

Svatopluk Krýsl

born 1978, February 28
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Employment in academic area

2018 – associate professor, Faculty of Mathematics and Physics, Charles University (CU)

2016 – 2017 scientific researcher, Faculty of Mathematics and Physics, CU

2005 – 2016 assistant professor, Faculty of Mathematics and Physics, CU

Oct 2006 – Jan 2007 post-doc Faculty of Mathematics and Nat. Sciences II, Humboldt University
in Berlin

Oct 2004 – Dec 2004 post-doc at Eduard Čech Centre for Algebra and Geometry (Czech republic)

Education and Qualifications

- 2017 Habilitation (qualification for associate professorship) in Geometry and Topology at CU,
defence of habilitation thesis „Symplectic Spinors and Hodge Theory“

- 2001 - 2004 doctoral studies in Geometry and Topology, Global Analysis and General structures
Representation Theory at CU and, partly, at Vienna University, dissertation thesis „Invariant
differential operators for contact projective geometry“

- study of Cartan geometry, general geometry, complex manifolds, LG rep. theory – invariants and
combinatorics and super-symmetry

- 2001 MSc. in Theoretical Physics (spec. Math. Phys. and Gravitation), CU

– 1996 – 2001 study of Physics, 1999 – 2001 specialisation at Chair of Theoretical Physics of CU,
diploma thesis: „Resolution of twistors for zero mass particles of spin 3/2“, exams: theoretical and
math. physics (gravity – cosmological models with dust and cosmological constant, QT: spin and
statistics, MP: heat equation, boundary value problems for classical PDE's)

Stages and Studies abroad

Sept. 2022 visitor at Int. Erw. Schrodinger institute for mathematics and physics

2007 – 2017 short stages at University of Marburg

2005 – 2012 short stages at Erwin Schrödinger Institute for Mathematical Physics in Vienna (ESI)

Jan – Feb 2004 visitor at ESI,

summer semester 2003 post-graduate studies at Vienna University (Math.)

summer semester 2000 graduate studies at University of Konstanz (Math.)

Scientific Journal articles

- Families of Elliptic complexes in Symplectic Geometry*, Journal of Geometry and Physics, Vol. 224, Elsevier (2026). **IF 1.2** (Q1 in math.)
- Twistor operators in symplectic geometry*, *Adv. Appl. Cliff. Algebr.*, 32, Springer, no.1, Paper No. 14, (2022). **IF 1.5** (Q2 in math.)
- Induced C^* -complexes in metaplectic geometry*. Zbl 07005135, Commun. Math. Phys., 365, No. 1, 61-91 (2019). **IF 2.338**
- Elliptic complexes over C^* -algebras of compact operators*, Zbl 1334.58010, Journal of Geometry and Physics, Vol. 101, 27-37, Elsevier (2016). **IF 0.819**
- Hodge theory for complexes over C^* -algebras with an application to A -ellipticity*. Zbl 1328.58002, Ann. Global Anal. Geom. 47, No. 4, 359-372 (2015). **IF 0.684**
- Analysis over C^* -algebras and the oscillatory representation*. Zbl 1311.81159, J. Geom. Symmetry Phys. 33, 1-25 (2014).
- Hodge theory for elliptic complexes over unital C^* -algebras*. Zbl 1316.58017, Ann. Global Anal. Geom. 45, No. 3, 197-210 (2014). **IF 0.684**
- Cohomology of the de Rham complex twisted by the oscillatory representation*. Zbl 1294.58001, Differ. Geom. Appl. 33, Suppl., 290-297 (2014). **IF 0.691**
- Howe duality for the metaplectic group acting on symplectic spinor valued forms*. Zbl 1275.17015, J. Lie Theory 22, No. 4, 1049-1063 (2012). **IF 0.455**
- Symplectic Killing spinors*. Zbl 1249.53093, Commentat. Math. Univ. Carol. 53, No. 1, 19-35 (2012).
- Ellipticity of the symplectic twistor complex*. Zbl 1249.22009, Arch. Math., Brno 47, No. 4, 309-327 (2011).
- Complex of twistor operators in symplectic spin geometry*. Zbl 1203.53024, Monatsh. Math. 161, No. 4, 381-398 (2010). **IF 0.647**
- Structure of the curvature tensor on symplectic spinors*. Zbl 05736308, J. Geom. Phys. 60, No. 9, 1251-1261 (2010). **IF 0.652**
- Symplectic Dirac operator and its generalization*. Zbl 1181.81079, Adv. Appl. Clifford Algebr. 18, No. 3-4, 853-863 (2008). **IF 0.396**
- Classification of 1st order symplectic spinor operators over contact projective geometries*. Zbl 1155.58017, Differ. Geom. Appl. 26, No. 5, 553-565 (2008). **IF 0.533**
- Symplectic Dirac operator and its higher spin analogues*. Zbl 1166.58305 Simos, Theodore E. (ed.) et al., American Institute of Physics (AIP) (ISBN 978-0-7354-0576-9/hbk). AIP Conference Proceedings 1048, 674-677 (2008).
- Relation of the spectra of symplectic Rarita-Schwinger and Dirac operators on flat symplectic manifolds*. Zbl 1199.58011, Arch. Math., Brno 43, No. 5, 467-484 (2007).
- Decomposition of a tensor product of a higher symplectic spinor module and the defining representation of $sp(2n, C)$* . Zbl 1120.17006, J. Lie Theory 17, No. 1, 63-72 (2007). **IF 0.367**
- Classification of p -homomorphisms between higher symplectic spinors*. Zbl 1193.53171, Čadek, Martin (ed.), The proceedings of the 25th winter school "Geometry and physics", Srní, Czech Republic, January 15–22, 2006. Palermo: Circolo Matematico di Palermo. Supplemento ai Rendiconti del Circolo Matematico di Palermo. Serie II 79, 117-127 (2006).
- Symplectic spinor valued forms and invariant operators acting between them*. Zbl 164.58320 Arch. Math., Brno 42, No. 5, 279-290 (2006).
- On a distinguished class of infinite dimensional representations of $sp(2n, C)$* . Zbl 1100.15014, Slovák, Jan (ed.) et al., The proceedings of the 24th winter school "Geometry and physics", Srní, Czech Republic, January 17–24, 2004. Palermo: Circolo Matematico di Palermo. Supplemento ai Rendiconti del Circolo Matematico di Palermo. Serie II 75, 269-277 (2005).
- A description of p -homomorphisms between harmonic modules in projective contact geometry*. Zbl 1149.17300, Bureš, Jarolím (ed.) et al., Differential geometry and its applications. Proceedings,

