

## Publications by Michael Bussmann

### July 25, 2018

- [1] T. Kluge, M. Bussmann, U. Schramm, and T. E. Cowan, “Simple scaling equations for electron spectra, currents, and bulk heating in ultra-intense short-pulse laser-solid interaction,” *Physics of Plasmas*, vol. 25, no. 7, p. 073106, 07 2018. [Online]. Available: <http://aip.scitation.org/doi/pdf/10.1063/1.5037753>
- [2] S. M. Schellhammer, S. Gantz, A. Luhr, B. M. Oborn, M. Bussmann, and A. L. Hoffmann, “Technical note : Experimental verification of magnetic field-induced beam deflection and bragg peak displacement for mr-integrated proton therapy,” *Medical Physics*, vol. 45, no. 7, pp. 3429–3434, 05 2018. [Online]. Available: <https://aapm.onlinelibrary.wiley.com/doi/epdf/10.1002/mp.12961>
- [3] J. M. Krämer, A. Jochmann, M. Budde, M. Bussmann, J. P. Couperus, T. E. Cowan, A. Debus, A. Köhler, M. Kuntzsch, A. L. Garcia, U. Lehnert, P. Michel, R. Pausch, O. Zarini, U. Schramm, and A. Irman, “Making spectral shape measurements in inverse compton scattering a tool for advanced diagnostic applications,” *Scientific Reports*, vol. 8, no. 1, p. 1398, January 2018. [Online]. Available: <https://www.nature.com/articles/s41598-018-19546-0.pdf>
- [4] P. Hilz, T. M. Ostermayr, A. Huebl, V. Bagnoud, B. Borm, M. Bussmann, M. Gallei, J. Gebhard, D. Haffa, J. Hartmann, T. Kluge, F. H. Lindner, P. Neumayr, C. G. Schaefer, U. Schramm, P. G. Thirolf, T. F. Rosch, F. Wagner, B. Zielbauer, and J. Schreiber, “Isolated proton bunch acceleration by a petawatt laser pulse,” *Nature Communications*, vol. 9, no. 1, p. 423, January 2018. [Online]. Available: <https://www.nature.com/articles/s41467-017-02663-1.pdf>
- [5] C. Fortmann-Grote, A. A. Andreev, K. Appel, J. Branco, R. Briggs, M. Bussmann, A. Buzmakov, M. Garten, A. Grund, A. Huebl, Z. Jurek, N. D. Loh, M. Nakatsutsumi, L. Samoylova, R. Santra, E. A. Schneidmiller, A. Sharma, K. Steiniger, S. Yakubov, C. H. Yoon, M. V. Yurkov, U. Zastra, B. Ziaja-Motyka, and A. P. Mancuso, “Simulations of ultra-fast x-ray laser experiments,” in *SPIE Proceedings Volume 10237 X-ray Optics and Beam Transport Issues Including Propagation of Coherent X-ray FEL Radiation and Simulation of X-ray FEL II*, T. Tschentscher and L. Patthey, Eds., vol. 10237, SPIE, International society for optics and photonics. Prague, Czech Republic: SPIE, 2017, p. 102370S.
- [6] U. Schramm, M. Bussmann, A. Irman, M. S. K. Zeil, D. Albach, C. Bernert, S. Bock, F. Brack, J. Branco, J. P. Couperus, T. Cowan, A. Debus, C. Eisenmann, M. Garten, R. Gebhardt, S. Grams, U. Helbig, A. Huebl, T. Kluge, A. Kohler, J. Kramer, S. Kraft, F. Kroll, M. Kuntzsch, U. Lehnert, M. Loeser, J. Metzkes, P. Michel, L. Obst, R. Pausch, M. Rehwald, R. Sauerbrey, H. P. Schlenvoigt, K. Steiniger, and O. Zarini, “First results with the novel peta-watt laser acceleration facility in dresden,” in *Proceedings of the 17th*

- International Particle Accelerator Conference IPAC2017*, C. Petit-Jean-Genaz, G. Arduini, P. Michel, and V. R. Schaa, Eds. Copenhagen, Denmark: JACOW, 2017, pp. WEPRO053 , 48–52. [Online]. Available: <http://accelconf.web.cern.ch/AccelConf/ipac2017/papers/mozb1.pdf>
- [7] A. Matthes, R. Widera, E. Zenker, B. Worpitz, A. Huebl, and M. Bussmann, “Tuning and optimization for a variety of many-core architectures without changing a single line of implementation code using the alpaka library,” in *High Performance Computing 10524: ISC High Performance 2017 International Workshops, DRBSD, ExaComm, HCPM, HPC-IODC, IWOPH, IXPUG, P<sup>3</sup>MA, VHPC, Visualization at Scale, WOPSSS, Frankfurt, Germany, June 18-22, 2017, Revised Selected Papers*, J. M. Kunkel, R. Yokota, M. Tauffer, and J. Shalf, Eds. Springer International Publishing, 2017, p. 496. [Online]. Available: [https://link.springer.com/chapter/10.1007/978-3-319-67630-2\\_36](https://link.springer.com/chapter/10.1007/978-3-319-67630-2_36)
- [8] A. Huebl, R. Widera, F. Schmitt, A. Matthes, N. Podhorszki, J. Y. Choi, S. Klasky, and M. Bussmann, “On the scalability of data reduction techniques in current and upcoming hpc systems from an application perspective,” in *High Performance Computing 10524, ISC High Performance 2017 International Workshops, DRBSD, ExaComm, HCPM, HPC-IODC, IWOPH, IXPUG, P<sup>3</sup>MA, VHPC, Visualization at Scale, WOPSSS, Frankfurt, Germany, June 18-22, 2017, Revised Selected Papers*, D. J. M. Kunkel, R. Yokota, D. M. Tauffer, and J. Shalf, Eds. Springer International Publishing, 2017, p. 15. [Online]. Available: <https://www.springerprofessional.de/on-the-scalability-of-data-reduction-techniques-in-current-and-u/15147224>
- [9] 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. Garten, S. H. Glenzer, E. Granados, C. Gutt, H. J. Lee, B. Nagler, W. Schumaker, F. Tavella, M. Zacharias, U. Schramm, and T. E. Cowan, “Nanometer-scale characterization of laser-driven compression, shocks, and phase transitions, by x-ray scattering using free electron lasers,” *Physics of Plasmas*, vol. 24, no. 10, p. 102709, Oct 2017. [Online]. Available: <http://aip.scitation.org/doi/pdf/10.1063/1.5008289>
- [10] J. P. Couperus, R. Pausch, A. Köhler, O. Zarini, J. M. Krämer, M. Garten, A. Huebl, R. Gebhardt, U. Helbig, S. Bock, K. Zeil, A. Debus, M. Bussmann, U. Schramm, and A. Irman, “Demonstration of a beam loaded nanocoulomb-class laser wakefield accelerator,” *Nature Communications*, vol. 8, no. 1, p. 487, September 2017. [Online]. Available: <https://www.nature.com/articles/s41467-017-00592-7.pdf>
- [11] L. Obst, S. Göde, M. Rehwald, F.-E. Brack, J. Branco, S. Bock, M. Bussmann, T. E. Cowan, C. B. Curry, F. Fiuza, M. Gauthier, R. Gebhardt, U. Helbig, A. Huebl, U. Hübner, A. Irman, L. Kazak, J. B. Kim, T. Kluge, S. Kraft, M. Loeser, J. Metzkes, R. Mishra, C. Rödel, H.-P. Schlenvoigt, M. Siebold, J. Tiggesbäumker, S. Wolter, T. Ziegler, U. Schramm, S. H. Glenzer, and K. Zeil, “Efficient laser-driven proton acceleration from cylindrical and planar cryogenic hydrogen jets,”

*Scientific Reports*, vol. 7, no. 1, p. 10248, August 2017. [Online]. Available: <https://www.nature.com/articles/s41598-017-10589-3.pdf>

