

# CV of Erik Panzer

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**Research interests:** Feynman integrals, multiple (elliptic) polylogarithms and zeta values, motivic periods, perturbative quantum field theory, scattering amplitudes, renormalization, combinatorial Hopf algebras, iterated integrals, graph complexes

## Studies and employment in mathematics and physics

since 10/2020	Royal Society University Research Fellow (grant <a href="#">URF\R1\201473</a> ) at <a href="#">Mathematical Institute, University of Oxford (UK)</a>
10/2015–09/2020	Post-Doctoral Research Fellow at <a href="#">All Souls College, Oxford (UK)</a>
03/2015	PhD (Dr. rer. nat.) in mathematics (HU), grade: summa cum laude Thesis “ <a href="#">Feynman integrals and hyperlogarithms</a> ”
07/2014–09/2015	<a href="#">Institut des Hautes Études Scientifiques</a> , Bures-sur-Yvette, France
2011–2014	Research associate and PhD student at HU under <a href="#">Prof. Dr. Dirk Kreimer</a>
10/2010–07/2011	<a href="#">Humboldt-Universität zu Berlin (HU)</a> Master thesis “ <a href="#">Hopf-algebraic renormalization of Kreimer’s toy model</a> ”
10/2009–09/2010	<a href="#">University of Cambridge, UK</a> (Part III of the mathematical tripos), degree <i>Certificate of Advanced Study in Mathematics</i> with Distinction
10/2008–09/2009	<a href="#">Freie Universität Berlin</a>
10/2006–09/2008	<a href="#">Brandenburgische Technische Universität (BTU)</a> , Cottbus
1999–2006	<a href="#">Max-Steenbeck-Gymnasium</a> (Cottbus), final grades (Abitur): 1.0

## Practical experience

01–03/2023	<a href="#">16 hour lecture course: Electromagnetism</a>
10/2022–02/2023	supervision of a masters thesis (Jean-Luc Portner)
07–09/2022	supervision of a summer research project with 2 undergraduate students
since 2021	co-supervision of PhD student Simone Hu
07–09/2021	supervision of a summer research project with 6 undergraduate students
2021	coeditor of <a href="#">Algebraic Structures in Perturbative Quantum Field Theory</a>
10/2020–05/2021	supervision of 4 undergraduate dissertations tutor for <a href="#">Differentiable Manifolds</a>
07–08/2019	supervision of two undergraduate summer projects
2018–2022	co-supervision of PhD student <a href="#">Matija Tapušković</a>
since 2012	30 reviews for journals including: <a href="#">AIHPD</a> , <a href="#">AMS Contemp. Math.</a> , <a href="#">CJM</a> , <a href="#">CMP</a> , <a href="#">CNTF</a> , <a href="#">CPC</a> , <a href="#">E-JC</a> , <a href="#">Front. Phys.</a> , <a href="#">IRMA Lect.</a> , <a href="#">J. Algebra</a> , <a href="#">JCA</a> , <a href="#">JHEP</a> , <a href="#">JMP</a> , <a href="#">JNCG</a> , <a href="#">JNT</a> , <a href="#">J. Phys. A</a> , <a href="#">Nagoya Math. J.</a> , <a href="#">Nucl. Phys. B</a> , <a href="#">Open Math.</a> , <a href="#">SIGMA</a>
10/2011–02/2012	Teaching assistant: <a href="#">Introduction to Quantum Field Theory I</a>
08/2008–09/2008	Programming internship with Miaplaza Inc. (San Francisco, USA)

## Practical experience (continued)

04/2008–07/2008	Teaching assistant: <i>Linear algebra</i>
03/2008–08/2008	Student research assistant, project: <i>adaptive traffic control</i>
10/2007–02/2008	Teaching assistant: <i>Discrete Mathematics</i>

