

List of Publications

Prof. Dr. Christian Gutt

November 7, 2025

preprints / submitted

- **Probing laser-driven surface and subsurface dynamics via grazing incidence XFEL scattering and diffraction**
L. Randolph *et al.*, submitted, arXiv:2509.12015
- **Five-stage gelation dynamics in thermally driven egg yolk granule suspensions**
N. D. Anthuparambil *et al.*, submitted
- **Depletion induced intermediate-range order modulates nanoscale protein diffusion in polymer crowders**
M. Dargasz *et al.*, submitted, arXiv:2509.04087
- **Probing ultrafast heating and ionization dynamics in solid density plasmas with time-resolved resonant X-ray emission spectroscopy**
L. Huang *et al.*, submitted
- **Ultrafast evolution of reversible Pre-LIPSS states in a non-destructive regime**
D. Ksenzov *et al.*, submitted
- **Microscopic dynamics of dark chocolate revealed by coherent X-ray scattering**
N. Begam *et al.*, submitted
- **Long-range hydrodynamic interactions and particle softness affect the diffusion of lipoproteins under crowded conditions**
N. D. Anthuparambil *et al.*, submitted, arXiv:2505.22520
- **Pipeline for MHz-XPCS on soft matter samples at the MID instrument of the European XFEL**
A. Leonau *et al.*, submitted, arXiv:2506.08668
- **Resonant self-diffraction of femtosecond extreme ultraviolet pulses in cobalt**
A. A. Maznev *et al.*, submitted, arXiv:2505.07168
- **3D evolution of protein networks and lipid globules in heat-treated egg yolk**
F. Wittwer, N. D. Anthuparambil, F. Unger, R. Gauam, S. Flenner, I. Greving, C. Gutt, P. Modregger, submitted, arXiv:2504.06032

2025

- 120. **Broadband surface phonon spectroscopy by time-domain extreme ultraviolet diffuse scattering**
F. Capotondi *et al.*, Phys. Rev. Lett. (in print)
- 119. **Coherent X-rays reveal anomalous molecular diffusion and cage effects in crowded protein solutions**
A. Girelli *et al.*, Nature Communications (in print)
- 118. **Measurement of turbulent velocity and bounds for thermal diffusivity in laser shock compressed foams by X-ray photon correlation spectroscopy**
C. Heaton *et al.*, Phys. Rev. E 112, 045218 (2025)
- 117. **Demonstration of diagnosing spatio-temporal dynamics of solid density plasmas using a free-electron laser**
L. Huang *et al.*, Matter and Radiation at Extremes 11, 017201 (2025)
- 116. **Ultrafast dynamics of chiral spin spirals in synthetic antiferromagnets**
Z. Guo *et al.*, Phys. Rev. B 112, L020408 (2025), see also Physics Viewpoint
- 115. **FAIR data – The Photon and Neutron Communities move together towards open science**
B. Murphy *et al.*, IUCrJ 12, 8 (2025)
- 114. **Speckle contrast from the split-and-delay unit with seeded X-ray pulses of the MID instrument at European XFEL**
C. Goy *et al.*, J. Phys.: Conf. Ser. 3010, 012173 (2025)
- 113. **DAPHNE4NFDI – improving research data management at synchrotron radiation facilities**
L. Amelung *et al.*, J. Phys.: Conf. Ser. 3010, 012133 (2025)
- 112. **A 250 Hz fast X-ray shutter with flexible sampling schemes for Bio-XPCS experiments at beamline P10, PETRA III**
N. D. Anthuparambil, M. Kowalski, S. Timmermann, F. Westermeier, D. Weschke, M. Ziolkowski, S. Heidbrink, M. Dargasz, M. Paulus, M. Sprung, C. Gutt, J. Phys.: Conf. Ser. 3010, 012095 (2025)

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- 111. **Salt induced slowdown of kinetics and dynamics during thermal gelation of egg-yolk**
N. D. Anthuparambil, S. Timmermann, M. Dargasz, S. Retzbach, M. D. Senft, N. Begam, A. Ragulskaia, M. Paulus, F. Zhang, F. Westermeier, M. Sprung, F. Schreiber, C. Gutt, J. Chem. Phys. 161, 055102 (2024)
- 110. **Visualizing ultrafast kinetic instabilities in laser-driven solids using X-ray scattering**
P. Ordyna *et al.*, Communications Physics 7, 296 (2024)