- [12] H. B. Wang, W. Q. Wen, Z. K. Huang, D. C. Zhang, B. Hai, X. L. Zhu, D. M. Zhao, J. Yang, J. Li, X. N. Li, L. J. Mao, R. S. Mao, J. X. Wu, J. C. Yang, Y. J. Yuan, L. Eidam, D. Winters, T. Beck, D. Kiefer, B. Rein, T. Walther, M. Loeser, U. Schramm, M. Siebold, M. Bussmann, and X. Ma, “Measurement of the lifetime and the proportion of  $^{12}\text{C}^{3+}$  ions in stored relativistic ion beams as a preparation for laser cooling experiments at the csre,” *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, vol. 408, no. 1, p. 280, Oct 2017. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0168583X17303464>
- [13] P. A. Walker, P. D. Alesini, A. S. Alexandrova, M. P. Anania, N. E. Andreev, I. Andriyash, A. Aschikhin, R. W. Assmann, T. Audet, A. Bacci, I. F. Barna, A. Beaton, A. Beck, A. Beluze, A. Bernhard, S. Bielawski, F. G. Bisesto, J. Boedewadt, F. Brandi, O. Bringer, R. Brinkmann, E. Brundermann, M. Bucher, M. Bussmann, G. C. Bussolino, A. Chance, J. C. Chanteloup, M. Chen, E. Chiadroni, A. Cianchi, J. Clarke, J. Cole, M. E. Couprie, M. Croia, B. Cros, J. Dale, G. Dattoli, N. Delerue, O. Delferriere, P. Delinikolas, J. Dias, U. Dorda, K. Ertel, A. F. Pousa, M. Ferrario, F. Filippi, J. Fils, R. Fiorito, R. A. Fonseca, M. Galimberti, A. Gallo, D. Garzella, P. Gastinel, D. Giove, A. Giribono, L. A. Gizzi, F. J. Gruner, A. F. Habib, L. C. Haefner, T. Heinemann, B. Hidding, B. J. Holzer, S. M. Hooker, T. Hosokai, A. Irman, D. A. Jaroszynski, S. Jaster-Merz, C. Joshi, M. C. Kaluza, M. Kando, O. S. Karger, S. Karsch, E. Khazanov, D. Khikhlikha, A. Knetsch, D. Kocon, P. Koester, O. Kononenko, G. Korn, I. Kostyukov, L. Labate, C. Lechner, W. P. Leemans, A. Lehrach, F. Y. Li, X. Li, V. Libov, A. Lifschitz, V. Litvinenko, W. Lu, A. R. Maier, V. Malka, G. G. Manahan, S. P. D. Mangles, B. Marchetti, A. Marocchino, A. M. de la Ossa, J. L. Martins, F. Massimo, F. Mathieu, G. Maynard, T. J. Mehrling, A. Y. Molodozhentsev, A. Mosnier, A. Mostacci, A. S. Mueller, Z. Najmudin, P. A. P. Nghiem, F. Nguyen, P. Niknejadi, J. Osterhoff, D. Papadopoulos, B. Patrizi, R. Pattathil, V. Petrillo, M. A. Pocsai, K. Poder, R. Pompili, L. Pribyl, D. Pugacheva, S. Romeo, A. R. Rossi, E. Roussel, A. A. Sahai, P. Scherkl, U. Schramm, C. B. Schroeder, J. Schwindling, J. Scifo, L. Serafini, Z. M. Sheng, L. O. Silva, T. Silva, C. Simon, U. Sinha, A. Specka, M. J. V. Streeter, E. N. Svystun, D. Symes, C. Szwej, G. Tauscher, A. G. R. Thomas, N. Thompson, G. Toci, P. Tomassini, C. Vaccarezza, M. Vannini, J. M. Vieira, F. Villa, C. G. WahlstrAssm, R. Walczak, M. K. Weikum, C. P. Welsch, C. Wiemann, J. Wolfenden, G. Xia, M. Yabashi, L. Yu, J. Zhu, and A. Zigler, “Horizon 2020 eupraxia design study,” *Journal of Physics : Conference Series*, vol. 874, no. 1, p. 012029, 2017. [Online]. Available: <http://iopscience.iop.org/article/10.1088/1742-6596/874/1/012029/pdf>
- [14] S. Schellhammer, B. Oborn, A. Lühr, S. Gantz, P. Wohlfahrt, M. Bussmann, and A. Hoffmann, “Oc-0343 : Experimental setup to measure magnetic field effects of proton dose distributions: simulation

- study,” *Radiotherapy and Oncology*, vol. 123, no. 1, pp. S180–S181, May 2017, eSTRO 36, May 5-9, 2017, Vienna, Austria. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0167814017307855>
- [15] R. Pausch, M. Bussmann, A. Huebl, U. Schramm, K. Steiniger, R. Widera, and A. Debus, “Identifying the linear phase of the relativistic kelvin-helmholtz instability and measuring its growth rate via radiation,” *Phys. Rev. E*, vol. 96, no. 1, p. 013316, Jul 2017. [Online]. Available: <https://journals.aps.org/pre/pdf/10.1103/PhysRevE.96.013316>
- [16] R. Sanchez, M. Lochmann, R. Jöhren, Z. Anelkovic, D. Anielski, B. Botermann, M. Bussmann, A. Dax, N. Frommgen, C. Geppert, M. Hammen, V. Hannen, T. Kuehl, Y. Litvinov, R. L. Coto, T. Stoehlker, R. Thompson, J. Vollbrecht, W. Wen, C. Weinheimer, E. Will, D. Winters, and W. Noertershaeuser, “Laser spectroscopy measurement of the 2s-hyperfinesplitting in lithium-like bismuth,” *Journal of Physics B : Atomic, Molecular and Optical Physics*, vol. 50, no. 8, p. 085004, March 2017. [Online]. Available: <http://iopscience.iop.org/article/10.1088/1361-6455/aa63a0/pdf>
- [17] C. Fortmann-Grote, R. Briggs, M. Bussmann, A. Buzmakov, M. Garten, A. Grund, A. Huebl, Z. Jurek, D. H. Loh, T. Rueter, L. Samoylova, S. Yakubov, C. H. Yoon, A. P. Mancuso, B. Ziaja, R. Santra, S. Hauf, A. Joy, M. Wing, A. A. Andreev, E. A. Schneidmiller, and A. Sharma, “Simex : Simulation of experiments at advanced laser light sources,” *NOBUGS 2016 Proceedings - New Opportunities for Better User Group Software*, pp. 29–34, Oct 2016. [Online]. Available: <https://indico.esss.lu.se/event/357/session/3/contribution/21/material/0/0.pdf>
- [18] A. Matthes, A. Huebl, R. Widera, S. Grottel, S. Gunhold, and M. Bussmann, “In situ, steerable, hardware-independent and data-structure agnostic visualization with isaac,” *Supercomputing Frontiers and Innovations*, vol. 3, no. 4, p. 30, Dec 2016. [Online]. Available: <http://superfri.org/superfri/article/view/114/206>
- [19] E. Zenker, B. Worpitz, R. Widera, A. Huebl, G. Juckeland, A. Knüpfer, W. E. Nagel, and M. Bussmann, “Alpaka - an abstraction library for parallel kernel acceleration,” *2016 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, vol. 00, pp. 631–640, 2016. [Online]. Available: <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7529924>
- [20] E. Zenker, R. Widera, A. Huebl, G. Juckeland, A. Knüpfer, W. E. Nagel, and M. Bussmann, “Performance-portable many-core plasma simulations : Porting picongpu to openpower and beyond,” *Lecture Notes in Computer Science*, vol. 9945, p. 293, Oct 2016. [Online]. Available: [http://dx.doi.org/10.1007/978-3-319-46079-6\\_21](http://dx.doi.org/10.1007/978-3-319-46079-6_21)
- [21] M. Siebold, M. Loeser, F. Röser, D. Albach, M. Bussmann, S. Eckhardt, A. F. Lasagni, R. Sauerbrey, and U. Schramm, “High energy yb:yag active mirror laser system for transform limited pulses bridging the picosecond gap,” *Laser & Photonics Reviews*,

vol. 10, no. 4, pp. 673–680, June 2016. [Online]. Available: <http://onlinelibrary.wiley.com/doi/10.1002/lpor.201600063/epdf>

