazis  
*Tipping solutions: emerging 3D nano-fabrication/-imaging technologies*  
Nanophotonics **6** (2017) p. 923–941, DOI: 10.1515/nanoph-2017-0008
12. I. Mohacsi, I. Vartiainen, B. Rösner, M. Guizar-Sicairos, V.A. Guzenko, I. McNulty, R. Winarski, M.V. Holt, and C. David  
*Interlaced zone plate optics for practical hard X-ray imaging in the 10 nm range*  
Scientific Reports **7** (2017) p. 43624, DOI: 10.1038/srep43624

13. B. Pedrini, A. Menzel, V.A. Guzenko, C. David, R. Abela, C. Gutt  
*Model-independent particle species disentanglement by solution X-ray cross-correlation scattering*  
Scientific Reports **7** (2017) p. 45618, DOI: 10.1038/srep45618
14. J. Rehanek, M. Makita, P. Wiegand, P. Heimgartner, G. Seniutinas, U. Flechsig, V. Thominet, C. Schneider, A. Rodriguez Fernandez, C. David, L. Patthey and P. Juranić  
*The hard X-ray Photon Single-Shot Spectrometer of SwissFEL – initial characterization*  
Journal of Instrumentation **12** (2017) P05024, DOI:10.1088/1748-0221/12/05/P05024
15. M.-C. Zdora, J. Vila-Comamala, G. Schulz, A. Khimchenko, A. Hipp, A.C. Cook, D. Dilg, C. David, C. Grünzweig, C. Rau, P. Thibault, and I. Zanette  
*X-ray phase microtomography with a single grating for high-throughput investigations of biological tissue*  
Biomedical Optics Express **8** (2017) p. 1257-1270, <https://doi.org/10.1364/BOE.8.001257>
16. F. Marschall, J. Vila-Comamala, V.A. Guzenko, C. David  
*Systematic efficiency study of line-doubled ultra-high resolution zone plates*  
Microelectronic Engineering **177** (2017) p. 25-29
17. M. Makita, P. Karvinen, V.A. Guzenko, P. Vagovic, C. David  
*Diamond diffraction gratings for experiments with intense hard x-rays*  
Microelectronic Engineering **176** (2017) p. 75-78
18. Y. Kayser, C. David, U. Flechsig, J. Krempasky, V. Schlott and R. Abela  
*X-ray grating interferometer for in-situ and at-wavelength wavefront metrology*  
Journal of Synchrotron Radiation **24** (2017) p. 150-162

## 2016:

19. J. Szlachetko, J. Hoszowska, J.-Cl. Dousse, M. Nachtegaal, W. Błachucki, Y. Kayser, J. Sà, M. Messerschmidt, S. Boutet, G.J. Williams, C. David, G. Smolentsev, J.A. van Bokhoven, B.D. Patterson, T.J. Penfold, G. Knopp, M. Pajek, R. Abela, C.J. Milne  
*Establishing nonlinearity thresholds with ultraintense X-ray pulses*  
Scientific Reports **6** (2016) p. 33292
20. C.-S. Lee, Y.-Y. Lee, K.S.L. Chong, L. Wang, C. Dais, F. Clube, H.H. Solak, I. Mohacsi, C. David and R. Bischofberger  
*High-resolution, high-aspect-ratio iridium-nickel composite nanoimprint molds*  
Journal of Vacuum Science and Technology B **34** (2016) p. 061804-5
21. Y. Kayser, C. David, U. Flechsig, J. Krempasky, V. Schlott and R. Abela  
*X-ray grating interferometer for in-situ and at-wavelength wavefront metrology*  
Journal of Synchrotron Radiation **24** (2016) p. 1-13 <https://doi.org/10.1107/S1600577516017562>
22. L. Ahad, I. Vartiainen, T. Setälä, A.T. Friberg, C. David, M. Makita, and J. Turunen  
*On spectral and temporal coherence of X-ray free-electron laser beams*  
Optics Express **24** (2016) p. 13081-13090
23. P. Roedig, R. Duman, J. Sanchez-Weatherby, I. Vartiainen, A. Burkhardt, M. Warmer, C. David, A. Wagner, and A. Meents  
*Room-temperature macromolecular crystallography using a micro-patterned silicon chip with minimal background scattering*  
Journal of Applied Crystallography **49** (2016) p. 968-975
24. J. Vila-Comamala, J. Bosgra, D.S. Eastwood, U. Wagner, A.J. Bodey, M. Garcia-Fernandez, C. David, C. Rau,  
*Transmission x-ray microscopy at Diamond-Manchester I13 Imaging Branchline*  
AIP Conference Proceedings **1696** (2016) p. 020036-4
25. Y. Kayser, S. Rutishauser, T. Katayama, T. Kameshima, H. Ohashi, U. Flechsig, M. Yabashi, and C. David  
*Shot-to-shot diagnostic of the longitudinal photon source position at the SPring-8 Angstrom Compact Free Electron Laser by means of X-ray grating interferometry,*  
Optics Letters **41** (2016) p. 733-736
26. I. Vartiainen, I. Mohacsi, K. Stachnik, M. Guizar-Sicairos, C. David, and A. Meents  
*Zernike X-ray Ptychography*  
Optics Letters **41** (2016) p. 721-724
27. T. Katayama, S. Owada, T. Togashi, K. Ogawa, P. Karvinen, I. Vartiainen, A. Eronen, C. David, T. Sato, K. Nakajima, Y. Joti, H. Yumoto, H. Ohashi, and M. Yabashi

