

## I. Research with Free-Electron Lasers

### Research Articles:

- 137 V. Lipp, V. Tkachenko, I. Inoue, P. Heimann, A. Ryzhkova, A. Bashandi, B. Ziaja, "Exploring x-ray irradiation conditions for triggering ultrafast diamond graphitization", Phys. Rev. B 111(2), 024103 (2025).
- 136 L. Mercadier, A. Benediktovitch, S. Krušič, J.J. Kas, J. Schlappa, M. Agåker, R. Carley, G. Fazio, N. Gerasimova, Y.Y. Kim, L. Le Guyader, G. Mercurio, S. Parchenko, J.J. Rehr, J.-E. Rubensson, S. Serkez, M. Stransky, M. Teichmann, Z. Yin, M. Žitnik, A. Scherz, B. Ziaja, N. Rohringer, "Transient absorption of warm dense matter created by an X-ray free-electron laser", Nat. Phys. 20(10), 1564 - 1569 (2024).
- 135 M. Stransky, J. E. Z. Jurek, R. Santra, R. Bean, B. Ziaja, A. Mancuso, "Computational study of diffraction image formation from XFEL irradiated single ribosome molecule", Sci. Rep. 14, 10617 (2024).
- 134 M. Stransky, T. Lane, A. Gorel, S. Boutet, I. Schlichting, A. Mancuso, Z. Jurek, B. Ziaja, "Ionization by XFEL radiation produces distinct structure in liquid water", Commun. Phys. 7(1), 281 (2024)
- 133 I. Inoue, V. Tkachenko, Y. Kubota, F. Dorchies, T. Hara, H. Höppner, Y. Inubushi, K. J. Kapcia, H.J. Lee, V. Lipp, P. Martinez, E. Nishibori, T. Osaka, S. Toleikis, J. Yamada, M. Yabashi, B. Ziaja, P. A. Heimann, "Interplay of thermal and nonthermal effects in x-ray-induced ultrafast melting", Phys. Rev. B 110(10), L100102 (2024).
- 132 I. Inoue, B. Ziaja, "Perspective for in-volume machining of solid materials by undersurface focusing of x-ray pulses", J. Phys. B 57(19), 192501 (2024) .
- 131 K. A. Kapcia, V. Tkachenko, F. Capotondi, A. Lichtenstein, S. Molodtsov, P. Piekarz, B. Ziaja, "Ultrafast demagnetization in bulk nickel induced by X-ray photons tuned to Ni M3 and L3 absorption edges", Sci. Rep. 14(1), 473 (2024).
- 130 B. Ziaja, M. Stransky, K. J. Kapcia, I. Inoue, "Modeling femtosecond reduction of atomic scattering factors in X-ray excited silicon with Boltzmann kinetic equations", Atoms 11(12), 154 (2023) .
- 129 P. Heimann et al. (BZ), "Non-thermal structural transformation of diamond driven by x-rays", Struct. Dyn. 10(5), 054502 (2023).

- 128** I. Inoue et al. (BZ), *"Femtosecond Reduction of Atomic Scattering Factors Triggered by Intense X-Ray Pulse"*,  
Phys. Rev. Lett. 131(16), 163201 (2023).
- 127** J. E. M. Stransky, Z. Shen, Z. Jurek, C. Fortmann-Grote, R. Bean, R. Santra, B Ziaja, A. Mancuso, *"Water layer and radiation damage effects on the orientation recovery of proteins in single-particle imaging at an X-ray free-electron laser"*,  
Sci. Rep. 13(1), 16359 (2023).
- 126** V. Lipp, J. Grünert, J. Liu, B. Ziaja, *"Picosecond to microsecond dynamics of X-ray irradiated materials at MHz pulse repetition rate"*,  
Sci. Rep. 13(1), 16344 (2023).
- 125** V. Lipp, I. Inoue, B. Ziaja, *"Advantages of Using Hard X-ray Photons for Ultrafast Diffraction Measurements"*,  
Photonics 10(8), 948 (2023).
- 124** K. J. Kapcia, V. Lipp, V. Tkachenko, B. Ziaja, *"Theoretical analysis of X-Ray Free-Electron-Laser Experimental Data Using Monte-Carlo and Molecular-Dynamics Based Computational Tools"*, In book: Reference Module in Chemistry, Molecular Sciences and Chemical Engineering, Elsevier 2023 ISBN 9780124095472, <https://doi.org/10.1016/B978-0-12-821978-2.00110-0>.
- 123** B. Ziaja, J.J. Bekx, M. Masek, N. Medvedev, V. Lipp, V. Saxena, M. Stransky, *"Application of Boltzmann kinetic equations to model X-ray-created warm dense matter and plasma."*,  
Phil.Trans.R.Soc. A 381, 20220216 (2023).
- 122** K. Kapcia, V. Tkachenko, F. Capotondi, A. Lichtenstein, S. Molodtsov, L. Mueller, A. Philippi-Kobs, P. Piekarz, B. Ziaja, *"Electronic processes occurring during ultrafast demagnetization of cobalt, triggered by X-ray photons tuned to Co L3 resonance"*,  
Phys. Rev. B 107(9), 094402 (2023).
- 121** K. Kapcia, V. Tkachenko, F. Capotondi, A. Lichtenstein, S. Molodtsov, L. Müller, A. Philippi-Kobs, P. Piekarz, B. Ziaja, *"Modeling of ultrafast X-ray induced magnetization dynamics in magnetic multilayer systems"*,  
npj Computational Materials 8(1), 212 (2022).
- 120** M. Stransky, Z. Jurek, R. Santra, A. Mancuso, B. Ziaja, *"Tree-Code Based Improvement of Computational Performance of the X-ray-Matter-Interaction Simulation Tool XMDYN"*,  
Molecules 27(13), 4206 (2022).
- 119** V. Lipp, B. Ziaja, *"Classical molecular dynamics simulations of surface modifications triggered by a femtosecond laser pulse"*,  
Modelling 3(3), 333 - 343 (2022).
- 118** I. Inoue et al. (BZ), *"Delayed onset and directionality of x-ray-induced atomic displacements observed on subatomic length scales"*,  
Phys. Rev. Lett. 128, 223203 (2022).