- [22] W. Q. Wen, H. B. Wang, Z. K. Huang, D. C. Zhang, B. Hai, X. L. Zhu, X. Y. Chuai, D. M. Zhao, J. Yang, J. Li, X. N. Li, L. J. Mao, R. S. Mao, J. X. Wu, J. W. Xia, J. C. Yang, Y. J. Yuan, H. W. Zhao, T. C. Zhao, L. Eidam, M. Loeser, B. Rein, M. Siebold, D. Winter, M. Bussmann, and X. W. Ma, “Recent progress on laser cooling of relativistic lithium-like  $12c3+$  ion beams at heavy ion storage ring csre,” *Scientia Sinica(Physica, Mechanica & Astronomica)*, vol. 46, no. 5, p. 053001, May 2016. [Online]. Available: [http://www.cnki.com.cn/Article\\_en/CJFDTOTAL-JGXX201605011.htm](http://www.cnki.com.cn/Article_en/CJFDTOTAL-JGXX201605011.htm)
- [23] C. Eckert, E. Zenker, M. Bussmann, and D. Albach, “Haseongpu - an adaptive, load-balanced mpi/gpu-code for calculating the amplified spontaneous emission in high power laser media,” *Computer Physics Communications*, vol. 207, p. 362, Oct 2016. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0010465516301436>
- [24] T. Kluge, M. Bussmann, H. K. Chung, C. Gutt, L. G. Huang, M. Zacharias, U. Schramm, and T. E. Cowan, “Nanoscale femtosecond imaging of transient hot solid density plasmas with elemental and charge state sensitivity using resonant coherent diffraction,” *Physics of Plasmas*, vol. 23, no. 3, p. 033103, March 2016. [Online]. Available: <http://scitation.aip.org/content/aip/journal/pop/23/3/10.1063/1.4942786>
- [25] H. B. Wang, X. Ma, W. Q. Wen, Z. K. Huang, D. C. Zhang, B. Hai, X. L. Zhu, D. M. Zhao, J. Li, X. M. Ma, T. L. Yan, R. S. Mao, T. C. Zhao, J. X. Wu, J. C. Yang, Y. J. Yuan, J. W. Xia, M. Loeser, M. Siebold, U. Schramm, O. Boine-Frankenheim, L. Eidam, D. Winters, G. Birkel, B. Rein, T. Walther, and M. Bussmann, “Progress of laser cooling of  $12c3+$  ions at the csre,” *Journal of Physics : Conference Series*, vol. 635, no. 2, p. 022080, 2015. [Online]. Available: <http://stacks.iop.org/1742-6596/635/i=2/a=022080>
- [26] D. Winters, T. Beck, G. Birkel, C. Dimopoulou, V. Hannen, T. Kuhl, M. Lochmann, M. Loeser, X. Ma, F. Nolden, W. Nortershauser, B. Rein, R. Sanchez, U. Schramm, M. Siebold, P. Spiller, M. Steck, T. Stohlker, J. Ullmann, T. Walther, W. Wen, J. Yang, D. Zhang, and M. Bussmann, “Laser cooling of relativistic heavy-ion beams for fair,” *Physica Scripta*, vol. 2015, no. T166, p. 014048, 2015. [Online]. Available: <http://stacks.iop.org/1402-4896/2015/i=T166/a=014048>
- [27] H. B. Wang, W. Q. Wen, X. Ma, Z. K. Huang, D. C. Zhang, M. Bussmann, D. F. A. Winters, Y. J. Yuan, X. L. Zhu, D. M. Zhao, R. S. Mao, J. Li, L. J. Mao, J. C. Yang, H. W. Zhao, H. S. Xu, G. Q. Xiao, and J. W. Xia, “Rf-bunching of relativistic  $12c3+$  ion beam for laser cooling experiment at the csre,” *Journal of Physics : Conference Series*, vol. 583, no. 1, p. 012045, January 2015. [Online]. Available: <http://stacks.iop.org/1742-6596/583/i=1/a=012045>

- [28] M. Bussmann, “Laser cooling of ion beams at relativistic energies,” in *ICFA Beam Dynamics Newsletter No. 65*, Y. Zhang and W. Zhou, Eds. ICFA Beam Dynamics Panel, 2014, pp. 8–21. [Online]. Available: [http://icfa-usa.jlab.org/archive/newsletter/icfa\\_bd\\_nl.65.pdf](http://icfa-usa.jlab.org/archive/newsletter/icfa_bd_nl.65.pdf)
- [29] U. Schramm, M. Bussmann, J. Couperus, T. E. Cowan, A. Debus, A. Irman, A. Jochmann, R. Pausch, R. Sauerbrey, and K. Steiniger, “Bright x-ray pulse generation by laser thomson-backscattering and traveling wave optical undulators,” in *Frontiers in Optics 2014*, Optical Society of America. Optical Society of America, 2014. [Online]. Available: <https://www.osapublishing.org/viewmedia.cfm?uri=FiO-2014-FTu4G.2&seq=0>
- [30] K. Steiniger, M. Bussmann, R. Pausch, T. Cowan, A. Irman, A. Jochmann, R. Sauerbrey, U. Schramm, and A. Debus, “Optical free-electron lasers with traveling-wave thomson-scattering,” *Journal of Physics B : Atomic, Molecular and Optical Physics*, vol. 47, no. 23, p. 234011, November 2014. [Online]. Available: <http://stacks.iop.org/0953-4075/47/i=23/a=234011>
- [31] M. Lochmann, R. Jöhren, C. Geppert, Z. Anđelković, D. Anielski, B. Botermann, M. Bussmann, A. Dax, N. Frömmgen, M. Hammen, V. Hannen, T. Kühl, Y. A. Litvinov, R. López-Coto, T. Stöhlker, R. C. Thompson, J. Vollbrecht, A. Volotka, C. Weinheimer, W. Wen, E. Will, D. Winters, R. Sánchez, and W. Nörtershäuser, “Observation of the hyperfine transition in lithium-like bismuth  $^{209}\text{Bi}^{80+}$ : Towards a test of qed in strong magnetic fields,” *Phys. Rev. A*, vol. 90, no. 3, p. 030501(R), September 2014. [Online]. Available: <http://link.aps.org/doi/10.1103/PhysRevA.90.030501>
- [32] K. Zeil, J. Metzkes, T. Kluge, M. Bussmann, T. E. Cowan, S. D. Kraft, R. Sauerbrey, B. Schmidt, M. Zier, and U. Schramm, “Robust energy enhancement of ultrashort pulse laser accelerated protons from reduced mass targets,” *Plasma Physics and Controlled Fusion*, vol. 56, no. 8, p. 084004, July 2014. [Online]. Available: <http://stacks.iop.org/0741-3335/56/i=8/a=084004>
- [33] K. Steiniger, M. H. Bussmann, A. D. Debus, A. Irman, A. Jochmann, R. G. Pausch, U. Schramm, and T. E. Cowan, “All-optical free electron lasers using travelling-wave thomson scattering,” in *Proceedings of the 5th International Particle Accelerator Conference IPAC2014*, C. Petit-Jean-Genaz, G. Arduini, P. Michel, and V. R. Schaa, Eds., EPS. Dresden, Germany: JACOW, 2014, pp. WEPRO053 , 2065–2068. [Online]. Available: <http://accelconf.web.cern.ch/AccelConf/IPAC2014/papers/wepro053.pdf>
- [34] R. G. Pausch, H. Burau, M. H. Bussmann, J. P. Couperus, A. D. Debus, A. Huebl, A. Irman, A. Kohler, U. Schramm, K. Steiniger, R. Widera, and T. E. Cowan, “Computing angularly-resolved far field emission spectra in particle-in-cell codes using gpus,” in *Proceedings of the 5th International Particle Accelerator Conference IPAC2014*, C. Petit-Jean-Genaz, G. Arduini, P. Michel, and V. R. Schaa, Eds., EPS. Dresden,

- Germany: JACOW, 2014, pp. MOPRI069, 761–764. [Online]. Available: <http://accelconf.web.cern.ch/AccelConf/IPAC2014/papers/mopri069.pdf>
- [35] A. Huebl, D. Pugmire, F. Schmitt, R. Pausch, and M. Bussmann, “Visualizing the radiation of the kelvin-helmholtz instability,” *Plasma Science, IEEE Transactions on*, vol. PP, no. 99, pp. 1–1, June 2014. [Online]. Available: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6832603>
- [36] W. Q. Wen, D. Winters, T. Beck, B. Rein, T. Walther, S. Tichelmann, G. Birkl, R. Sanchez-Alarcon, J. Ullmann, M. Lochmann, W. Nörtershäuser, C. Clark, C. Kozhuharov, T. Kühl, S. Sanjari, Y. Litvinov, T. Giacomini, M. Steck, C. Dimopoulou, F. Nolden, T. Stöhlker, J. Yang, D. Zhang, X. Ma, M. Seltmann, M. Siebold, U. Schramm, and M. Bussmann, “Laser cooling of stored relativistic ion beams with large momentum spreads using a laser system with a wide scanning range,” in *XXVIII International Conference on Photonic, Electronic and Atomic Collisions ICPEAC 2013*, ser. 488, G. Xiao, X. Cai, D. Ding, X. Ma, and Y. Zhao, Eds., vol. 12, Institute of Modern Physics, Chinese Academy of Science, 509 Nanchang Road, Lanzhou 730000, Gansu Province, P. R. China: IOP Publishing, April 2014, p. 122005. [Online]. Available: <http://dx.doi.org/10.1088/1742-6596/488/12/122005>
- [37] U. Masood, M. Bussmann, T. E. Cowan, W. Enghardt, L. Karsch, F. Kroll, U. Schramm, and J. Pawelke, “A compact solution for ion beam therapy with laser accelerated protons,” *Applied Physics B*, vol. 117, pp. 41–52, April 2014. [Online]. Available: <http://dx.doi.org/10.1007/s00340-014-5796-z>
- [38] T. Kluge, C. Gutt, L. G. Huang, J. Metzkes, U. Schramm, M. Bussmann, and T. E. Cowan, “Using x-ray free-electron lasers for probing of complex interaction dynamics of ultra-intense lasers with solid matter,” *Physics of Plasmas (1994-present)*, vol. 21, no. 3, p. 033110, March 2014. [Online]. Available: <http://scitation.aip.org/content/aip/journal/pop/21/3/10.1063/1.4869331>
- [39] R. Pausch, A. Debus, R. Widera, K. Steiniger, A. Huebl, H. Bura, M. Bussmann, and U. Schramm, “How to test and verify radiation diagnostics simulations within particle-in-cell frameworks,” *Nuclear Instruments and Methods in Physics Research Section A : Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 740, p. 250, March 2014. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0168900213014642>
- [40] K. Steiniger, R. Widera, R. Pausch, A. Debus, M. Bussmann, and U. Schramm, “Wave optical description of the traveling-wave thomson-scattering optical undulator field and its application to the twts-fel,” *Nuclear Instruments and Methods in Physics Research Section A : Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 740, p. 147, March 2014. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0168900213014988>