109. **Excitation and detection of coherent nanoscale spin waves via extreme ultra-violet transient gratings**
P. Miedaner *et al.*, Science Advances 10, eadp6015 (2024)
108. **(Sub-)picosecond surface correlations of femtosecond laser excited Al-coated multilayers observed by grazing-incidence X-ray scattering**
L. Randolph *et al.*, Nanomaterials 14, 1050 (2024)
107. **Application of machine learning in the grain related clustering of Laue spots in a polycrystalline energy dispersive Laue pattern**
A. Tosson, M. Shokr, M. Humaida, E. Mikayelyan, C. Gutt, U. Pietsch, Int. J. Artificial Intelligence and Soft Computing (in print)
106. **Dynamic Metadata Schemes in Neutron and Photon Science Communities: A case study of X-ray photon correlation spectroscopy**
A. Tosson, M. Reza, C. Gutt, Int. J. Computer and Information Engineering 18, 276 (2024)
105. **On the analysis of two-time correlation functions: equilibrium vs non-equilibrium systems**
A. Ragulskaya, V. Starotsin, F. Zhang, C. Gutt, F. Schreiber, J. Appl. Cryst. 1, 57 (2024)

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104. **Exploring non-equilibrium processes and spatio-temporal scaling laws in heated egg yolk using coherent X-rays**
N. D. Anthuparambil, A. Girelli, S. Timmermann, M. Kowalski, M. Akhundzadeh, S. Retzbach, M. D. Senft, M. Dargasz, D. Gutmüller, A. Hieremath, M. Moron, Ö. Öztürk, H. F. Poggemann, A. Ragulskaya, N. Begam, A. Tosson, M. Paulus, F. Westermeier, F. Zhang, M. Sprung, F. Schreiber, C. Gutt, *Nature Communications* 15, 5580 (2023)
103. **Probing the dynamics of solid density micro-wire targets after ultra-intense laser irradiation using a free-electron laser**
T. Kluge, M. Bussmann, E. Galtier, S. Glenzer, J. Grenzer, C. Gutt, N. Hartley, L. Huang, A. Laso Garcia, H. J. Lee, E. McBride, J. Metzges-Ng, M. Nakatsutsumi, I. Nam, A. Pelka, I. Prencipe, L. Randolph, M. Rehwald, C. Rödel, M. Rödel, T. Toncian, L. Yang, U. Schramm, T. Cowan, *New Journal of Physics* (2023)
102. **X-ray driven and intrinsic dynamics in protein gels**
S. Timmermann, N. D. Anthuparambil, A. Girelli, N. Begam, M. Kowalski, S. Retzbach, M. D. Senft, M. S. Akhundzadeh, H. F. Poggemann, M. Moron, A. Hieremath, D. Gutmüller, M. Dargasz, Ö. Öztürk, M. Paulus, F. Westermeier, M. Sprung, A. Ragulskaya, F. Zhang, F. Schreiber, C. Gutt, *Scientific Reports* 13, 11048 (2023)
101. **Nanocrystallites modulate intermolecular interactions in cryoprotected protein solutions**
M. Filianina, M. Bin, S. Berkowicz, M. Reiser, H. Li, S. Timmermann, M. Blankenburg, K. Amann-Winkel, C. Gutt, F. Perakis, *J. Phys. Chem. B* 127, 6197 (2023)

100. **DAPHNE4NFDI – the NFDI consortium for the synchrotron and neutron research community**
A. Barty, C. Gutt, W. Lohstroh, B. Murphy, A. Schneidewind, J.-D. Grunwaldt, F. Schreiber, S. Busch, U. Tobias, M. Bussmann, H. Fangohr, H. Gözig, A. Houben, T. Kluge, M. Ingo, D. Lützenkirchen-Hecht, T. Schneider, F. Weber, B. Giovanni, O. Einsle, C. Felder, E. Herzig, U. Konrad, H. Markötter, K. Rossnagel, T. Sheppard, D. Turchinovich, *Zenodo*, doi:10.5281/zenodo.8040606
99. **Coherent X-ray scattering reveals nanoscale fluctuations in hydrated proteins**
M. Bin, M. Reiser, M. Filianina, S. Berkowicz, S. Das, S. Timmermann, W. Roseker, R. Bauer, J. Öström, A. Karina, K. Amann-Winkel, M. L. Parada, F. Westermeier, M. Sprung, J. Möller, F. Lehmkuhler, C. Gutt, F. Perakis, *J. Phys. Chem. B* 127, 4299 (2023)
98. **Effects of temperature and ionic strength on the microscopic structure and dynamics of egg white gels**
N. Begam, S. Timmermann, A. Ragulska, A. Girelli, M. Senft, S. Retzbach, N. D. Anthuparambil, M. Akhundzadeh, M. Kowalski, M. Reiser, F. Westermeier, M. Sprung, F. Zhang, C. Gutt, F. Schreiber, *J. Chem. Phys.* 158, 074903 (2023)