- 117** V. Lipp et al. (BZ), "*Density Functional Tight Binding approach utilized to study X-ray-induced transitions in solid materials*",  
Sci. Rep. 12, 1551(2022).
- 116** N. Medvedev et al. (BZ), "*Structural stability and electron-phonon coupling in two-dimensional carbon allotropes at high electronic and atomic temperatures*",  
Carbon Trends 5, 100121 (2021).
- 115** J. E et al. (BZ), "*Effects of radiation damage and inelastic scattering on single-particle imaging of hydrated proteins with an X-ray Free-Electron Laser*",  
Sci. Rep. 11(1), 17976 (2021).
- 114** B. Ziaja et al., "*Tracing X-ray-induced formation of warm dense gold with Boltzmann kinetic equations*",  
EPJD 75, 224 (2021).
- 113** N. Medvedev et al. (BZ), "*Response of free-standing graphene monolayer exposed to ultrashort intense XUV pulse from free-electron laser*", J. Chem. Phys. 154, 204706 (2021).
- 112** V. Tkachenko et al. (BZ), "*Limitations of Structural Insight into Ultrafast Melting of Solid Materials with X-ray Diffraction Imaging*",  
Appl. Sci. 11, 5157 (2021).
- 111** I. Inoue et al. (BZ), "*Atomic-Scale Visualization of Ultrafast Bond Breaking in X-Ray-Excited Diamond*",  
Phys. Rev. Lett. 126, 117403 (2021).
- 110** Y. Kumagai et al. (BZ), "*Suppression of thermal nanoplasma emission in clusters strongly ionized by hard x-rays*",  
J. Phys. B 54(4), 044001 (2021).
- 109** V. Tkachenko et al. (BZ), "*Effect of Auger recombination on transient optical properties in XUV and soft X-ray irradiated silicon nitride*",  
Sci. Rep. 11, 5203 (2021).
- 108** J. J. Bekx, S.-K. Son, B. Ziaja, R. Santra, "*Electronic-structure calculations for nonisothermal warm dense matter*",  
Phys. Rev. Res. 2(3), 033061 (2020).
- 107** N. Mukharamova et al. (BZ), "*Femtosecond laser produced periodic plasma in a colloidal crystal probed by XFEL radiation*",  
Sci. Rep. 10(1), 10780 (2020).
- 106** I. Milov et al. (BZ), "*Two-level ablation and damage morphology of Ru films under femtosecond extreme UV irradiation*"  
Appl. Surf. Sci. 528, 146952 (2020).