### *(Co-)Organization of scientific events*

05–09/09/2022	<a href="#">Tropical and Convex Geometry and Feynman integrals</a> , ETH-ITS Zurich
27–28/06/2022	<a href="#">Special Values of L-functions, Periods, and Fundamental Groups</a> , Oxford
16/11–20/11/2020	<a href="#">Algebraic Structures in Perturbative Quantum Field Theory</a> , IHES Paris
22–23/07/2019	<a href="#">Arithmetic and Geometric Aspects of Modular Forms</a> , Oxford
18–22/03/2019	<a href="#">The Mathematics of Linear Relations between Feynman Integrals</a> , MITP Mainz
11/02–12/04/2019	<a href="#">Modular forms, periods and scattering amplitudes</a> , ITS/ETH Zürich
19/12/2017	KMPB-Day, Adlershof Berlin

## Prizes and awards

2020	<a href="#">Hermann Weyl Prize</a> of the International Colloquium on Group Theoretical Methods in Physics
10/2009–08/2010	Foreign exchange scholarship from the <a href="#">Studienstiftung</a> <sup>1</sup>
07/2010	College Prize ( <a href="#">Peterhouse</a> , Cambridge) „Retrospective Title of Scholar“
07/2008	Participation in the <a href="#">58th Lindau Nobel Laureate meeting</a> as a „Fellow of the <a href="#">Wilhelm und Else Heraeus Stiftung</a> “
2006 and 2007	<a href="#">Student prize</a> of the <a href="#">German Physical Society (DPG)</a>
2006	<a href="#">18th IOI</a> <sup>2</sup> (Mexico): bronze medal, <a href="#">37th IPhO</a> (Singapore): gold medal
2005	Admission to the <a href="#">Studienstiftung</a> <a href="#">17th IOI</a> (Poland): bronze medal, <a href="#">36th IPhO</a> (Spain): bronze medal <a href="#">BOI</a> <sup>3</sup> (Lithuania): gold medal, <a href="#">12nd CEOI</a> (Hungary): bronze medal
2004	<a href="#">11st CEOI</a> (Poland): silver medal, <a href="#">16th IOI</a> (Greece): bronze medal

## Scientific publications

### *Preprints*

1. Feynman symmetries of the Martin and  $c_2$  invariants of regular graphs (with K. Yeats)  
April 2023. [[arXiv:2304.05299](#)]

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<sup>1</sup>Studienstiftung des Deutschen Volkes (German National Academic Foundation)

<sup>2</sup>IOI = International Olympiad in Informatics, IPhO = International Physics Olympiad

<sup>3</sup>BOI = Baltic Olympiad in Informatics, CEOI = Central European Olympiad in Informatics

## Scientific publications (continued)

- Hierarchies in relative Picard-Lefschetz theory (with M. Berghoff)  
December 2022. [[arXiv:2212.06661](#)]
- Five-loop massless propagator integrals (w. A. Georgoudis, V. Gonçalves and R. Pereira)  
February 2018. [[arXiv:1802:00803](#)]