- [41] J. Metzkes, T. Kluge, K. Zeil, M. Bussmann, S. D. Kraft, T. E. Cowan, and U. Schramm, “Experimental observation of transverse modulations in laser-driven proton beams,” *New Journal of Physics*, vol. 16, no. 2, p. 023008, February 2014. [Online]. Available: <http://stacks.iop.org/1367-2630/16/i=2/a=023008>
- [42] M. Lochmann, R. Jöhren, C. Geppert, Z. Andelkovic, D. Anielski, B. Botermann, M. Bussmann, A. Dax, N. Frommgen, M. Hammen, V. Hannen, T. Kühn, Y. A. Litvinov, R. Lopez-Coto, T. Stöhlker, R. C. Thompson, J. Vollbrecht, A. Volotka, C. Weinheimer, W. Q. Wen, E. Will, D. Winters, R. Sanchez, and W. Nörtershäuser, “Laser spectroscopy of the ground state hyperfine splittings of  $^{209}\text{Bi}^{82+}$  and  $^{209}\text{Bi}^{80+}$ ,” arXiv:1401.8224, p. 8224, January 2014. [Online]. Available: <http://arxiv.org/pdf/1401.8224v1>
- [43] W. Q. Wen, X. Ma, M. Bussmann, Y. J. Yuan, D. C. Zhang, D. F. A. Winters, X. L. Zhu, J. Li, H. P. Liu, D. M. Zhao, Z. S. Wang, R. S. Mao, T. C. Zhao, J. X. Wu, X. M. Ma, T. L. Yan, G. H. Li, X. D. Yang, Y. Liu, J. C. Yang, J. W. Xia, and H. S. Xu, “Longitudinal dynamics of rf-bunched and electron-cooled ion beam at the csre,” *Nuclear Instruments and Methods in Physics Research Section A : Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 736, no. 1, pp. 75–80, February 2014.
- [44] T. Kluge, T. E. Cowan, A. Debus, U. Schramm, K. Zeil, and M. Bussmann, “Kluge et al. reply:,” *Phys. Rev. Lett.*, vol. 111, no. 21, p. 219502, November 2013. [Online]. Available: <http://prl.aps.org/pdf/PRL/v111/i21/e219502>
- [45] M. Bussmann, H. Burau, T. E. Cowan, A. Debus, A. Huebl, G. Juckeland, T. Kluge, W. E. Nagel, R. Pausch, F. Schmitt, U. Schramm, J. Schuchart, and R. Widera, “Radiative signatures of the relativistic kelvin-helmholtz instability,” in *Proceedings of SC13 : International Conference for High Performance Computing, Networking, Storage and Analysis*, W. Gropp and S. Matsuoka, Eds., ACM. New York, NY, USA: ACM, 2013, pp. 5–1.
- [46] A. Jochmann, A. Irman, M. Bussmann, J. P. Couperus, T. E. Cowan, A. D. Debus, M. Kuntzsch, K. W. D. Ledingham, U. Lehnert, R. Sauerbrey, H. P. Schlenvoigt, D. Seipt, T. Stölker, D. B. Thorn, S. Trotsenko, A. Wagner, and U. Schramm, “High resolution energy-angle correlation measurement of hard x rays from laser-thomson backscattering,” *Phys. Rev. Lett.*, vol. 111, no. 11, p. 114803, September 2013.
- [47] W. Wen, X. Ma, D. Zhang, M. Bussmann, X. Zhu, D. Winters, L. Meng, H. Liu, D. Zhao, Z. Wang, J. Li, R. Mao, T. Zhao, J. Wu, G. Li, X. Yang, Y. Liu, J. Yang, Y. Yuan, J. Xia, and H. Xu, “Preparations for laser cooling of relativistic heavy-ion beams at the csre,” *Physica Scripta*, vol. 2013, no. T156, p. 014090, September 2013.
- [48] W. Nörtershäuser, M. Lochmann, R. Jöhren, C. Geppert, Z. Andelkovic, D. Anielski, B. Botermann, M. Bussmann, A. Dax, N. Frommgen,



- M. Hammen, V. Hannen, T. Kühl, Y. A. Litvinov, J. Volbrecht, T. Stölker, R. C. Thompson, C. Weinheimer, W. Wen, E. Will, D. Winters, and R. M. Sanchez, “First observation of the ground-state hyperfine transition in  $209\text{bi } 80+$ ,” *Physica Scripta*, vol. 2013, no. T156, p. 014016, September 2013.
- [49] L. G. Huang, M. Bussmann, T. Kluge, A. L. Lei, W. Yu, and T. E. Cowan, “Ion heating dynamics in solid buried layer targets irradiated by ultra-short intense laser pulses,” *Physics of Plasmas*, vol. 20, no. 9, p. 093109, September 2013.
- [50] D. Winters, C. Clark, C. Dimopoulou, T. Giacomini, C. Kozhuharov, Y. A. Litvinov, F. Nolden, R. Sanchez, M. S. Sanjari, M. Steck, J. Ullmann, M. Bussmann, U. Schramm, M. Seltmann, M. Siebold, T. Beck, G. Birkel, B. Rein, S. Tichelmann, T. Walther, T. Kühl, M. Lochmann, X. Ma, W. Wen, J. Yang, D. Zhang, W. Nörtershäuser, and T. Stöhlker, “Laser cooling of relativistic  $c3+$  ion beams with large initial momentum spread,” in *Proceedings of Workshop on Beam Cooling and Related topics, COOL13*, ser. THAM1HA04, L. V. Joergensen and V. R. W. Schaa, Eds., CERN. Müren, Switzerland: JACOW, 2013, pp. 166–169.
- [51] L. G. Huang, M. Bussmann, T. Kluge, A. L. Lei, W. Yu, and T. E. Cowan, “Ion heating dynamics in solid buried layer targets irradiated by ultra-short intense laser pulses,” arXiv:1307.5148, p. 5148, July 2013. [Online]. Available: <http://arxiv.org/pdf/1307.5148v1>
- [52] T. Kluge, C. Gutt, L. G. Huang, J. Metzkes, U. Schramm, M. Bussmann, and T. E. Cowan, “Using xfels for probing of complex interaction dynamics of ultra-intense lasers with solid matter,” arXiv:1306.0420, p. 0420, June 2013. [Online]. Available: <http://arxiv.org/pdf/1306.0420v1>
- [53] O. Klimo, M. Jirka, M. Masek, J. Limpouch, M. Bussmann, and G. Korn, “The radiation reaction effect in ultra intense laser foil interactions,” in *Proc. SPIE 8780, High-Power, High-Energy, and High-Intensity Laser Technology; and Research Using Extreme Light: Entering New Frontiers with Petawatt-Class Lasers*, vol. 8780, SPIE - The International Society for Optical Engineering. SPIE, May 2013, p. 87801O.
- [54] W. Q. Wen, M. Lochmann, X. Ma, M. Bussmann, D. F. A. Winters, W. Nörtershäuser, B. Botermann, C. Geppert, N. Frommgen, M. Hammen, V. Hannen, R. Jöhren, T. Kühl, Y. Litvinov, R. Sanchez, T. Stölker, J. Vollbrecht, C. Weinheimer, C. Dimopoulou, F. Nolden, and M. Steck, “Optical measurement of the longitudinal ion distribution of bunched ion beams in the esr,” *Nuclear Instruments and Methods in Physics Research Section A : Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 711, pp. 90–95, May 2013.
- [55] D. Winters, C. Clark, C. Dimopoulou, T. Giacomini, C. Kozhuharov, T. Kühl, Y. Litvinov, M. Lochmann, W. Nörtershäuser, F. Nolden, R. Sanchez, S. Sanjari, M. Steck, T. Stöhlker, J. Ullmann, T. Beck, G. Birkel, B. Rein, S. Tichelmann, T. Walther, X. Ma, W. Wen, J. Yang, D. Zhang, U. Schramm, M. Seltmann, M. Siebold, and M. Bussmann, “Laser cooling of stored relativistic  $c3+$  ions at