- 105** K. Nass et al. (BZ), "*Structural dynamics in proteins induced by and probed with X-ray free-electron laser pulses*",  
Nat. Commun. 11(1), 1814 (2020).
- 104** Y. Kumagai et al. (BZ), "*Real-time observation of disintegration processes within argon clusters ionized by a hard-x-ray pulse of moderate fluence*"  
Phys. Rev. A 101(2), 023412 (2020).
- 103** V. Tkachenko, S. Toleikis, V. Lipp, B. Ziaja, U. Teubner, "*Time-resolved investigation of the optical phase change as a potential diagnostics tool for extreme-ultraviolet free-electron-laser pump and optical probe experiments*",  
Opt. Lett. 45(1), 33 - 36 (2020).
- 102** I. Milov et al. (BZ), "*Similarity in ruthenium damage induced by photons with different energies: From visible light to hard X-rays*"  
Appl. Surf. Sci. 501, 143973 (2020).
- 101** V. Tkachenko et al. (BZ), "*Time-resolved ionization measurements with intense ultrashort XUV and X-ray free-electron laser pulses*",  
Las. Part. Beams 37(2), 235 - 241 (2019).
- 100** T.-H. Dinh et al. (BZ), "*Controlled strong excitation of silicon as a step towards processing materials at sub-nanometer precision*",  
Commun. Phys. 2(1), 150 (2019).
- 99** M. Makita et al. (BZ), "*X-ray induced non-thermal transition of bismuth on femtosecond timescales*",  
Sci. Rep. 9, 602 (2019).
- 98** R. Follath et al. (BZ), "*X-ray induced damage of B4C-coated multilayer materials under various irradiation geometries*",  
Sci. Rep. 9, 2029 (2019).
- 97** K. Mecseki et al. (BZ), "*Hard X-ray induced fast secondary electron cascading processes in solids*",  
Appl. Phys. Lett. 113(11), 114102 (2018).
- 96** J. Bekx et al. (BZ), "*Ab-initio calculation of electron impact ionization cross sections for ions in exotic electron configurations*",  
Phys. Rev. A, 98(2), 022701 (2018).
- 95** N. Medvedev, Viktor Tkachenko, V. Lipp, Zheng Li, and B. Ziaja, "*Various damage mechanisms in carbon and silicon materials under femtosecond x-ray irradiation*",  
4Open 1,3 (2018).
- 94** Y. Kumagai et al. (BZ), "*Radiation-induced chemical dynamics in Ar clusters exposed to strong x-ray pulses*",  
Phys. Rev. Lett., 120(22), 223201 (2018).

- 93** N. Medvedev and B. Ziaja, "*Multistep transition of diamond to warm dense matter state revealed by femtosecond X-ray diffraction*",  
Sci. Rep. 8, 5284 (2018).
- 92** M. Toufarová et al (BZ), "*Contrasting behavior of covalent and molecular carbon allotropes exposed to extreme ultraviolet and soft x-ray free-electron laser radiation*",  
Phys. Rev. B 96, 214101 (2017).
- 91** C. Fortmann-Grote et al. (BZ), "*Start-to-end simulation of single particle imaging using ultrashort pulses at the European X-ray Free Electron Laser*",  
IUCrJ 4, 560 (2017).
- 90** V. Tkachenko, V. Lipp, N. Medvedev, B. Ziaja, "*Picosecond Relaxation of X-ray Excited GaAs*",  
High Energy Density Phys. 24, 15-21 (2017).
- 89** P. Finetti et al. (BZ), "*Pulse Duration of Seeded Free-Electron Lasers*",  
Phys. Rev. X 7, 021043 (2017).
- 88** F. Tavella et al. (BZ), "*Soft x-ray induced femtosecond solid-to-solid phase transition*",  
High Energy Density Phys. 24, 22 - 27 (2017).
- 87** N. Medvedev, Z. Li. V. Tkachenko, B. Ziaja, "*Electron-ion coupling in semiconductors beyond Fermi's golden rule*",  
Phys. Rev. B 95(1), 014309 (2017).
- 86** V. Tkachenko, N. Medvedev, B. Ziaja, "*Transient Changes of Optical Properties in Semiconductors in Response to Femtosecond Laser Pulses*",  
Appl. Sci. 6(9) (2016) 238.
- 85** B. Ziaja, V. Saxena, S.-K. Son, N. Medvedev, B. Barbrel, B. Woloniewicz, M. Stransky, "*Kinetic Boltzmann approach adapted for modeling highly ionized matter created by x-ray irradiation of a solid*",  
Phys. Rev. E 93 (2016) 053210.
- 84** C. H. Yoon, M. V. Yurkov, E. A. Schneidmiller, L. Samoylova, A. Buzmakov, Z. Jurek, B. Ziaja, R. Santra, N. D. Loh, T. Tschentscher, A. P. Mancuso, "*A comprehensive simulation framework for imaging single particles and biomolecules at the European X-ray Free-Electron Laser*",  
Sci. Rep. 6 (2016) 24791.
- 83** Z. Jurek, S-K. Son, B. Ziaja, R. Santra, "*XMDYN and XATOM: versatile simulation tools for quantitative modeling of X-ray free-electron laser induced dynamics of matter*",  
J. Appl. Cryst. 49 (2016) 1048-1056.
- 82** V. Tkachenko, N. Medvedev, Z. Li, P. Piekarz, B. Ziaja, "*Transient optical properties of semiconductors under femtosecond x-ray irradiation*",  
Phys. Rev. B 93 (2016) 144101.
- 81** V. Saxena, B. Ziaja, "*Hydrodynamic model for expansion and collisional relaxation of x-ray*