## Journal articles

- Hepp's bound for Feynman graphs and matroids  
*Ann. Inst. H. Poincaré D* **10** (2023), no. 1 pp. 31–119. [[arXiv:1908.09820](#)]
- Two-loop mixed QCD-EW corrections to  $q\bar{q} \rightarrow Hg$ ,  $qg \rightarrow Hq$ , and  $\bar{q}g \rightarrow H\bar{q}$  (with M. Bonetti and L. Tancredi)  
*JHEP* **2022** (Mar., 2022) p. 115. [[arXiv:2203.17202](#)]
- Glue-and-cut at five loops (with A. Georgoudis, V. Gonçalves, R. Pereira, A. V. Smirnov and V. A. Smirnov)  
*JHEP* **2021** (Sept. 2021) 098. [[arXiv:2104.08272](#)]
- Four-loop collinear anomalous dimensions in QCD and  $\mathcal{N} = 4$  super Yang-Mills (with B. Agarwal, A. von Manteuffel and R. M. Schabinger)  
*Physics Letters B* **820**, 136503, Sep. 2021. [[arXiv:2102.09725](#)]
- Two-loop mixed QCD-EW corrections to  $gg \rightarrow Hg$  (with M. Bonetti, V. A. Smirnov and L. Tancredi) *JHEP* **2020** (Nov. 2020) 45. [[arXiv:2007.09813](#)]
- The four-loop cusp anomalous dimension from the  $\mathcal{N} = 4$  Sudakov form factor (with T. Huber, A. von Manteuffel, R. M. Schabinger and G. Yang),  
*Physics Letters B* **807**, 135543, August 2020. [[arXiv:1912.13459](#)]
- Multiple zeta values in deformation quantization (with P. Banks and B. Pym)  
*Inventiones Mathematicae* **222** (2020), pp. 79–159. [[arXiv:1812.11649](#)]
- Cusp and collinear anomalous dimensions in four-loop QCD from form factors (with A. von Manteuffel and R. M. Schabinger),  
*Phys. Rev. Lett.* **124**, 162001 – 24 April 2020. [[arXiv:2002.04617](#)]
- Lambert-W solves the noncommutative  $\Phi^4$ -model (with R. Wulkenhaar),  
*Commun. Math. Phys.* **374** (2020), pp. 1935–1961. [[arXiv:1807.02945](#)]

## Scientific publications (continued)

13. Manifestly dual-conformal loop integration (with J. Bourjaily and F. Dulat),  
*Nuclear Physics B* **942** (May 2019), pp. 251–302. [[arXiv:1901.02887](#)]
14. Feynman integral relations from parametric annihilators (with T. Bitoun, C. Bogner and R. P. Klausen),  
*Letters in Mathematical Physics* **109**(3) (2019), pp. 497–564. [[arXiv:1712.09215](#)]
15. Loopedia, a database for loop integrals (with C. Bogner, S. Borowka, T. Hahn, G. Heinrich, S. P. Jones, M. Kerner, A. von Manteuffel, M. Michel and V. Papara)  
*Computer Physics Communications* **225** (2018), pp. 1–9. [[arXiv:1709.01266](#)]
16. The Galois coaction on  $\phi^4$  periods (with O. Schnetz),  
*Communications in Number Theory and Physics* **11** (2017) no. 6, pp. 657–705.  
[[arXiv:1603.04289](#)]
17. Minimally subtracted six loop renormalization of  $O(n)$ -symmetric  $\phi^4$  theory and critical exponents (with M. V. Kompaniets), *selected as an Editors' Suggestion*,  
*Phys. Rev. D* **96**, 036016 (2017). [[arXiv:1705.06483](#)]
18. Graphical functions in parametric space (with M. Golz and O. Schnetz),  
*Letters in Mathematical Physics* **107**(6) (2017) no. 6, pp. 1177–1192. [[arXiv:1509.07296](#)]
19. The parity theorem for multiple polylogarithms,  
*Journal of Number Theory* **172** (March 2017) pp. 93–113. [[arXiv:1512.04482](#)]
20. Computation of form factors in massless QCD with finite master integrals (with A. von Manteuffel and R. M. Schabinger),  
*Physical Review D* **93**:125014, June 2016. [[arXiv:1510.06758](#)]
21. A quasi-finite basis for multi-loop Feynman integrals (with A. von Manteuffel and R. M. Schabinger),  
*Journal of High Energy Physics*, **2015**(2):120, February 2015. [[arXiv:1411.7392](#)]
22. Algorithms for the symbolic integration of hyperlogarithms with applications to Feynman integrals,  
*Computer Physics Communications* **188**, pp. 148–166, March 2015. [[arXiv:1403.3385](#)]
23. On hyperlogarithms and Feynman integrals with divergences and many scales,  
*Journal of High Energy Physics*, **2014**(3):71, March 2014. [[arXiv:1401.4361](#)]
24. On the analytic computation of massless propagators in dimensional regularization,  
*Nuclear Physics B* **874** pp. 567–593, September 2013. [[arXiv:1305.2161](#)]