Matfyzpress (ISBN 80-86732-63-0/pbk), 333-340 (2005).

BGG diagrams for contact graded odd dimensional orthogonal geometries. Zbl

1083.17011, Acta Univ. Carol., Math. Phys. 45, No. 1, 67-77 (2004). Acta Univ. Carol., Math. Phys. 45, No. 1, 67-77 (2004).

Textbook

Pavel Čihák et al., *Matematická analýza pro fyziky V.*, Matfyzpress, Praha, (2003), 320 pp. (ISBN 8086732126), (authors M. Rokyta, J. Gřondilová, S. Krýsl, D. Ondřích, T. Ostatnický, D. Šmíd, K. Výborný)

Theses

Habilitation thesis – *Symplectic spinors and Hodge theory*, Charles University, Prague, 2016, submitted by faculty in 2017

Dissertation thesis – *Invariant Operators for Contact projective geometries*, Mathematical Institute of CU, Faculty of Mathematics and Physics, Prague, 2004

Diploma thesis – *Resolution of twistors for zero-mass particles of spin 3/2 (in Czech)*, Faculty of Mathematics and Physics, Prague, 2001

Reviews for journals (excerptum)

Annals of Global Analysis and Geometry; Journal of Geometric Analysis; Journal of Geometry and Physics; Symmetry, Integrability and Geometry: Methods and Applications; Archivum Mathematicum (Brno); Comment. Math. Univ. Carolinae; Journal of Geometry and Symmetry in Physics; Mathematica Bohemica

Current-contents review for

Zentralblatt für Mathematik (from 2004), EMS newsletter (2003–2008), Journal of Geometry and Symmetry in Physics

Foundation, Scholarships and Prizes

2020 – 2022 Czech Science Foundation (research team member)

2017 – 2019 Czech Science Foundation (17-01171S, research team member)

2006 – 2008 Czech Science Foundation (GP201/P6/223, principal researcher, postdoc foundation)

2004 – 2006 Foundation of Charles University (447/2004/B-MAT/MFF, researcher)

2003 Austrian Academic Exchange Office (OaAD, research at ESI)

2002 McKinsey foundation (study scholarship used for study at Vienna University)

2000 Herbert Quandt foundation (study scholarship for study in Univ. Konstanz, Germany)

1996 Prize of the Minister of Education, Youth and Sport of Czech Republic for a result in competitions in mathematics for high school students

Talks at Conferences, Workshops and Seminars (excerptum)

Winter School (school, conference and workshop) Geometry and Physics, *Schur—Weyl—Howe-type duality and ellipticity of the symplectic twistor complex* (JČMF, Masaryk U. in Brno, MFF UK), Srní (Pilsen region), Jan 14-21, 2023.

Conference "Spaces, Structures, Symmetries", *Complexes of symplectic twistor operators*, University of Bari, Bari (Puglia), Aug 28-Sept 2, 2022.

Program (conference & workshop & courses) of I-ESI-MaP "Geometry for Higher Spin Gravity: Conformal Structures, PDEs, and Q-manifolds", *Differential operators invariant with respect to compact operators*, International Erwin Schroedinger Institute for Mathematics and Physics (former ESI), Vienna, 2021

Meeting of the Expro Centre on the topic "Homotopical and homological methods and tools related to mathematical physics", *Elliptic operators on homogeneous bundles over compact spaces*, Masaryk University, Charles University, Telc (Jihlava region), 2019.