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97. **Amortized Bayesian Inference of GISAXS Data with Normalizing Flows**
M. Zhadanov, L. Randolph, T. Kluge, M. Nakatsutsumi, C. Gutt, M. Ganeva, N. Hoffmann, *Machine Learning and the Physical Sciences @ NeurIPS 2022*
96. **MHz-Rate Ultrafast X-ray scattering and holographic imaging at the European XFEL**
N. Z. Hagström *et al.*, *J. Synchrotron Radiation* 29, 1454 (2022)
95. **Photo-controlled dynamics and transport in entangled wormlike micellar nanocomposites studied by XPCS**
M. Reiser, J. Hallmann, J. Möller, K. Kazarian, D. Orsi, L. Randolph, H. Rahmann, F. Westermeier, E. Stellamanns, M. Sprung, F. Zontone, L. Cristofolini, C. Gutt, A. Madsen, *Macromolecules* 55, 8757 (2022)
94. **Resolving molecular diffusion and aggregation of antibody proteins with megahertz X-ray free-electron laser pulses**
M. Reiser, A. Girelli, A. Ragulska, S. Das, S. Berkowicz, M. Bin, M. Ladd-Parada, M. Filianina, H.-F. Poggemann, N. Begam, M. S. Akhundzadeh, S. Timmermann, L. Randolph, Y. Chushkin, T. Seydel, U. Boesenberg, J. Hallmann, J. Möller, A. Rodrigues-Fernandez, R. Rosca, R. Schaffer, M. Scholz, R. Shayduk, A. Zozulya, A. Madsen, F. Schreiber, F. Zhang, F. Perakis, C. Gutt, *Nature Communications* 13, 5528 (2022)
93. **Nanoscale subsurface dynamics of solids upon high-intensity femtosecond laser irradiation observed by grazing-incidence X-ray scattering**
L. Randolph, M. Banjafar, F. Schon, T. R. Preston, T. Yabuuchi, E. Bambrink, N. Dover, G. Jakob, M. Paulus, M. Makita, Y. Inubushi, J. Kaa, A. Kon, J. Koga, D. Ksenzov, S. Göde, T. Matsuoka, M. Nishiuchi, K. Sueda, Y. Sentoku, T. Togashi, M. Vafae-Khanjani,

M. Kläui, M. Bussmann, T. E. Cowan, A. P. Mancuso, C. Fortmann-Grote, T. Kluge, C. Gutt, M. Nakatsutsumi, *Rev. Res.* 4, 033038 (2022)

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91. **Using low dose X-ray speckle visibility spectroscopy to study dynamics of soft matter samples**

J. Möller, M. Reiser, J. Hallmann, U. Boesenberg, A. Zozulya, A. Becker, F. Westermeier, T. Zinn, T. Narayanan, C. Gutt, A. Madsen, *New J. Phys.* 23 093041 (2021)

90. **Interplay between kinetics and dynamics of liquid–liquid phase separation in a protein solution revealed by coherent X-ray spectroscopy**

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89. **Nanoscale transient magnetization gratings excited and probed by femtosecond extreme ultraviolet pulses**

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88. **Microscopic dynamics underlying arrested phase separation of a model protein solution revealed by XPCS**

A. Girelli, H. Rahmann, N. Begam, A. Ragulskaya, M. Reiser, S. Chandran, F. Westermeier, M. Sprung, F. Zhang, C. Gutt, F. Schreiber, *Phys. Rev. Lett.* 126 138004 (2021)

87. **Kinetics of network formation and heterogeneous dynamics of an egg-white gel revealed by coherent scattering**

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86. **Chiral versus collinear magnetic order dynamics: faster chiral recovery after optical excitation revealed by femtosecond XUV scattering**

N. Kerber, D. Ksenzov, F. Freimuth, F. Capotondi, E. Pedersoli, I. L. Quintas, B. Seng, J. Cramer, K. Litzius, D. Lacour, H. Zabel, Y. Mokrousov, M. Kläui, C. Gutt, *Nature Communications* 11 6304 (2020)