## Scientific publications (continued)

### *Conference proceedings*








25. Some open problems on Feynman periods, pp. 29–44 in *Periods in Quantum Field Theory and Arithmetic* (J. I. Burgos Gil, K. Ebrahimi-Fard and H. Gangl, eds.), vol. 314 of *Springer Proceedings in Mathematics & Statistics*, Springer, 2020. (Workshop Research Trimester on Multiple Zeta Values, Multiple Polylogarithms, and Quantum Field Theory, ICMAT, Madrid, Spain, September 15–December 19, 2014)
26. Renormalization group functions of  $\phi^4$  theory in the MS-scheme to six loops (with M. V. Kompaniets),  
in *Loops and Legs in Quantum Field Theory (Leipzig, Germany), 24–29 April 2016*.  
Proceedings of Science, PoS(LL2016)038. [[arXiv:1606.09210](#)]
27. Renormalisation, Hopf algebras and Mellin transforms,  
in *Feynman Amplitudes, Periods and Motives* (L. Álvarez-Cónsul, J. I. Burgos-Gil and K. Ebrahimi-Fard, eds.), vol. 648 of *Contemporary Mathematics*, (Providence, RI), pp. 169–202, Amer. Math. Soc., 2015, proceedings of the conference at ICMAT Madrid (July 2–6, 2012). [[arXiv:1407.4943](#)]
28. Feynman integrals via hyperlogarithms,  
in *Loops and Legs in Quantum Field Theory (Weimar, Germany), 27 April–2 May 2014*.  
Proceedings of Science, PoS(LL2014)049. [[arXiv:1407.0074](#)]
29. Renormalization and Mellin transforms (with D. Kreimer)  
in *Computer Algebra in Quantum Field Theory* (C. Schneider and J. Blümlein, eds.), vol. XII of *Texts & Monographs in Symbolic Computation*, pp. 195–223, Springer Wien, Sept., 2013. [[arXiv:1207.6321](#)]

### *Other*






30. Symbolic integration with hyperlogarithms,  
*Computeralgebra Rundbrief* **56** (Mar., 2015) pp. 6–9.
31. Feynman integrals and hyperlogarithms,  
PhD thesis, Humboldt-Universität zu Berlin, 2014. [[arXiv:1506.07243](#)]
32. Hopf-algebraic renormalization of Kreimer’s toy model,  
Master’s thesis, Humboldt-Universität zu Berlin, July, 2011. [[arXiv:1202.3552](#)]