28. I. Mohacsi, I. Vartiainen, M. Guizar-Sicairos, P. Karvinen, V.A. Guzenko, E. Müller, C.M. Kewish, A. Somogyi and C. David  
*Fabrication and characterization of high efficiency double-sided blazed X-ray optics*  
Optics Letters **41** (2016) p. 281-284
  29. K. Gajos, V.A. Guzenko, M. Dubner, J. Haberko, A. Budkowski, and C. Padeste  
*Electron-Beam Lithographic Grafting of Functional Polymer Structures from Fluoropolymer Substrates*  
Langmuir **32** (2016) p. 10641-10650
  30. S. Pfirrmann, A. Voigt, A. Kolander, G. Grützner, O. Lohse, I. Harder, and V.A. Guzenko  
*Towards a novel positive tone resist mr-PosEBR for high resolution electron-beam lithography*  
Microelectronic Engineering **155** (2016) p. 67-73
  31. R. Kirchner, V.A. Guzenko, I. Vartiainen, N. Chidambaram, and H. Schiff  
*ZEP520A-A resist for electron-beam grayscale lithography and thermal reflow*  
Microelectronic Engineering **153** (2016) p. 71-76
  32. S. Pfirrmann, R. Kirchner, O. Lohse, V.A. Guzenko, A. Voigt, I. Harder, A. Kolander, H. Schiff, and G. Grützner  
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Proceedings of the SPIE **9779** (2016) p. 977925 doi: 10.1117/12.2219165
- 2015:**
33. S.V. Roth, R. Döhrmann, R. Gehrke, R. Röhlberger, K. Schlage, E. Metwalli, V. Körstgens, M. Burghammer, C. Riekkel, C. David, and P. Müller-Buschbaum  
*Mapping the morphological changes of deposited gold nanoparticles across an imprinted groove*  
Journal of Applied Crystallography **48** (2015) p. 1-7
  34. P. Trtik, J. Hovind, C. Grünzweig, A. Bollhalder, V. Thominet, C. David, A. Kaestner, and E.H. Lehmann  
*Improving the spatial resolution of neutron imaging at Paul Scherrer Institut – The Neutron Microscope Project*  
Physics Procedia **69** (2015) p. 169–176
  35. M. Makita, P. Karvinen, D. Zhu, P. Juranic, J. Grünert, S. Cartier, J. H. Jungmann-Smith, H.T. Lemke, A. Mozzanica, S. Nelson, L. Patthey, M. Sikorski, S. Song, Y. Feng, and C. David  
*High Resolution Single Shot Spectral Monitoring of Hard X-ray Free Electron Laser Radiation*  
Optica **2** (2015) p. 912-916
  36. K. Stachnik, I. Mohacsi, I. Vartiainen, N. Stuebe, J. Meyer, M. Warmer, C. David, and A. Meents  
*Influence of finite spatial coherence on ptychographic reconstruction*  
Applied Physics Letters **107** (2015) p. 011105 – 5
  37. I. Mohacsi, I. Vartiainen, M. Guizar-Sicairos, P. Karvinen, C. Kewish, A. Somogyi, V.A. Guzenko, E. Müller, E. Färm, M. Ritala, and C. David  
*Double-sided diffractive X-ray optics for hard X-ray microscopy*  
Optics Express **23** (2015) p. 776-786
  38. I. Vartiainen, C. Holzner, I. Mohacsi, P. Karvinen, A. Diaz, and C. David  
*Artifact characterization and reduction in scanning X-ray Zernike phase contrast microscopy*  
Optics Express **23** (2015) p. 13278-13294
  39. P. Roedig, I. Vartiainen, R. Duman, S. Panneerselvam, N. Stuebe, O. Lorbeer, M. Warmer, G. Sutton, D. H. Stuart, E. Weckert, C. David, A. Wagner, and A. Meents  
*A micro-patterned silicon chip as sample holder for macromolecular crystallography experiments with minimal background scattering*  
Scientific Reports **5** (2015) p. 10451
  40. C. David, P. Karvinen, M. Sikorski, I. Vartiainen, S. Song, C.J. Milne, A. Mozzanica, Y. Kayser, A. Diaz, I. Mohacsi, G. Carini, S. Herrmann, E. Färm, M. Ritala, D.M. Fritz, and A. Robert  
*Following the dynamics of matter with femtosecond precision using the X-ray streaking method*  
Scientific Reports **5** (2014) p. 7644
  41. C. Donnelly, M. Guizar-Sicairos, V. Scagnoli, M. Holler, T. Huthwelker, A. Menzel, I. Vartiainen, E. Müller, E. Kirk, S. Gliga, J. Raabe, L.J. Heyderman,  
*Element-Specific X-Ray Phase Tomography of 3D Structures at the Nanoscale*  
Physical Review Letters **114** (2015) p. 115501