- the esr,” in *GSI Scientific Report 2012 - GSI Report 2013-1*, K. Große, Ed. Planckstr. 1, 64291 Darmstadt: GSI Helmholtzzentrum für Schwerionenforschung GmbH, 2013, p. 313. [Online]. Available: <http://repository.gsi.de/record/52207/files/PNI-IONS-EXP-05.pdf>
- [56] R. Dietrich, F. Schmitt, R. Widera, and M. Bussmann, “Phase-based profiling in gpgpu kernels,” in *41st International Conference on Parallel Processing Workshops (ICPPW)*,. 10662 Los Vaqueros Circle, Los Alamitos, CA 90720-1314: IEEE Computer Society Order, 2012, pp. 414–423.
- [57] K. Zeil, J. Metzkes, T. Kluge, M. Bussmann, T. E. Cowan, S. D. Kraft, R. Sauerbrey, and U. Schramm, “Direct observation of prompt pre-thermal laser ion sheath acceleration,” *Nature Communications*, vol. 3, no. 874, p. 1, June 2012.
- [58] J. J. Melone, K. W. D. Ledingham, T. McCanny, T. Burris-Mog, U. Schramm, R. Grotzschel, S. Akhmadaliev, D. Hanf, K. M. Spohr, M. Bussmann, T. Cowan, S. M. Wiggins, and M. R. Mitchell, “Characterisation of permanent magnetic quadrupoles for focussing proton beams,” *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 676, no. 0, pp. 126–134, June 2012.
- [59] T. Kluge, S. A. Gaillard, K. A. Flippo, T. Burris-Mog, W. Enghardt, B. Gall, M. Geissel, A. Helm, S. D. Kraft, T. Lockard, J. Metzkes, D. T. Offermann, M. Schollmeier, U. Schramm, K. Zeil, M. Bussmann, and T. E. Cowan, “High proton energies from cone targets : electron acceleration mechanisms,” *New Journal of Physics*, vol. 14, no. 2, p. 023038, February 2012.
- [60] T. Burris-Mog, K. Harres, F. Nürnberg, S. Busold, M. Bussmann, O. Depert, G. Hoffmeister, M. Joost, M. Sobiella, A. Tauschwitz, B. Zielbauer, V. Bagnoud, T. Herrmannsdoerfer, M. Roth, and T. E. Cowan, “Laser accelerated protons captured and transported by a pulse power solenoid,” *Phys. Rev. ST Accel. Beams*, vol. 14, no. 12, p. 121301, December 2011.
- [61] T. Kluge, T. Cowan, A. Debus, U. Schramm, K. Zeil, and M. Bussmann, “Electron temperature scaling in laser interaction with solids,” *Physical Review Letters*, vol. 107, no. 20, p. 205003, November 2011.
- [62] J. Ren, K. Flippo, S. Gaillard, D. Offermann, J. Cobble, E. Dodd, M. Schmitt, T. Kwan, M. Geissel, M. Schollmeier, T. Kluge, M. Bussmann, J. Rassuchine, T. Burris-Mog, K. Zeil, S. Kraft, J. Metzkes, T. Cowan, T. Lockard, C. Plechaty, Y. Sentoku, B. Gall, X. Yang, and G. Miley, “Raman backscattering from subpicosecond laser pulses in a relativistic laser-plasma interaction,” in *53rd Annual Meeting of the APS Division of Plasma Physics Volume 56, Number 16, November 14-18, 2011, Salt Lake City, Utah*, A. Thomas, Ed., American Physical Society. 1 Physics Ellipse College Park, MD 20740-3844: American Physical Society, November 2011, p. BAPS.2011.DPP.GO8.3.

- [63] W. Enghardt, M. Bussmann, T. Cowan, F. Fiedler, M. Kaluza, J. Pawelke, U. Schramm, R. Sauerbrey, A. Tünnermann, and M. Baumann, “A technology platform for translational research on laser driven particle accelerators for radiotherapy,” in *Proc. SPIE 8079, Laser Acceleration of Electrons, Protons, and Ions; and Medical Applications of Laser-Generated Secondary Sources of Radiation and Particles*, ser. 8079, K. W. D. Ledingham, W. P. Leemans, E. Esarey, S. M. Hooker, K. Spohr, and P. McKenna, Eds., vol. 1, SPIE - The International Society for Optical Engineering. SPIE, 2011, p. 80791F.
- [64] S. A. Gaillard, T. Kluge, K. A. Flippo, M. Bussmann, B. Gall, T. Lockard, M. Geissel, D. T. Offermann, M. Schollmeier, Y. Sentoku, and T. E. Cowan, “Increased laser-accelerated proton energies via direct laser-light-pressure acceleration of electrons in microcone targets,” *Physics of Plasmas*, vol. 18, no. 5, p. 056710, 2011.
- [65] J. J. Melone, K. W. D. Ledingham, T. McCanny, T. Burris-Mog, U. Schramm *et al.*, “In situ characterisation of permanent magnetic quadrupoles for focussing proton beams,” arXiv:1104.1932, p. 1932v1, April 2011. [Online]. Available: <http://arxiv.org/pdf/1104.1932v1>
- [66] M. Bussmann, F. Kroll, M. Löser, M. Siebold, U. Schramm, C. Novotny, W. Nörtershäuser, C. Dimopoulou, F. Nolden, M. Steck, C. Kozhuharov, T. Köhl, T. Stölker, D. F. A. Winters, S. Tichelmann, G. Birkel, T. Beck, B. Rein, T. Walther, X. Ma, and W. Wen, “Laser cooling of relativistic  $c^{3+}$  ions at the esr,” in *GSI Scientific Report 2010 - GSI Report 2011-1*, K. Große, Ed. Planckstr. 1, 64291 Darmstadt, Germany: GSI Helmholtzzentrum für Schwerionenforschung GmbH, 2011, p. 339. [Online]. Available: <http://www.gsi.de/informationen/wti/library/scientificreport2010/PAPERS/PNI-AP-13.pdf>
- [67] T. Kluge, W. Enghardt, S. D. Kraft, U. Schramm, K. Zeil, T. E. Cowan, and M. Bussmann, “Enhanced laser ion acceleration from mass-limited foils,” *Physics of Plasmas*, vol. 17, no. 12, p. 123103, December 2010.
- [68] U. Schramm, K. Zeil, C. Richter, E. Beyreuther, M. Bussmann, T. E. Cowan, W. Enghardt, L. Karsch, T. Kluge, S. Kraft, L. Laschinsky, J. Metzkes, D. Naumburger, J. Pawelke, and R. Sauerbrey, “Ultrashort pulse laser accelerated proton beams for first radiobiological applications,” in *AIP Conference Proceedings 1299(1) of the 14th Advanced Accelerator Concepts Workshop, AAC2010*, S. H. Gold and G. S. Nusinovich, Eds., vol. 1299, no. 1, American Institute of Physics. AIP, November 2010, pp. 731–736.
- [69] T. E. Cowan, U. Schramm, T. Burris-Mog, F. Fiedler, S. D. Kraft, K. Zeil, M. Baumann, M. Bussmann, W. Enghardt, K. Flippo, S. Gaillard, K. Harres, T. Herrmannsdoerfer, T. Kluge, F. Nürnberg, J. Pawelke, M. Roth, B. Schmidt, M. Sobiella, and R. Sauerbrey, “Prospects for and progress towards laser-driven particle therapy accelerators,” in *AIP Conference Proceedings 1299(1) of the 14th Advanced Accelerator Concepts Workshop, AAC2010*, S. H. Gold and G. S. Nusinovich, Eds., vol. 1299, no. 1, American Institute of Physics. AIP, 2010, pp. 721–726.