## Scientific activities

### *Invited seminar talks and research stays*<sup>4</sup>

30/11/2023	(S) Niels Bohr Institute, Copenhagen	
19–21/06/2023	(S) DESY Theory Seminar, Hamburg	
10/05/2023	(S) Seminar on motives and period integrals in Quantum field theory and String theory, Oxford	
26/04–05/05/2023	McGill University, Montréal	
17–21/04/2023	(S) Institute for Advanced Study, Princeton	
03–15/04/2023	Perimeter Institute, Waterloo	
23–24/03/2023	(S) MATHEXP-PolSys Seminar, Inria Saclay	
22/08–02/09/2022	(S) New connections in number theory and physics, INI Cambridge	
01–14/05/2022	<i>Research in Pairs</i> “Motives in Deformation Quantization” with Clément Dupont and Brent Pym, MFO Oberwolfach	
20/12/2021	(S) Humboldt-Universität zu Berlin (online)	
01/06/2021	(S) Japan Europe Number Theory Exchange Seminar (online)	
07/05/2021	(S) IPPP Seminar, Durham (online)	
10/03/2021	(S) Arithmetic Geometry and Quantum Field Theory, Warwick (online)	
27/10/2020	(S) Calgary Algebra & Number Theory Seminar (online)	
19/10/2020	(S) Matroid Union, Waterloo (online)	
12/06/2020	(S) Mathematical Physics Seminar, Lyon (online)	
28/05/2020	(S) NIKHEF, Amsterdam (online)	
27/04/2020	(S) ETH Zürich (online)	
09–12/12/2019	Humboldt-Universität zu Berlin	
28/11/2019	(S) Dalitz Seminar in Fundamental Physics, Oxford	
01/11/2019	(S) Maths HEP Lunchtime Seminars, Durham	
29/10/2019	(S) Relativity Seminar, University of Oxford	
17–24/09/2019	Spacetime and quantum mechanics, total positivity and motives, CSMA Harvard	
02–06/09/2019	Valeurs zêta multiples en quantification par déformation, IMAG Montpellier	
29–30/07/2019	(S) Max-Planck-Institut für Physik, München	
18–19/06/2019	(S) Felix Klein Kolloquium, TU Kaiserslautern	
04/04/2019	(S) Talks in mathematical physics, ETH Zürich	
25/03–12/04/2019	Modular forms, periods and scattering amplitudes, ITS Zürich	
11–15/03/2019	Modular forms, periods and scattering amplitudes, ITS Zürich	
18–21/02/2019	(S) Niels Bohr Institute, Copenhagen	
24/01/2019	(S) Mathematical Physics Seminar, The University of York	
19/12/2018	(S) QFT and String Theory seminar, Humboldt-Universität zu Berlin	
17–21/12/2018	(S) Humboldt-Universität zu Berlin	
13/12/2018	(S) Séminaire de Mathématique, IHÉS, Bures-sur-Yvette	
	(S) Séminaire Darboux, LPTHE, Paris	
07/12/2018	(S) Southampton High Energy Physics Seminar	
26–30/11/2018	(S) Séminaire AGATA, Institut Montpellierain A. Grothendieck	

## Scientific activities (continued)

15/10/2018 (S)	String Theory Seminar, University of Oxford	
24–30/05/2018	University of Waterloo	
18–20/04/2018 (S)	Niels Bohr Institute, Copenhagen	
26–30/03/2018	University of Edinburgh	
26/02–02/03/2018 (S)	Amplitudes and Periods, HIM, Bonn	
18–22/12/2017 (S)	Humboldt-Universität zu Berlin	
07/12/2017 (S)	String Theory Seminar, DESY, Hamburg	
06–30/11/2017 (S)	Kyushu University, Fukuoka	
26/05/2017 (S)	North meets South Colloquium, Oxford	
08/03/2017 (S)	Edinburgh Mathematical Physics Group, Edinburgh	
26–27/01/2017	LPTHE, Paris	
01–02/12/2016 (S)	DAMTP, Cambridge	
29–30/11/2016 (S)	University of Liverpool	
23–25/11/2016	CERN, Geneva	
02–04/10/2016 (S)	NIKHEF, Amsterdam	
18–19/07/2016 (S)	Particle Physics Seminar, ETH Zürich	
17/06/2016 (S)	University of Warwick	
13–15/06/2016 (S)	Humboldt-Universität zu Berlin	
02–03/05/2016 (S)	Albert-Ludwigs-Universität, Freiburg	
07/04/2016 (S)	5th Itzykson seminar, IHES, Bures-sur-Yvette	
14–27/03/2016 (S)	Simon Fraser University, Vancouver	
29/02–04/03/2016	Max-Planck-Institut für Mathematik, Bonn	
15–17/02/2016 (S)	School of Mathematics, Trinity College Dublin	
01–05/02/2016 (S)	Emmy-Noether-Seminar, FAU Erlangen	
26/01/2016 (S)	University of Oxford	
30/11–02/12/2015 (S)	Humboldt-Universität zu Berlin	
14/09–18/09/2015	Johannes-Gutenberg-Universität (THEP), Mainz	
30/04–01/05/2015 (S)	Higgs Centre for Theoretical Physics, Edinburgh	
21–24/04/2015 (S)	Humboldt-Universität zu Berlin	
19–20/01/2015	NCSR Demokritos, Athens	
09–12/12/2014 (S)	Johannes-Gutenberg-Universität (THEP), Mainz	
05–09/12/2014 (S)	KIT (TTP), Karlsruhe	
21/11/2014 (S)	Insitute for Theoretical Studies, Zürich	
17/11–28/11/2014	ICMAT, Madrid	
22/09–03/10/2014 (S)	ICMAT, Madrid	
18–29/08/2014	NIKHEF, Amsterdam	
05–07/05/2014 (S)	Max-Planck-Institut für Physik, München	
17–19/03/2014 (S)	ITP, ETH Zürich	
08/01/2014 (S)	Research seminar “Quantum Fields and Strings” (HU Berlin)	
12/12/2013 (S)	DESY Theory Seminar Zeuthen	
25–29/03/2013	Institut des Hautes Études Scientifiques, Bures-sur-Yvette	