*laser-excited multi-component nanoplasma* " ,  
Phys. Plasmas 23 (2016) 012710.

**80** B. Ziaja, N. Medvedev, V. Tkachenko, T. Maltezopoulos, W. Wurth , " *Time-resolved observation of band-gap shrinking and electron-lattice thermalization within X-ray excited gallium arsenide* " ,  
Sci. Rep. 5 (2015) 18068.

**79** N. Medvedev, A. E. Volkov, B. Ziaja, " *Electronic and atomic kinetics in solids irradiated with free-electron lasers or swift-heavy ions* " ,  
Nucl. Instrum. Meth. B 365 (437) (2015).

**78** T. Tachibana et al. (BZ), " *Nanoplasma formation by high intensity hard x-rays* " ,  
Sci. Rep. 5 (2015) 10977.

**77** V. Saxena, Z. Jurek, B. Ziaja, R. Santra , " *Hydrodynamic model for picosecond propagation of laser-created nanoplasmas* " ,  
High Energy Density Phys. 15 (2015) 93.

**76** B. Ziaja, Z. Jurek, N. Medvedev, V. Saxena, S-K. Son, R. Santra, " *Towards realistic simulations of macromolecules irradiated under the conditions of coherent diffraction imaging with an X-ray Free-Electron Laser* " ,  
Photonics 2 (2015) 256.

**75** N. Medvedev, Z. Li, B. Ziaja , " *Thermal and nonthermal melting of silicon under femtosecond x-ray irradiation* " ,  
Phys. Rev. B 91 (2015) 054113.

**74** N. Medvedev, V. Tkachenko, B. Ziaja , " *Modeling of nonthermal solid-to-solid phase transition in diamond irradiated with femtosecond X-ray FEL pulse* " ,  
Contrib. Plasma Phys. 55 (2015) 12.

**73** B. Ziaja, Z. Jurek, V. Saxena, R. Santra , " *Modeling of nanoplasmas created from finite systems by ultrafast intense X-ray pulses* " ,  
Contrib. Plasma Phys. 55 (2015) 58.

**72** S.-K. Son, R. Thiele, Z. Jurek, B. Ziaja, R. Santra , " *Quantum-mechanical calculation of Ionization-potential lowering in dense plasmas* " ,  
Phys. Rev. X 4 (2014) 031004.

**71** Z. Jurek, B. Ziaja, R. Santra, " *Applicability of the classical molecular dynamics method to study x-ray irradiated molecular systems* " ,  
J. Phys. B 47 (2014) 124036.

**70** N. Medvedev, H. O. Jeschke, B. Ziaja , " *Nonthermal graphitization of diamond induced by a femtosecond X-ray laser pulse* " ,  
Phys. Rev. B 88 (2013) 224304.

**69** B. Ziaja, Z. Jurek, N. Medvedev, S.-K. Son, R. Thiele, S. Toleikis, " *Photoelectron spectroscopy method to reveal ionization potential lowering in nanoplasmas.* " ,

J. Phys. B 46 (2013) 164009.

**68** J. Gaudin, N. Medvedev et al. (B. Ziaja), *"Photon energy dependence of graphitization threshold for diamond irradiated with intense XUV FEL pulse"*,  
Phys. Rev. B 88 (2013) 060101.

**67** L. Mueller, C. Gutt, B. Pfau, S. Schaffert, J. Geilhufe, F. Buettner, J. Mohanty, S. Flewett, R. Treusch, S. Duesterer, H. Redlin, A. Al-Shemmary, M. Hille, A. Kobs, R. Froemter, H. P. Oepen, B. Ziaja, N. Medvedev, S.-K. Son, R. Thiele, R. Santra, B. Vodungbo, J. Luening, S. Eisebitt, G. Gruebel ,  
*"Breakdown of the X-Ray resonant magnetic scattering signal during intense pulses of extreme ultraviolet free-electron-laser radiation"* ,  
Phys. Rev. Lett. 110 (2013) 234801.