- [70] T. Kluge, S. A. Gaillard, M. Bussmann, K. A. Flippo, T. Burris-Mog, B. Gall, M. Geissel, S. D. Kraft, T. Lockard, J. Metzkes, D. T. Offermann, J. Rassuchine, M. Schollmeier, U. Schramm, Y. Sentoku, K. Zeil, and T. E. Cowan, “Theoretical understanding of enhanced proton energies from laser-cone interactions,” in *AIP Conference Proceedings 1299(1) of the 14th Advanced Accelerator Concepts Workshop, AAC2010*, S. H. Gold and G. S. Nusinovich, Eds., vol. 1299, no. 1, American Institute of Physics. AIP, 2010, pp. 715–720.
- [71] K. A. Flippo, S. A. Gaillard, T. Kluge, M. Bussmann, D. T. Offermann, J. A. Cobble, M. J. Schmitt, T. Bartal, F. N. Beg, T. E. Cowan, B. Gall, D. C. Gautier, M. Geissel, T. J. Kwan, G. Korgan, S. Kovaleski, T. Lockard, S. Malekos, D. S. Montgomery, M. Schollmeier, and Y. Sentoku, “Advanced laser particle accelerator development at lanl : From fast ignition to radiation oncology,” in *AIP Conference Proceedings 1299(1) of the 14th Advanced Accelerator Concepts Workshop, AAC2010*, S. H. Gold and G. S. Nusinovich, Eds., vol. 1299, no. 1, American Institute of Physics. AIP, 2010, pp. 693–698.
- [72] H. Burau, R. Widera, W. Honig, G. Juckeland, A. Debus, T. Kluge, U. Schramm, T. E. Cowan, R. Sauerbrey, and M. Bussmann, “Picon-gpu : A fully relativistic particle-in-cell code for a gpu cluster,” *Plasma Science, IEEE Transactions on*, vol. 38, no. 10, p. 2831, October 2010.
- [73] A. Debus, M. Bussmann, M. Siebold, A. Jochmann, U. Schramm, T. Cowan, and R. Sauerbrey, “Erratum to : Traveling-wave thomson scattering and optical undulators for high-yield euv and x-ray sources,” *Applied Physics B : Lasers and Optics*, vol. 101, no. 1, pp. 483–483, August 2010.
- [74] S. D. Kraft, C. Richter, K. Zeil, M. Baumann, E. Beyreuther, S. Bock, M. Bussmann, T. E. Cowan, Y. Dammene, W. Enghardt, U. Helbig, L. Karsch, T. Kluge, L. Laschinsky, E. Lessmann, J. Metzkes, D. Naumburger, R. Sauerbrey, M. Schürer, M. Sobiella, J. Woithe, U. Schramm, and J. Pawelke, “Dose dependent biological damage of tumour cells by laser-accelerated proton beams,” *New Journal of Physics*, vol. 12, no. 8, p. 085003, August 2010.
- [75] T. Kluge, W. Enghardt, S. D. Kraft, U. Schramm, Y. Sentoku, K. Zeil, T. E. Cowan, R. Sauerbrey, and M. Bussmann, “Efficient laser-ion acceleration from closely stacked ultrathin foils,” *Physical Review E*, vol. 82, no. 1, p. 016405, July 2010.
- [76] A. D. Debus, M. Bussmann, M. Siebold, A. Jochmann, U. Schramm, T. Cowan, and R. Sauerbrey, “Traveling-wave thomson scattering and optical undulators for high-yield euv and x-ray sources,” *Applied Physics B: Lasers and Optics*, vol. 100, no. 1, pp. 61–76, July 2010. [Online]. Available: <http://www.springerlink.com/content/t232232508026467/fulltext.pdf>
- [77] K. Zeil, S. D. Kraft, S. Bock, M. Bussmann, T. E. Cowan, T. Kluge, J. Metzkes, T. Richter, R. Sauerbrey, and U. Schramm, “The scaling

- of proton energies in ultrashort pulse laser plasma acceleration,” *New Journal of Physics*, vol. 12, no. 4, p. 045015, April 2010.
- [78] T. Kluge, M. Bussmann, S. A. Gaillard, K. A. Flippo, D. C. Gautier, B. Gall, T. Lockard, M. E. Lowenstern, J. E. Mucino, Y. Sentoku, K. Zeil, S. D. Kraft, U. Schramm, T. E. Cowan, and R. Sauerbrey, “Low-divergent, energetic electron beams from ultra-thin foils,” in *AIP Conference Proceedings 1209(1) of the 2nd International Conference on ultra-intense Laser Interaction Science, ULIS 2009*, A. Gamucci, A. Giulietti, and L. Labate, Eds., vol. 1209, no. 1, American Institute of Physics. AIP, 2010, pp. 51–54.
- [79] A. D. Debus, M. Bussmann, U. Schramm, R. Sauerbrey, C. D. Murphy, Z. Major, R. Hörlein, L. Veisz, K. Schmid, J. Schreiber, K. Witte, S. P. Jamison, J. G. Gallacher, D. A. Jaroszynski, M. C. Kaluza, B. Hidding, S. Kiselev, R. Heathcote, P. S. Foster, D. Neely, E. J. Divall, C. J. Hooker, J. M. Smith, K. Ertel, A. J. Langley, P. Norreys, and J. L. Collier, “Electron bunch length measurements from laser-accelerated electrons using single-shot thz time-domain interferometry,” *Physical Review Letters*, vol. 104, no. 8, p. 084802, February 2010.
- [80] M. Bussmann, U. Schramm, P. Thirolf, and D. Habs, “Simulating strongly coupled plasmas on high-performance computers,” in *High Performance Computing in Science and Engineering, Garching/Munich 2009*, S. Wagner, M. Steinmetz, A. Bode, and M. M. Müller, Eds. Springer Berlin Heidelberg, 2010, pp. 589–598.
- [81] U. Schramm, M. Bussmann, W. Nörtershäuser, C. Novotny, C. Geppert, T. Walther, G. Birkel, D. F. A. Winters, T. Kühl, C. Kozhuharov, M. Steck, F. Nolden, C. Dimopoulou, T. Stölker, W. Wen, and X. Ma, “Laser cooling of relativistic ion beams,” in *GSI Scientific Report 2009 - GSI Report 2010-1*, K. Große, Ed. Planckstr. 1, 64291 Darmstadt, Germany: GSI Helmholtzzentrum für Schwerionenforschung GmbH, 2010, p. 384. [Online]. Available: <http://www.gsi.de/informationen/wti/library/scientificreport2009/PAPERS/ATOMIC-PHYSICS-34.pdf>
- [82] J. Szerypo, V. Kolhinen, M. Bussmann, E. Gartzke, D. Habs, J. Neumayr, U. Schramm, C. Schürmann, M. Sewtz, and P. Thirolf, “Status of the penning trap project in munich,” *The European Physical Journal A - Hadrons and Nuclei*, vol. 42, no. 3, pp. 319–322, December 2009.
- [83] S. Becker, M. Bussmann, S. Raith, M. Fuchs, R. Weingartner, P. Kunz, W. Lauth, U. Schramm, M. E. Ghazaly, F. Grüner, H. Backe, and D. Habs, “Characterization and tuning of ultrahigh gradient permanent magnet quadrupoles,” *Physical Review Special Topics - Accelerators and Beams*, vol. 12, no. 10, p. 102801, October 2009.
- [84] M. Bussmann, U. Schramm, W. Nörtershäuser, C. Novotny, C. Geppert, T. Walther, G. Birkel, D. F. A. Winters, T. Kühl, C. Kozhuharov, M. Steck, F. Nolden, C. Dimopoulou, and T. Stölker, “All-optical ion beam cooling and online diagnostics at relativistic energies,” in *Proceedings of Workshop*