<sup>4</sup>Speaker (S) indicates that I gave a talk.

## Scientific activities (continued)

### *Workshops and conferences*






- 02–05/10/2023 (S) Tropical Geometry and Infrared Divergences: Heated Discussions on Cool Topics, Institute for Advanced Study, Princeton 
- 07–11/08/2023 Amplitudes conference, CERN, Geneva 
- 10–14/07/2023 (S) SIAM Conference on Applied Algebraic Geometry, Eindhoven 
- 14–16/06/2023 From perturbative to non-perturbative QFT, Münster 
- 19–22/07/2022 (S) Group34 (ICGTMP), Straßbourg 
- 28/03–01/04/2022 Graph Complexes and Quantum Field Theory, HU Berlin (online participation) 
- 15–18/11/2021 (S) Higher Structures Emerging from Renormalisation, ESI Vienna 
- 18–22/10/2021 (S) Elliptics '21, Uppsala 
- 09–13/08/2021 (S) GEOQUANT 2021, Freiburg (online participation) 
- 16/06/2021 (S) StringMath, IMPA (online) 
- 05–09/10/2020 (S) Antidifferentiation and the Calculation of Feynman Amplitudes, Zeuthen (online participation) 
- 18–20/12/2019 Intersection theory and Feynman integrals, Padova 
- 09–13/09/2019 Graph complexes in algebraic geometry and topology, Manchester 
- 22–23/07/2019 Arithmetic and Geometric Aspects of Modular Forms, Oxford 
- 02–04/07/2019 Amplitudes, Dublin 
- 31/05–04/06/2019 (S) Supergravity Divergences and Modular Graph Forms, Uppsala 
- 18–22/03/2019 (S) The Mathematics of Linear Relations between Feynman Integrals, MITP Mainz 
- 29/10–09/11/2018 Amplitudes in the LHC era, Galileo Galilei Institute for Theoretical Physics, Florence 
- 05–08/09/2018 (S) Elliptic integrals in Mathematics and Physics, ETZ Zürich, Ascona 
- 13–17/08/2018 (S) International Workshop on Arithmetic Geometry and Quantum Field Theory, KIAS Seoul 
- 18–22/06/2018 (S) Amplitudes, SLAC 
- 25/05/2018 (S) Combinatorial structures in perturbative QFT 2: transforms and graph counting, University of Waterloo 
- 29/04–04/05/2018 (S) Loops & Legs in Quantum Field Theory, St Goar 
- 03–26/01/2018 Periods in Number Theory, Algebraic Geometry and Physics, HIM, Bonn 
- 11–12/11/2017 (S) Polylogs, multiple zetas, and related topics, Tohoku University, Sendai 
- 04–15/09/2017 (S) Mathematics and Physics of Scattering Amplitudes, MIAPP Munich 
- 28/08–01/09/2017 (S) Motives for Periods, Berlin 
- 11–12/07/2017 Amplitudes, Edinburgh 
- 26–30/06/2017 Algebraic Combinatorics, Resurgence, Moulds and Applications (CARMA), CIRM, Luminy 