85. **Slowing down of dynamics and orientational order preceding crystallisation in hard-sphere systems**
F. Lehmkuhler, B. Hankiewicz, M. A. Schroer, L. Müller, B. Ruta, D. Sheyfer, M. Sprung, K. Tono, T. Katayama, M. Yabashi, T. Ishikawa, C. Gutt, G. Grübel, *Science Advances* 6 (43) eabc5916 (2020)
84. **Towards molecular movies with X-ray photon correlation spectroscopy**
F. Perakis, C. Gutt, *Phys. Chem. Chem. Phys.* 22 19443 (2020)
83. **Wave vector dependence of the dynamics in supercooled metallic liquids**
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82. **Intermittent dynamics of an antiferromagnetic phase in inhomogeneous $K_xFe_{2-y}Se_2$ superconductor**
A. Ricci, G. Campi, B. Joseph, N. Poccia, D. Innocenti, C. Gutt, M. Tanaka, H. Takeya, Y. Takano, T. Mizokawa, M. Sprung, N. Saini, *Phys. Rev. B* 101 020508 (R) (2020)

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81. **Berlin Declaration on NFDI Cross-Cutting Topics**
F. O. Glöckner, M. Diepenbroek, J. Felden, J. Overmann, A. Bonn, B. Gemeinholzer, A. Güntsch, B. König-Ries, B. Seeger, A. Pollex-Krüger, J. Fluck, I. Pigeot, T. Kirsten, T. Mühlhaus, C. Wolf, U. Heinrich, C. Steinbeck, O. Koepler, O. Stegle, J. Weimann, T. Schörner-Sadenius, C. Gutt, F. Stahl, K. Wagemann, T. Schrade, R. Schmitt, C. Eberl, F. Gauterin, M. Schultz, L. Bernard, doi:10.5281/zenodo.3457213
80. **X-ray photon correlation spectroscopy of protein dynamics at nearly diffraction-limited storage rings**
J. Möller, M. Sprung, A. Madsen, C. Gutt, *IUCrJ* 6, 794 (2019)
79. **Implications of disturbed photon counting statistics of Eiger detectors on X-ray speckle visibility experiments**
J. Möller, M. Reiser, J. Hallmann, U. Boesenberg, A. Zozulya, H. Rahmann, A.-L. Becker, F. Westermeier, T. Zinn, F. Zontone, C. Gutt, A. Madsen, *J. Synchrotron Radiat.* 26, 1705 (2019)
78. **Challenges and Opportunities of Digital Transformation in Fundamental Research on Universe and Matter**
M. Erdmann, C. Gutt, A. Haungs, K. Hradil, T. Kuhr, M. Kunze, A.-S. Müller, G. Quast, M. Steinmetz, Recommendations of the ErUM Committees, printed by DESY PT

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77. **Observation of ultrafast solid-density plasma dynamics using femtosecond X-ray pulses from a free-electron laser**
T. Kluge, C. Rödel, M. Rödel, A. Pelka, E. E. McBride, L. B. Fletcher, M. Harmand, A. Krygier, A. Higginbotham, M. Bussmann, E. Galtier, E. Gamboa, A. L. Garcia, M.