**66** N. Medvedev, B. Ziaja, M. Cammarata, M. Harmand, S. Toleikis  
*"Electron Kinetics in Femtosecond X-Ray Irradiated SiO<sub>2</sub>"*,  
Contrib. Plasma Phys. 53 (2013) 347–354.

**65** R. Riedel, A. Al-Shemmary, M. Gensch, T. Golz, M. Harmand, N. Medvedev, M. J. Prandolini, K. Sokolowski-Tinten, S. Toleikis, U. Wegner, B. Ziaja, N. Stojanovic, F. Tavella , *"Single-shot pulse duration monitor for extreme ultraviolet and X-ray free-electron lasers"* ,  
Nat. Commun. 4 (2013) 1731.

**64** M. Harmand, R. Coffee, M. R. Bionta, M. Chollet, D. French, D. M. Fritz, H. T. Lemke, N. Medvedev, B. Ziaja, S. Toleikis, M. Cammarata , *"Achieving few-femtosecond time-sorting at hard X-ray free electron lasers"* ,  
Nature Photonics 7 (2013) 215.

**63** N. Medvedev, H. O. Jeschke, B. Ziaja , *"Nonthermal phase transitions in semiconductors induced by a femtosecond extreme ultraviolet laser pulse"* ,  
New J. Phys. 15 (2013) 015016.

**62** B. Ziaja, H. N. Chapman, R. Fäustlin, S. Hau-Riege, Z. Jurek, A. V. Martin, S. Toleikis, F. Wang, E. Weckert, R. Santra , *"Limitations of coherent diffractive imaging of single objects due to their damage by intense x-ray radiation"*,  
New J. Phys. 14 (2012) 115015.

**61** Z. Jurek, R. Thiele, B. Ziaja, R. Santra , *"Effect of two-particle correlations on x-ray coherent diffractive imaging studies performed with continuum models"*,  
Phys. Rev. E 86 (2012) 036411.

**60** R. Thiele, S. –K. Son, B. Ziaja, R. Santra , *"Effect of screening by external charges on the atomic orbitals and photoinduced processes within the Hartree-Fock-Slater atom"* ,  
Phys. Rev. A 86 (2012) 033411.

**59** B. Ziaja and N. Medvedev , *"Modelling ultrafast transitions within laser-irradiated solids"* ,  
High Energy Density Phys. 8 (2012) 18.

**58** B. Ziaja, H. N. Chapman, R. Santra, T. Laarmann, E. Weckert, C. Bostedt, T. Möller,  
*"Heterogeneous clusters as a model system for the study of ionization dynamics within tampered"*

*samples* ,

Phys. Rev. A 84 (2011) 033201.

57 F. Wang, E. Weckert, B. Ziaja, D.S.D. Larsson, D. van der Spoel , "*Coherent diffraction of a single virus particle: The impact of a water layer on the available orientational information*" ,  
Phys. Rev. E 83 (2011) 031907.

56 B. Ziaja, A.V. Martin, F. Wang, H.N. Chapman, E. Weckert, "*Theoretical estimation for correlations of diffraction patterns from objects differently oriented in space*",  
Ultramicroscopy 111, 793 (2011).

55 S. Hau-Riege et al., "*Near-ultraviolet luminescence of  $N_2$  irradiated by short x-ray pulses*",  
Phys. Rev. Lett. **105**, 043003 (2010).

54 S. Toleikis et al., "*Probing near-solid density plasmas using X-ray scattering*",  
J. Phys. B **43**, 194017 (2010).

53 R. Fäustlin et al., "*Observation of ultrafast non-equilibrium collective dynamics in a warm dense hydrogen plasma*",  
Phys. Rev. Lett 104 (2010), 125002.

52 B. Ziaja, T. Laarmann, H. Wabnitz, F. Wang, E. Weckert, C. Bostedt and T. Möller, "*Emission of electrons from rare gas clusters after their irradiation with intense VUV pulses of 100 nm and 32 nm wavelength.*",  
New J. Phys. 11 (2009), 103012.

51 B. Ziaja, H. Wabnitz, F. Wang, E. Weckert and T. Möller, "*Ionization and expansion dynamics of atomic clusters irradiated with short intense VUV pulses.*",  
Phys. Rev. Lett. 102 (2009) 205002.

50 B. Ziaja, F. Wang and E. Weckert, "*Multi-electron-recombination rates estimated within dense plasmas.*",  
High Energy Density Physics 5 (2009), 221.

49 F. Wang, B. Ziaja, E. Weckert, "*Inverse bremsstrahlung cross section estimated within evolving plasmas using effective ion potentials.*"  
J. Plasma Phys. 75 (2009) 289.