## Scientific activities (continued)

07/06/2017	(S) Workshop on multi-loop calculations, Paris	
06–09/06/2017	(S) The elliptic/missing Feynman integrals, ETH Zürich	
10–14/04/2017	(S) Iterated integrals and the Regge limit, Higgs Centre, Edinburgh	
27–31/03/2017	Galois Theory of Periods and Applications, MSRI Berkeley	
06–10/02/2017	Amplitudes: Practical and Theoretical Developments, MITP Mainz	
13–14/07/2016	(S) ICMS 2016, ZIB Berlin	
04–08/07/2016	Amplitudes, NORDITA, Stockholm	
23/06–02/07/2016	Aspects of Amplitudes, NORDITA, Stockholm	
24–25/05/2016	Number Theory and Physics, Institut Henri Poincaré, Paris	
25–29/04/2016	(S) Loops & Legs in Quantum Field Theory, Leipzig	
21/03/2016	(S) CombStructPQFT, SFU Vancouver	
08–12/02/2016	(S) Paths to, from and in renormalization, Potsdam	
20–23/07/2015	(S) Applications of Computer Algebra (ACA), Kalamata	
06–10/07/2015	(S) Amplitudes, Zürich	
22–26/06/2015	International Conference in Number Theory and Physics, IMPA, Rio de Janeiro	
15–19/06/2015	(S) RADCOR/LoopFest, Los Angeles	
01–04/06/2015	(S) CanaDAM, Saskatoon	
02–13/03/2015	The interrelation between mathematical physics, number theory and noncommutative geometry, ESI Vienna	
18/01/2015	(S) HOCTOOLS NNLO meeting, Athens	
01–04/12/2014	Workshop on Multiple Zeta Values, Modular Forms and Elliptic Motives II, Madrid	
15–19/09/2014	(S) Numbers and Physics, Madrid	
27/04–02/05/2014	(S) Loops & Legs in Quantum Field Theory, Weimar	
27/03/2014	(S) DPG-Frühjahrstagung, Mainz	
07–09/11/2013	(S) Renormalisation from Quantum Field Theory to Random and Dynamical Systems, Potsdam	
02–06/07/2012	Periods and Motives, A Modern Perspective on Renormalization, Madrid	
25–29/06/2012	Quantum Field Theory, Periods and Polylogarithms III, dedicated to David Broadhurst's 65th birthday, Berlin	

## Schools

02–04/08/2023	(S) Amplitudes Summer School, CERN, Geneva	
08–09/06/2023	(S) Workshop and School on Complex Lagrangians, Integrable Systems, and Quantization, Oxford	
19–23/07/2021	(S) The Amplitude Games, MITP Mainz (online)	
17–20/02/2020	(S) 2nd SAGEX training school, HU Berlin	
20–24/05/2019	(S) Masterclass: Elliptic Motives, KTH and University of Stockholm	
11–15/02/2019	(S) Modular forms, periods and scattering amplitudes, ETH Zürich	

## Scientific activities (continued)

- 04–15/06/2018 (S) Summer school on structures in local quantum field theory, Les Houches 
- 25–29/05/2015 (S) Applied combinatorics graduate summer school, Saskatoon 
- 09–20/06/2014 (S) Summer school on structures in local quantum field theory, Les Houches 
- 01–05/10/2013 (S) Multiple Zeta Values in Mathematics and Physics, KOSMOS Summer University, Berlin 
- 03–12/07/2013 Polylogarithms as a Bridge between Number Theory and Particle Physics, London Mathematical Society - EPSRC Durham Symposium 
- 18–22/03/2013 (S) Feynman Graphs and motives, Bingen 
- 10–14/09/2012 New Methods for Field Theory Amplitudes, Arnold Sommerfeld School, LMU München 
- 11–16/09/2011 Symmetries, Fundamental Interactions and Cosmology, Frauenchiemsee 
- 09/2010 (S) Summer academy of the *Studienstiftung*, San Giovanni  
Project: *The direct method of the calculus of variations* 
- 07 – 09/2009 (S) *DESY Summer student programme*, Zeuthen 
- 08/2007 (S) Summer academy of the *Studienstiftung*, Schloß Neubeuern  
Project: *Billiards and Veech-groups of origamis* 