42. G. Fülöp, F. Dominguez, S. d'Hollosy, A. Baumgartner, P. Makk, M.H. Madsen, V.A. Guzenko, J. Nygard, C. Schönenberger, A.L. Yeyati, and S. Csonka  
*Magnetic Field Tuning and Quantum Interference in a Cooper Pair Splitter*  
Physical Review Letters **115** (2015) p. 227003
43. S. d'Hollosy, M. Jung, A. Baumgartner, V.A. Guzenko, M.H. Madsen, J. Nygard, C. Schönenberger  
*Gigahertz Quantized Charge Pumping in Bottom-Gate-Defined In As Nanowire Quantum Dots*  
Nano Letters **15** (2015) p. 4585-4590
44. R. Kirchner, V.A. Guzenko, M. Rohn, E. Sonntag, M. Mühlberger, I. Bergmair, H. Schift  
*Bio-inspired 3D funnel structures made by grayscale electron-beam patterning and selective topography equilibration*  
Microelectronic Engineering **141** (2015) p. 107-111
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46. P. Das Kanungo, P. Helfenstein, V.A. Guzenko, C. Lee, M. Paraliev, S. Tsujino  
*Electron beam collimation from an all-metal double-gate 40 000 nanotip array: Improved emission current and beam uniformity upon neon gas conditioning*  
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47. C. Lee, P. Das Kanungo, V.A. Guzenko, P. Helfenstein, R.J.D. Miller, S. Tsujino  
*Field emission beam characteristics of single metal nanotip cathodes with on-chip collimation gate electrode*  
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48. K. Bedner, V.A. Guzenko, A. Tarasov, M. Wipf, R.L. Stoop, S. Rigante, J. Brunner, W. Fu, C. David, M. Calame, J. Gobrecht and C. Schönenberger  
*Investigation of the dominant 1/f Noise Source in Silicon Nanowire Sensors*  
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49. S.S. Sarkar, H.H. Solak, C. David, J.F. van der Veen  
*Pinhole diffraction holography for fabrication of high-resolution Fresnel Zone Plates*  
Optics Express **22** (2014) p. 1402-1412
50. J. Szlachetko, C.J. Milne, J. Hoszowska, J.-Cl. Dousse, W. Blachucki, J. Sà, Y. Kayser, M. Messerschmidt, R. Abela, S. Boutet, C. David, G. Williams, M. Pajek, B. Patterson, G. Smolentsev, J.A. van Bokhoven, and M. Nachttegaal  
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Structural Dynamics **1** (2014) p. 021101-8
51. I. Vartiainen, R. Mokso, M. Stampanoni, and C. David  
*Halo suppression in full field X-ray Zernike phase contrast Microscopy*  
Optics Letters **39** (2014) p. 1601-1604
52. I. Mohacs, P. Karvinen, I. Vartiainen, V.A. Guzenko, A. Somogyi, C. Kewish, P. Mercere and C. David  
*High efficiency X-ray nanofocusing by multilevel zone plates*  
Journal of Synchrotron Radiation **21** (2014) p. 497-501
53. Y. Kayser, S. Rutishauser, T. Katayama, T. Kameshima, H. Ohashi, U. Flechsig, M. Yabashi, and C. David  
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54. I. Vartiainen, M. Warmer, D. Goeries, E. Herker, R. Reimer, C. David and A. Meents  
*X-ray Zernike phase contrast imaging of biological samples with tender X-rays at 50 nm resolution*  
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55. T. Thüning, M. Abis, Z. Wang, C. David, M. Stampanoni,  
*X-ray phase-contrast imaging at 100 keV on a conventional source*  
Scientific Reports **4** (2014) p. 5198, doi:10.1038/srep05198
56. P. Karvinen, C. Borca, M. Willmann, B. Meyer, M. Birri, D. Grolimund, J. Patommel, G. Wellenreuther, G. Falkenberg, M. Guizar-Sicairos, A. Menzel and C. David  
*Kinoform diffractive lenses for efficient nano-focusing of hard X-rays*  
Optics Express **22** (2014) p. 16676-16685