48 B. Ziaja, H. Wabnitz, E. Weckert, T. Möller, "*Atomic clusters of various sizes irradiated with short intense pulses of VUV radiation.*",  
Europhys. Lett. 82 (2008) 24002.

47 B. Ziaja, H. Wabnitz, E. Weckert, T. Möller, "*Femtosecond non-equilibrium dynamics of clusters irradiated with short intense VUV pulses.*",  
New J. Phys. 10 (2008) 043003.

46 B. Ziaja, E. Weckert, T. Möller, "*Statistical model of radiation damage within an atomic cluster irradiated by photons from free-electron-laser.*",



Laser and Particle Beams 25 (2007) 407

45 B. Ziaja, A. R. B. de Castro, E. Weckert, T. Möller, "Modelling dynamics of samples exposed to free-electron-laser radiation with Boltzmann equations.",  
Eur. Phys. J. D 40 (2006) 465.

44 B. Ziaja, R. A. London, J. Hajdu, "Ionization by impact electrons in solids: electron mean free path fitted over a wide energy range.",  
J. Appl. Phys. 99 (2006) 033514.

43 B. Ziaja, R. A. London, J. Hajdu, "Unified model of secondary electron cascades in diamond.",  
J. Appl. Phys. 97 (2005) 064905.

42 B. Ziaja, A. Szöke, D. van der Spoel and J. Hajdu, "Space-time evolution of electron cascades in diamond.",  
Phys. Rev. B 66 (2002) 024116.

41 P. Persson, S. Lunell, A. Szöke, B. Ziaja and J. Hajdu, "Shake-up and shake-off excitations with associated electron losses in X-ray studies of proteins.",  
Protein Sci. 10 (2001) 2480.

40 B. Ziaja, D. van der Spoel, A. Szöke and J. Hajdu, "Auger-electron cascades in diamond and amorphous carbon.",  
Phys. Rev. B 64 (2001) 214104.

### **Conference Proceedings:**

39 T. Tschentscher et al. (BZ), "Simulations of ultrafast x-ray laser experiments",  
*SPIE Optics + Optoelectronics, Prague, Czech Republic*, Proc. of SPIE 10237, 102370S (2017)

38 Z. Jurek et al., " Simulations of single-particle imaging of hydrated proteins with x-ray free-electron lasers", *Advances in Computational Methods for X-Ray Optics IV, San Diego, United States, 6 Aug 2017 - 10 Aug 2017*, Proc. of SPIE 10388, 10388OM (2017)

37 V. Lipp, N. Medvedev, B. Ziaja, "Classical Monte-Carlo simulations of x-ray induced electron cascades in various materials",  
Proc. of SPIE 10239, 102360H (2017)

36 N. Medvedev, Z. Li, B. Ziaja, " Thermal and nonthermal melting of silicon exposed to femtosecond pulses of X-ray irradiation ",  
Proc. SPIE 9511 (2015) 95110I

35 B. Ziaja, Z. Jurek, N. Medvedev, R. Thiele, S. Toleikis , "A review of environment-dependent processes within FEL excited matter",  
High Energy Density Phys. 9 (2013) 462-472.

34 H. O. Jeschke, N. Medvedev, B. Ziaja , "Non-thermal phase transitions in semiconductors under femtosecond XUV irradiation",  
Proc. SPIE 8777 (2013) 877709.

33 B. Ziaja, H. Wabnitz, F. Wang, E. Weckert, "Ionization and expansion dynamics of atomic clusters irradiated with short intense VUV pulses.",  
Proceedings of the 16th International Conference on Atomic Processes and Plasmas,  
Monterey, 23-26 March, 2009.

32 B. Ziaja, H. Wabnitz, F. Wang, E. Weckert, "Radiation damage within atomic clusters irradiated with intense VUV radiation.",  
Proceedings of the SPIE Europe, Optics and Optoelectronics, Prague, 20-23 April, 2009.

31 B. Ziaja, D. van der Spoel, A. Szöke, J. Hajdu "Radiation-induced electron cascade in diamond and amorphous carbon.",  
Proceedings of the SPIE's 46th Annual Meeting, 1 August 2001".

### **Preprints:**

30 A. Philippi-Kobs et al. (BZ), "Ultrafast Demagnetization Excited by Extreme Ultraviolet Light From a Free-Electron Laser", Research Square (2021), DOI: 10.21203/rs.3.rs-955056/v1

## **II. High Energy Physics**

### **Research Articles:**

29 B. Ziaja, "Polarized deep inelastic scattering at low Bjorken  $x$  and resummation of logarithmic corrections,  $\ln^2(1/x)$ .",  
Acta Phys. Pol. B 34 (2003) 3013.