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S. Gorfman, A. Bokov, A. Davtyan, M. Reiser, Y. Xie, Y. Ye, A. Zozulya, M. Sprung, U. Pietsch, C. Gutt, *Proc. Natl. Acad. Sci. USA (PNAS)* 115 (29), 6680 (2018)
75. **Low dose X-ray speckle visibility spectroscopy reveals nanoscale dynamics in radiation sensitive samples**
J. Verwohlt, M. Reiser, L. Randolph, A. Matic, A. Medina, M. Sprung, A. Zozulya, A. Madsen, C. Gutt, *Phys. Rev. Lett.* 120, 168001 (2018)
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74. **Measurements of ultrafast spin-profiles and spin-diffusion properties in the domain wall area at a metal/ferromagnetic film interface**
T. Sant, D. Ksenzov, F. Capotondi, E. Pedersoli, M. Manfredda, M. Kiskinova, H. Zabel, M. Kläui, J. Lüning, U. Pietsch, C. Gutt, *Scientific Reports* 7, 15064 (2017)
73. **Nanometer-scale characterization of laser-driven compression, shocks and phase transitions by X-ray scattering using free-electron lasers**
T. Kluge, C. Rödel, M. Rödel, A. Pelka, E. McBride, L. B. Fletcher, M. Bussmann, E. Galtier, E. Gamboa, A. L. Garcia, M. Garten, S. H. Glenzer, C. Gutt, H. J. Lee, B. Nagler, W. Schumaker, M. Zacharias, U. Schramm, T. E. Cowan, *Phys. Plasmas* 24, 102709 (2017)
72. **Probing ultrafast changes of a vertical spin density profile with resonant XUV magnetic reflectivity at the free-electron laser FERMI**
C. Gutt *et al.*, *Struct. Dyn.* 4, 055101 (2017)
71. **Model independent particle species disentanglement by X-ray cross-correlation analysis**
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70. **Indirect excitation of ultrafast demagnetization**
B. Vodungbo *et al.*, *Sci. Rep.* 6, 18970 (2016)
69. **Colloidal Crystallite Suspensions Studied by High Pressure Small Angle X-ray Scattering**
M. A. Schroer, F. Westermeier, F. Lehmkuhler, H. Conrad, A. Schavkan, A. Zozulya, B. Fischer, W. Roseker, M. Sprung, C. Gutt, G. Grübel, *J. Chem. Phys.* 144, 084903 (2016)
68. **Nanoscale femtosecond imaging of transient hot solid density plasma with elemental and charge state sensitivity using resonant coherent diffraction**
T. Kluge, M. Bussmann, H.-K. Chung, C. Gutt, L. G. Huang, M. Zacharias, U. Schramm, T. Cowan, *Phys. Plasmas* 23, 033103 (2016)

67. **Sequential Single Shot X-ray Photon Correlation Spectroscopy at the SACLA Free Electron Laser**
F. Lehmkuhler *et al.*, *Sci. Rep.* 5, 17193 (2015)
66. **Correlated heterogeneous dynamics in glass-forming polymers**
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65. **X-ray photon correlation spectroscopy**
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64. **Nano-beam X-ray microscopy of dried colloidal films**
M. A. Schroer, C. Gutt, F. Lehmkuhler, B. Fischer, I. Steinke, F. Westermeier, M. Sprung, G. Grübel, *Soft Matter* 11, 5465 (2015)

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63. **Resolving high-speed colloidal dynamics beyond detector response time via two pulse speckle contrast correlation**
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62. **Demonstration of feasibility of X-ray free electron laser studies of dynamics of nanoparticles in entangled polymer melts**
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61. **Characteristics of angular cross correlations studied by light scattering from two-dimensional microsphere films**
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60. **Local Orientational Structure of P3HT conjugated network investigated by X-ray nanodiffraction**
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58. **Single Shot Coherence Properties of the Free-Electron Laser SACLA in the Hard X-ray Regime**
F. Lehmkuhler *et al.*, *Sci. Rep.* 4, 5234 (2014)
57. **Using X-ray free-electron lasers for probing complex interaction dynamics of ultraintense lasers with solid matter**
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56. **Ultrafast Dynamics of Magnetic Domain Structures Probed by Coherent Free-Electron Laser Light**
L. Müller *et al.*, *Synchrotron Radiation News* 26, 27 (2013)
55. **Single shot speckle and coherence analysis of the hard X-ray free-electron laser LCLS**
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51. **High Contrast X-ray Speckle from Atomic-Scale Order in Liquids and Glasses**
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50. **Ultrafast optical demagnetization manipulates nanoscale spin structure in domain walls**
B. Pfau *et al.*, *Nature Commun.* 3, 1100 (2012)
49. **Femtosecond single-shot imaging of nanoscale ferromagnetic order in Co/Pd multilayers using resonant X-ray holography**
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48. **Single shot spatial and temporal coherence properties of the LCLS in the hard X-ray regime**
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45. **Slow aging dynamics and avalanches in a gold–cadmium alloy investigated by X-ray photon correlation spectroscopy**
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44. **Domain size in systems with canted magnetization**
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41. **System-level simulation of an X-ray imager with non-linear gain and per-pixel digitizer: XPCS case study**
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40. **Single-pulse resonant magnetic scattering using a soft X-ray free-electron laser**
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39. **Overcoming the field of view restrictions in soft X-ray holographic imaging**
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38. **Coherent imaging of biological samples with femtosecond pulses at FLASH**
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37. **Hydrate formation at the methane/water interface on the molecular scale**
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35. **Dynamics at the liquid–vapor interface of a supercooled organic glass former**
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