- on Beam Cooling and Related topics, COOL09*, Y. Yan and X. Yang, Eds., Institute of Modern Physics, Chinese Academy of Science. Lanzhou, China: Atomic Energy Press, 2009, pp. 22–26. [Online]. Available: <http://accelconf.web.cern.ch/AccelConf/COOL2009/papers/proceed.pdf>
- [85] A. Debus, S. Bock, M. Bussmann, T. E. Cowan, A. Jochmann, T. Kluge, S. D. Kraft, R. Sauerbrey, K. Zeil, and U. Schramm, “Linear and non-linear thomson-scattering x-ray sources driven by conventionally and laser plasma accelerated electrons,” in *Proc. SPIE 7359, Harnessing Relativistic Plasma Waves as Novel Radiation Sources from Terahertz to X-Rays and Beyond*, D. A. Jaroszynski and A. Rousse, Eds., SPIE - The International Society for Optical Engineering. SPIE, 2009, p. 735908.
- [86] S. D. Kraft, K. Zeil, S. Bock, M. Bussmann, T. Kluge, J. Metzkes, T. Richter, T. E. Cowan, R. Sauerbrey, and U. Schramm, “Laser-accelerated ion beams for future medical applications,” in *World Congress on Medical Physics and Biomedical Engineering, September 7 - 12, 2009, Munich, Germany*, O. Dossel and W. C. Schlegel, Eds. Berlin, Heidelberg: Springer Berlin Heidelberg, 2009, pp. 106–107.
- [87] S. Becker, M. Bussmann, S. Raith, M. Fuchs, R. Weingartner, P. Kunz, W. Lauth, S. Schramm, M. E. Ghazaly, F. Grüner, H. Backe, and D. Habs, “Characterization and tuning of ultra high gradient permanent magnet quadrupoles,” arXiv:0902.2371, p. 2371, May 2009. [Online]. Available: <http://arxiv.org/pdf/0902.2371v3>
- [88] V. S. Kolhinen, M. Bussmann, E. Gartzke, D. Habs, J. B. Neumayr, C. Schürmann, J. Szerypo, and P. G. Thirolf, “Commissioning of the double penning trap system mlltrap,” *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*, vol. 600, no. 2, pp. 391–397, March 2009.
- [89] P. G. Thirolf, D. Habs, M. Bussmann, H. J. Maier, J. B. Neumayr, T. Schätz, H. Schmitz, J. Schreiber, J. Szerypo, L. Trepl, and H. F. Wirth, *Towards Optical Control over the Lowest Nuclear Excited State in  $^{229}\text{Th}$* , ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2008, vol. 2008, ch. 2.1 Experiments: Nuclear Spectroscopy, pp. 16–17. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2008/p016017.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2008/p016017.pdf)
- [90] V. S. Kolhinen, M. Bussmann, D. Habs, J. B. Neumayr, U. Schramm, C. Schürmann, M. Sewtz, J. Szerypo, and P. G. Thirolf, “Mlltrap: A penning trap facility for high-accuracy mass measurements,” *Nuclear Instruments and Methods in Physics Research Section B*, vol. 266, no. 19-20, pp. 4547–4550, June 2008.
- [91] M. Bussmann, “Laser-cooled ion beams and strongly coupled plasmas for precision experiments,” Ph.D. dissertation, Ludwig-Maximilians University Munich, Faculty of Physics, Schellingstrasse 4, D-80799 Munich, Germany, 2008. [Online]. Available: [http://edoc.ub.uni-muenchen.de/9729/1/Bussmann\\_Michael.pdf](http://edoc.ub.uni-muenchen.de/9729/1/Bussmann_Michael.pdf)

- [92] J. Szerypo, V. S. Kolhinen, M. Bussmann, D. Habs, J. B. Neumayr, C. Schürmann, M. Sewtz, P. G. Thirolf, and U. Schramm, “Penning trap progress in munich,” *Acta Physica Polonica B*, vol. 39, no. 2, pp. 471–476, February 2008. [Online]. Available: <http://th-www.if.uj.edu.pl/acta/vol39/pdf/v39p0471.pdf>
- [93] V. S. Kolhinen, M. Bussmann, D. Habs, J. B. Neumayr, C. Schürmann, J. Szerypo, and P. G. Thirolf, *Commissioning of the First Trap of the MLLTRAP System*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2007, vol. 2007, ch. 7.1 Instrumentation: Instrumental Developments, p. 93. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2007/p093.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2007/p093.pdf)
- [94] M. Bussmann, U. Schramm, V. S. Kolhinen, J. Szerypo, M. Sewtz, P. G. Thirolf, and D. Habs, *Stopping Dynamics of Highly Charged Ions in a Strongly Coupled Plasma*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2007, vol. 2007, ch. 5. Atomic Physics, p. 60. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2007/p060.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2007/p060.pdf)
- [95] P. G. Thirolf, D. Habs, M. Bussmann, H. J. Maier, J. B. Neumayr, J. Schreiber, M. Sewtz, and J. Szerypo, *Optical Access to the Lowest Nuclear Transition in  $^{229}\text{mTh}$* , ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2007, vol. 2007, ch. 2.1 Experiments : Nuclear Spectroscopy, pp. 18–19. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2007/p018019.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2007/p018019.pdf)
- [96] M. Bussmann, U. Schramm, and D. Habs, “Preparing a laser cooled plasma for stopping highly charged ions,” *European Physical Journal D*, vol. 45, no. 1, pp. 129–132, October 2007.
- [97] M. Bussmann, U. Schramm, D. Habs, M. Steck, T. Kühl, K. Beckert, P. Beller, B. Franzke, W. Nörtershäuser, C. Geppert, C. Novotny, J. Kluge, F. Nolden, T. Stölker, C. Kozhuharov, S. Reinhardt, G. Saathoff, and S. Karpuk, “The dynamics of bunched laser-cooled ion beams at relativistic energies,” *Journal of Physics : Conference Series*, vol. 88, pp. 012 043(1)–012 043(6), 2007.
- [98] M. Bussmann, D. Habs, U. Schramm, K. Beckert, P. Beller, B. Franzke, C. Kozhuharov, T. Kühl, W. Nörtershäuser, F. Nolden, M. Steck, S. Karpuk, C. Geppert, C. Novotny, G. Saathoff, and S. Reinhardt, “Schottky noise signal and momentum spread for laser-cooled bunched ion beams at relativistic energies,” in *Proceedings of the Workshop on Beam Cooling and Related Topics, COOL07 (Bad Kreuznach, Germany)*, R. W. Hasse and V. R. W. Schaa, Eds. Gesellschaft

- für Schwerionenforschung mbH, 2007, pp. 226–229. [Online]. Available: <http://accelconf.web.cern.ch/AccelConf/cl07/PAPERS/FRM1C02.PDF>
- [99] M. Bussmann, U. Schramm, and D. Habs, “Simulating the stopping dynamics of highly charged ions in an ultra-cold, strongly coupled plasma,” *Hyperfine Interactions*, vol. 173, no. 1-3, pp. 27–34, June 2007.
- [100] M. Bussmann, D. Habs, V. S. Kolhinen, J. B. Neumayr, M. Sewtz, S. Scheibe, C. Schürmann, J. Szerypo, and P. G. Thirolf, *From MLL-IonCatcher to MLLTRAP*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching; Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2006, vol. 2006, ch. 7.2 Instrumentation: Instrumental Developments, pp. 81–82. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2006/p081082.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2006/p081082.pdf)
- [101] M. Bussmann, U. Schramm, V. S. Kolhinen, J. Szerypo, M. Sewtz, P. G. Thirolf, and D. Habs, *Stopping Highly Charged Ions in a Laser-cooled Plasma*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching; Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2006, vol. 2006, ch. 5. Atomic Physics, pp. 55–56. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2006/p055056.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2006/p055056.pdf)
- [102] M. Bussmann, U. Schramm, and D. Habs, “Simulating strongly coupled plasmas at low temperatures,” in *AIP Conference Proceedings 862(1) of the International Workshop on Non-Neutral Plasmas 2006, NNP06 (Aarhus, Denmark)*, M. Drewsen, U. Uggerhoj, and H. Knudsen, Eds., American Institute of Physics. AIP, 2006, pp. 221–231.
- [103] M. Bussmann, U. Schramm, D. Habs, V. S. Kolhinen, and J. Szerypo, “Stopping highly charged ions in a laser-cooled one component plasma of ions,” *International Journal of Mass Spectrometry*, vol. 251, no. 2-3, pp. 179–189, April 2006.
- [104] U. Schramm, M. Bussmann, D. Habs, M. Steck, T. Kühl, K. Beckerts, P. Beller, B. Franzke, F. Nolden, G. Saathoff, S. Reinhardt, and S. Karpuk, “Laser cooling and spectroscopy of relativistic c3+ beams at the esr,” in *Laser 2004*, Z. Blaszcak, B. Markov, and K. Marinova, Eds. Springer Berlin Heidelberg, 2006, pp. 181–188.
- [105] U. Schramm, M. Bussmann, D. Habs, T. Kühl, P. Beller, B. Franzke, F. Nolden, M. Steck, G. Saathoff, S. Reinhardt, and S. Karpuk, “Combined laser and electron cooling of bunched c3+ ion beams at the storage ring esr,” in *AIP Conference Proceedings 821(1) of the International Workshop on Beam Cooling and Related Topics, COOL05 (Galena, Illinois (USA))*, S. Nagaitsev and R. J. Pasquinelli, Eds., American Institute of Physics. AIP, 2006, pp. 501–509.
- [106] V. S. Kolhinen, M. Bussmann, D. Habs, J. B. Neumayr, U. Schramm, C. Schürmann, M. Sewtz, J. Szerypo, and P. G. Thirolf, *The MLLTRAP*