28 B. Ziaja, "Proton spin structure function,  $g_1$ , with the unified evolution equations including NLO DGLAP terms and double logarithms,  $\ln^2(1/x)$ .",  
Eur. Phys. J. C 28 (2003) 475.

27 B. Ziaja, "Double logarithms,  $\ln^2(1/x)$ , and the NLO DGLAP evolution for the non-singlet component of the nucleon spin structure function,  $g_1$ .",  
Phys. Rev. D 66 (2002) 114017.

26 B. Badełek, J. Kwiecinski and B. Ziaja, "Spin structure function  $g_1(x, Q^2)$  and the DHGHY integral  $I(Q^2)$  at low  $Q^2$ : predictions from the GVMD model.",  
Eur. Phys. J. C 26 (2002) 45.

25 B. Ziaja, "Low  $x$  double  $\ln^2(1/x)$  resummation effects at the sum rule for nucleon structure function  $g_1$ .",  
Acta Phys. Polon. B 32 (2001) 2863.

24 R. Peschanski and B. Ziaja, "Factorial correlators: Angular scaling within QCD jets.",

Eur. Phys. J. C 21 (2001) 649.

23 L. Motyka and B. Ziaja, "*The photon structure and exclusive production of vector mesons in gamma gamma collisions.*",  
Eur. Phys. J. C 19 (2001) 709.

22 J. Kwiecinski and B. Ziaja, "*QCD predictions for spin dependent photonic structure function  $g_{\gamma 1}(x, Q^2)$  in the low  $x$  region of future linear colliders.*",  
Phys. Rev. D 63 (2001) 054022.

21 J. Kwiecinski and B. Ziaja, "*QCD predictions for polarized deep inelastic scattering accompanied by a forward jet in the low  $x$  region of possible HERA measurements.*",  
Phys. Lett. B 470 (1999) 247.

20 J. Kwiecinski and B. Ziaja, "*Polarized deep inelastic scattering accompanied by a forward jet as a probe of the  $\ln^2(1/x)$  resummation.*",  
Phys. Lett. B 464 (1999) 293.

19 B. Ziaja, "*Recovering corrections in the analysis of intermittent data.*",  
Eur. Phys. J. C 9 (1999) 633.

18 B. Ziaja, "*Implementation of the recovering corrections into the intermittent data analysis.*",  
Acta Phys. Polon. B 30 (1999) 2737.

17 J. Kwiecinski and B. Ziaja, "*QCD expectations for the spin structure function  $g_1$  in the low  $x$  region.*",  
Phys. Rev. D 60 (1999) 054004.

16 R. A. Janik and B. Ziaja, "*Improved intermittency analysis of single event data.*",  
Acta Phys. Polon. B 30 (1999) 259.

15 B. Ziaja, "*Inclusive single particle density in configuration space from the QCD-cascade in DLA approximation.*",  
Eur. Phys. J. C 5 (1998) 91.

14 B. Ziaja, "*Multiparton density matrix for the QCD cascade in DLA approximation.*",  
Acta Phys. Polon. B 27 (1996) 2179.

13 A. Białas and B. Ziaja, "*Intermittency in a single event.*",  
Phys. Lett. B 378 (1996) 319.

12 B. Ziaja, "*Intermittency for coherent and incoherent current ensemble model.*",  
Z. Phys. C 71 (1996) 639.

11 B. Ziaja, "*Current ensemble model and intermittency.*",  
Acta Phys. Polon. B 25 (1994) 1115.

10 A. Białas and B. Ziaja, "*Space-time structure of hadron sources and intermittency.*",

Acta Phys. Polon. B 24 (1993) 1509.

### Conference Proceedings:

9 B. Badełek, J. Kwiecinski and B. Ziaja, "*GVMD model predictions for the low  $Q^2$  behaviour of the spin structure function  $g_1(x, Q^2)$  and of the DHGHY integral  $I(Q^2)$* ", conference talk given at the "10th International Workshop on Deep Inelastic Scattering (DIS2002), Krakow, Poland, 30 April - 4 May 2002",  
Acta Phys. Polon. B33 (2002) 3701.

8 B. Ziaja, "*Implementation of the recovering corrections into the intermittent data analysis*", conference talk given at the "9th International Workshop on Multiparticle Production: New Frontiers in Soft Physics and Correlations on the Threshold of the New Millennium (Torino 2000), Torino, Italy, 12-17 Jun 2000",  
Nucl. Phys. Proc. Suppl. 92 (2001) 149.