57. P. Modregger, M. Kagias, S. Peter, V.A. Guzenko, C. David, and M. Stampanoni  
*Multiple scattering tomography*  
Physical Review Letters **113** (2014) p. 020801- 5
58. T. Zhou, U. Lundström, T. Thüning, S. Rutishauser, D.H. Larsson, M. Stampanoni, C. David, H.M. Hertz, and A. Burvall  
*Comparison of propagation- and grating-based x-ray phase-contrast imaging techniques with a liquid-metal-jet source*  
Proceedings of the SPIE **9033** (2014) p. 903353 doi: 10.1117/12.2043417
59. P. Modregger, S. Rutishauser, J. Meiser, C. David, and M. Stampanoni  
*Two-dimensional ultra-small angle X-ray scattering with grating interferometry*  
Applied Physics Letters **105** (2014) p. 024102-4
60. M. Guizar-Sicairos, I. Johnson, A. Diaz, M. Holler, P. Karvinen, H.C. Stadler, R. Dinapoli, O. Bunk, A. Menzel,  
*High-throughput ptychography using Eiger: scanning X-ray nano-imaging of extended regions*  
Optics Express **22** (2014) p. 14859-14870
61. M. Holler, A. Diaz, M. Guizar-Sicairos, P. Karvinen, E. Färm, E. Harkonen, M. Ritala, A. Menzel, J. Raabe, O. Bunk,  
*X-ray ptychographic computed tomography at 16 nm isotropic 3D resolution*  
Scientific Reports **4** (2014) p. 3857
62. V.A. Guzenko, B. Pedrini, A. Menzel, C. David  
*Fabrication of nanoparticles with 3D shape control for X-ray scattering experiments*  
Microelectronic Engineering **121** (2014) p. 127-130
63. S. Lang, I. Zanette, M. Dominiotto, M. Langer, A. Rack, G. Schulz, G. Le Duc, C. David, J. Mohr, F. Pfeiffer, B. Müller, T. Weitkamp  
*Comparing spatial and density resolution of grating- and propagation-based X-ray tomography of soft tissues*  
Journal of Applied Physics **116** (2014) p. 154903-12
64. G. Lovric, P. Oberta, I. Mohacsi, M. Stampanoni, R. Mokso,  
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Optics Express **22** (2014) p. 2745-2760
65. G. Fülöp, S. d'Hollosy, A. Baumgartner, P. Makk, V.A. Guzenko, M.H. Madsen, J. Nygard, C. Schönenberger, S. Csonka  
*Local electrical tuning of the nonlocal signals in a Cooper pair splitter*  
Physical Review B **90** (2014) p. 235412
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Nanotechnology **25** (2014) p. 085203

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*Fabrication of two-dimensional hard X-ray diffraction gratings*  
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68. T.H. Jensen, M. Bech, T. Binderup, A. Böttiger, C. David, T. Weitkamp, I. Zanette, F. Rank, R. Feidenhans'l, A. Kjær, L. Højgaard, F. Pfeiffer  
*Imaging of Metastatic Lymph Nodes by X-ray Phase Contrast Tomography*  
PLOS ONE **8** (2013) p. e54047
69. S. Rutishauser, A. Rack, T. Weitkamp, Y. Kayser, C. David and A.T. Macrander  
*Heat bump on a monochromator crystal measured with X-ray grating interferometry*  
Journal of Synchrotron Radiation **20** (2013) p. 300 - 305
70. E. Lima, A. Diaz, M. Guizar-Sicairos, S. Gorelick, P. Pernot, T. Schleier, A. Menzel,  
*Cryo-scanning x-ray diffraction microscopy of frozen-hydrated yeast*  
Journal of Microscopy **249** (2013) p. 1-7
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*X-ray wavefront characterization of a Fresnel zone plate using a two dimensional grating interferometer*  
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Nuclear Instruments in Physics A **710** (2013) p. 101–105
73. B. Pedrini, A. Menzel, M. Guizar-Sicairos, V.A. Guzenko, S. Gorelick, C. David, B.D. Patterson, and R. Abela  
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*Angular spectrum simulation of X-ray focusing by Fresnel zone plates*  
Journal of Synchrotron Radiation **20** (2013) p. 397–404
75. T. Thüring, S. Hämmerle, S. Weiss, J. Nüesch, J. Meiser, J. Mohr, C. David, M. Stampanoni  
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Proceedings of the SPIE - The International Society for Optical Engineering **8668** (2013) p. 866813-1
76. T. Thüring, R. Guggenberger, H. Alkadhi, J. Hodler, M. Vich, Z. Wang, C. David, M. Stampanoni  
*Human hand radiography using X-ray differential phase contrast combined with dark-field imaging*  
Skeletal Radiology **42** (2013) p. 827-835
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