- Penning Trap System*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching; Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2005, vol. 2005, ch. 7.2 Instrumentation: Instrumental Developments, p. 83. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2005/p083.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2005/p083.pdf)
- [107] U. Schramm, M. Bussmann, D. Habs, M. Steck, T. Kühl, P. Beller, B. Franzke, F. Nolden, G. Saathoff, S. Reinhardt, and S. Karpuk, *Combined Laser and Electron Cooling of Bunched C<sup>3+</sup> Beams at the ESR*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching; Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2005, vol. 2005, ch. 5. Atomic Physics, p. 46. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2005/p046.pdf](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2005/p046.pdf)
- [108] U. Schramm, M. Bussmann, D. Habs, M. Steck, T. Kühl, K. Beckert, P. Beller, B. Franzke, F. Nolden, G. Saathoff, S. Reinhardt, and S. Karpuk, “Laser cooling and spectroscopy of relativistic c<sup>3+</sup> beams at the esr,” *Hyperfine Interactions*, vol. 162, no. 1, pp. 181–188, April 2005.
- [109] U. Schramm, M. Bussmann, D. Habs, T. Kühl, P. Beller, B. Franzke, F. Nolden, M. Steck, G. Saathoff, S. Reinhardt, and S. Karpuk, “Laser-spectroscopy of the 2s<sub>2s</sub>-2p<sub>2p</sub> transitions of relativistic li-like carbon ions at the esr,” in *Proceedings of the 6th International Conference on Nuclear Physics at Storage Rings, STORI-2005 (Bonn, Germany)*, D. Chiladze, A. Kacharava, and H. Stroher, Eds. Forschungszentrum Jülich, 2005, pp. 324–327. [Online]. Available: <http://hdl.handle.net/2128/574>
- [110] U. Schramm, M. Bussmann, D. Habs, M. Steck, T. Kühl, K. Beller, P. Beckert, B. Franzke, F. Nolden, G. Saathoff, S. Reinhardt, and S. Karpuk, “Laser cooling of relativistic heavy ion beams,” in *Proceedings of the 2005 Particle Accelerator Conference, PAC05 (Knoxville, Tennessee (USA))*, C. Horak, Ed. American Physical Society, 2005, pp. 401–403. [Online]. Available: <http://cern.ch/AccelConf/p05/PAPERS/FOAD004.PDF>
- [111] U. Schramm, M. Bussmann, D. Habs, M. Steck, T. Kühl, K. Beckert, P. Beller, B. Franzke, H. J. Kluge, F. Nolden, T. Stölker, G. Saathoff, S. Reinhardt, and S. Karpuk, *Laser Cooling and Spectroscopy of Relativistic C<sup>3+</sup> Beams at the ESR*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching; Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2004, vol. 2004, ch. 5. Atomic Physics, p. 56. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2004/p056.ps](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2004/p056.ps)
- [112] U. Schramm, M. Bussmann, and D. Habs, “From laser cooling of non-relativistic to relativistic ion beams,” *Nuclear Instruments and Methods in Physics Research Section A*, vol. 532, no. 1-2, pp. 348–356, October 2004.

- [113] M. Roth, A. Blazevic, E. Brambrink, M. Geissel, T. E. Cowan, J. Fuchs, A. Kemp, H. Ruhl, P. Audebert, J. Cobble, J. Fernandez, M. Hegelich, S. Letzring, K. Ledingham, P. McKenna, R. Clarke, D. Neely, S. Karsch, D. Habs, U. Schramm, M. Bussmann, and J. Schreiber, “Laser-acceleration and laser-cooling for ion beams,” in *Proceedings of the 9th European Particle Accelerator Conference 2004, EPAC04 (Lucerne, Switzerland)*, J. Chrin, C. Petit-Jean-Genaz, J. Poole, C. Prior, and H. A. Synal, Eds. European Physical Society, 2004, pp. 54–58. [Online]. Available: <http://accelconf.web.cern.ch/AccelConf/e04/PAPERS/TUYACH01.PDF>
- [114] U. Schramm, M. Bussmann, T. Schätz, and D. Habs, “Observations on bunched crystalline ion beams,” in *Proceedings of the International Conference on Quantum Aspects Of Beam Physics 2003 : The Joint 28th ICFA Advanced Beam Dynamics And Advanced and Novel Accelerators (Hiroshima, Japan)*, P. Chen and K. Reil, Eds. World Scientific Publishing Co. Pte. Ltd., 2004, pp. 489–499. [Online]. Available: <http://www.worldscibooks.com/physics/5680.html>
- [115] U. Schramm, M. Bussmann, D. Habs, M. Steck, T. Stölker, B. Franzke, F. Nolden, and T. Kühl, *Laser Cooling of Stored Relativistic Heavy Ion Beams*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching, Germany: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2003, vol. 2003, ch. 5. Atomic Physics, p. 57. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2003/p57.ps](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2003/p57.ps)
- [116] M. Bussmann, D. Habs, F. Horak, and U. Schramm, *Structural and Temporal Analysis of Crystalline Ion Beams*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching, Germany: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2003, vol. 2003, ch. 5. Atomic Physics, p. 56. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2003/p56.ps](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2003/p56.ps)
- [117] U. Schramm, T. Schätz, M. Bussmann, and D. Habs, “Storage of crystalline beams,” in *Proceedings of the 2003 Particle Accelerator Conference, PAC03 (Portland, Oregon(USA))*, J. Chew, P. Lucas, and S. Webber, Eds. American Physical Society, 2003, pp. 112–116. [Online]. Available: <http://cern.ch/AccelConf/p03/PAPERS/TOAA004.PDF>
- [118] —, “Spatial compression of bunched crystalline ion beams,” *Physica Scripta*, vol. 2003, no. T104, pp. 189–195, June 2003.
- [119] M. Bussmann, U. Schramm, T. Schätz, and D. Habs, “Structural changes in bunched crystalline ion beams,” *Journal of Physics A*, vol. 36, no. 22, pp. 6119–6127, May 2003.
- [120] T. Schätz, U. Schramm, M. Bussmann, and D. Habs, “Crystallisation of ion beams in the rf quadrupole storage ring pallas,” *Applied Physics B*, vol. 76, no. 2, pp. 183–190, February 2003.

- [121] U. Schramm, T. Schätz, M. Bussmann, and D. Habs, “Cooling and heating of crystalline ion beams,” *Journal of Physics B*, vol. 36, no. 3, pp. 561–571, January 2003.
- [122] M. Bussmann, D. Habs, T. Schätz, and U. Schramm, *Dynamics and Structural Properties of Crystalline Ion Beams*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching, Germany: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2002, vol. 2002, ch. 7. Atomic Physics, p. 63. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2002/p63.ps](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2002/p63.ps)
- [123] U. Schramm, T. Schätz, M. Bussmann, and D. Habs, “The quest for crystalline ion beams,” *Plasma Physics and Controlled Fusion*, vol. 44, no. 12B, pp. B375–B387, November 2002.
- [124] M. Bussmann, “Associated higgs production at tevatron and lhc,” Master’s thesis, Ludwig-Maximilians University Munich, Faculty of Physics, Schellingstrasse 4, D-80799 Munich, Germany, 2002. [Online]. Available: [http://www.etp.physik.uni-muenchen.de/dokumente/thesis/diplom\\_bussmann.pdf](http://www.etp.physik.uni-muenchen.de/dokumente/thesis/diplom_bussmann.pdf)
- [125] M. Bussmann, G. Duceck, D. Schaile, R. Ströhmer, and T. Trefzger, *Associated Higgs Production at Tevatron and LHC*, ser. Annual Report. Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, Am Coulombwall 6, D-85748 Garching: Maier-Leibnitz-Laboratorium der Universität und der Technischen Universität München, 2001, vol. 2001, ch. 4. Particle Physics, p. 41. [Online]. Available: [http://www.bl.physik.uni-muenchen.de/bl\\_rep/jb2001/p41.ps](http://www.bl.physik.uni-muenchen.de/bl_rep/jb2001/p41.ps)