7 J. Kwiecinski and B. Ziaja, "*QCD predictions for the spin-dependent structure function  $g_1(x, Q^2)$  of the photon in the low  $x$  region of future  $ey$  colliders*",  
Nucl. Instrum. Meth. A 472 (2001) 229-232.

6 J. A. Aguilar-Saavedra et al. [ECFA/DESY LC Physics Working Group Collaboration], "*TESLA Technical Design Report Part III: Physics at an  $e^+e^-$  Linear Collider*",  
arXiv: hep-ph/0106315.

5 R. A. Janik and B. Ziaja, "*Improved intermittency analysis of individual events*", conference talk given at the "8th International Workshop on Multiparticle Production: Correlations and Fluctuations '98 (CF 98)", Matrahaza, Hungary, 14-21.06.1998,  
"Proceedings of the Workshop, World Scientific, 1998", 506.

4 J. Kwiecinski, B. Ziaja, "*QCD predictions for  $g_1$  at small  $x$  incorporating double  $\ln^2(1/x)$  resummation*", conference talk,  
"Proceedings of Workshop on Physics with Polarized Protons at Hera: 1st Meeting, Hamburg, Germany, 6-7 March 1997", "Proceedings of the Workshop on Physics with Polarized Protons at Hera: 2nd Meeting, Hamburg, Germany, 26-27 May 1997", and "Proceedings of Workshop on Physics with Polarized Protons at Hera: 3rd and Final Meeting, Hamburg, Germany, 30-31 Aug 1997". Also in "Hamburg 1997, Physics with polarized protons at HERA\* 90-96".

3 B. Ziaja, "*Single particle density and density matrix from the QCD cascade in DLA approximation*", conference talk given at the "37th Cracow School of Theoretical Physics: Dynamics of Strong Interactions", Zakopane, Poland, 30.05-10.06.1997,  
Acta Phys. Polon. B 28 (1997) 2683.

2 B. Ziaja, "*Intermittency in individual events*", conference talk given at the "7th International Workshop on Multiparticle Production: Correlations and Fluctuations", Nijmegen, Hollandia, 30.06-6.07.1996,  
"Proceedings of the Workshop, World Scientific, 1996", 243.

## Habilitation Thesis

1 B. Ziaja, "Analiza spolaryzowanego rozpraszania głębokonieelastycznego w obszarze małych wartości zmiennej  $x$  Bjorkena z uwzględnieniem resumacji poprawek logarytmicznych,  $\ln^2(1/x)$ .", Rep. 1922/PH of the INP, Krakow, April 2003, 23 pages. Thesis (in Polish) was written in partial fulfillment of the requirements for the degree of Doctor Habilitatus at the Institute of Nuclear Physics in Krakow. The English translation of the title is: "Analysis of the polarized deep inelastic scattering at low values of Bjorken  $x$ , including the resummation of logarithmic corrections,  $\ln^2(1/x)$ ".

## Most important publications (over last 5 years):

L. Mercadier, A. Benediktovitch, S. Krušič, J.J. Kas, J. Schlappa, M. Agåker, R. Carley, G. Fazio, N. Gerasimova, Y.Y. Kim, L. Le Guyader, G. Mercurio, S. Parchenko, J.J. Rehr, J.-E. Rubensson, S. Serkez, M. Stransky, M. Teichmann, Z. Yin, M. Žitnik, A. Scherz, B. Ziaja, N. Rohringer, "Transient absorption of warm dense matter created by an X-ray free-electron laser" Nat. Phys. 20(10), 1564 - 1569 (2024).

I. Inoue et al. (B. Ziaja - corresponding author), "Femtosecond reduction of atomic scattering factors triggered by intense X-ray pulse", Phys. Rev. Lett. 131, 163201 (2023).

K. Kapcia et al. (B. Ziaja - corresponding author), "Modeling of ultrafast X-ray induced magnetization dynamics in magnetic multilayer systems", npj Computational Materials 8(1), 212 (2022).

I. Inoue et al. (B. Ziaja - corresponding author), "Delayed onset and directionality of x-ray-induced atomic displacements observed on subatomic length scales", Phys. Rev. Lett. 128, 223203 (2022).

I. Inoue et al. (B. Ziaja - corresponding author), "Atomic-Scale Visualization of Ultrafast Bond Breaking in X-Ray-Excited Diamond", Phys. Rev. Lett. 126, 117403 (2021).

K. Nass et al. (B. Ziaja - corresponding author), "Structural dynamics in proteins induced by and probed with X-ray free-electron laser pulses", Nat. Commun. 11(1), 1814 (2020).

## Scientific Software:

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