Conference "Dirac operators in differential geometry and global analysis, In memory of Thomas Friedrich (1949-2018)", *Elliptic operators on homogeneous bundles over compact spaces*, Mathematical Institute of Polish Academy of Sciences, University Marburg, University of Warmia and Mazury, conference center in Bedlewo by Poznan (Greater Poland), October 2019.

International conference "Differential Geometry and its Applications", *Elliptic operators and Homogeneous spaces*, University Hradec Kralove, Dept. Mathematics and Statistics of Masaryk University, Hradec Kralove, September 2019

Dirac operators in differential geometry and global analysis, In memory of Thomas Friedrich, MI Polish Acad. Sciences, University Marburg, University Warmia and Mazury, Bedlewo, 2019

International conference "Differential Geometry and its Applications" (University Hradec Kralove, 2019)

International Conference on Topology and Application (Nafpaktos, 2018)

Annual Congress of Austrian Mathematical Society and German Mathematical Union (Salzburg, 2017)

Classical and Quantum Symmetry in Mathematics a Physics (University Jena, 2016)

seminar talk (Institute of Theoretical Physics, CU, 2016)

Workshop on Almost Hermitian and Contact Geometry (Bedlewo, 2015)

International Conference on Differential Geometry and Application (Brno, 2015)

seminar talk (Phillips University Marburg, 2014)

Cartan Connection, Geometry of Homogeneous Spaces and Dynamics (Vienna University, 2011)

Workshop and Conference on Lie theory a Complex Geometry (Univ. Marburg, 2010)

Conference on Geometry, Integrability and Quantization (St. Konstantin a St. Helena, 2010)

International Conference on Numerical Analysis and Applied Mathematics – section on Dirac operators and Representation theory (Kos, 2008)

Special Geometry in Mathematical Physics (Kühlungsborn, 2008)

seminar talk (Humboldt University, 2007)

International Conference on Differential Geometry and Application (Olomouc, 2007)

honour seminar DG - Smoczyk (Leibniz university Hannover, 2006)

seminar talk DGGAI (Humboldt University, 2006)

International Conference on Differential Geometry and Application (Praha, 2004)

Winter School of Geometry and Physics (Srní, Czech republic, repeatedly during 2004–2023)

Academic administrative

2003 – 2004 a 2008 – 2014 member of Academic senate of Faculty of Mathematics and Physics of Charles University (Study and Economic commissions)

Theses advisory

dissertation thesis

M. Holíková (born Dostalová), *Symplectic spin geometry*, CU, Prague, 2016

diploma theses

S. Hudeček, *Spectrum of Dirac operator on symplectic Grassmannian $Gr(2,4)$* , 2022

M. Dostálová, *Twistorový operátor v symplektické spinorové geometrii (Twistor operator in symplectic spin geometry)*, 2011

K. Pazourek, *Kontaktní geometrie typu F_4 (Contact geometry of type F_4)*, 2007

bachelor theses

D. Stejskal, *Moufangove rovina (Moufang plane)*, 2022 (among others completed proof of a thm. in Harvey's 'Spinors and Calibrations'; coherent presentation of the Moufang plane)

Š. Hudeček, *Symetrie a separace Laplaceova operátoru v nízkých dimenzích (Symmetry and separation of Laplace operator in low dimensions)*, 2019

D. Kokoška, *Integrabilita Hamiltonovy mechaniky (Integrability of Hamilton mechanics)*, 2019

M. Poppr, *Prostorové formy (Space forms)*, 2018

J. Kuchařík, *Variační počet ve fyzice a geometrii (Calculus of variation in Physics and Geometry)*, 2016

J. Nárožný, *Diferenciální geometrie a dynamika (Differential geometry and Dynamics)*, 2015

L. Peksová, *Kvantová logika a projektivní geometrie (Quantum logic and Projective geometry)*, 2013

M. Vaňkát (in that times), *Spinory v Minkowského časoprostoru (Spinors in Minkowski space time)*, 2011

P. Hájek, *Setrvačnický v R^4 (Spinning tops in R^4)*, 2011

M. Dostálová, *Projektivní oktonionová rovina (Projective octonion plane)*, 2009

Teaching - excerpted years

2022

summer semester

Noncommutative harmonic analysis 3/1

Advanced topics on groups for physicists 2/1

winter semester

Principles of harmonic analysis 3/1

2021

summer semester

Noncommutative harmonic analysis 3/1

Advanced topics on groups for physicists 2/1

Exc. Linear Algebra 2 (math.)

winter semester

Principles of harmonic analysis 3/1

Exc. Math. analysis for physicists 1

Exc. Linear algebra 1 (math.)

2020

summer semester

winter semester

2019

summer semester

Harmonic analysis 2 3/1

Advanced topics in group theory for physicists 2/0

winter semester

Linear algebra I 2/0

Harmonic analysis 1 3/1

2018

summer semester

Advanced topics in group theory for physicists 2/0

exercise Mathematical analysis II 0/3

winter semester

Riemannian geometry 1 2/0

exercise Riemannian geometry 1 0/2

Riemann surfaces 2/0

2017

summer semester

Harmonic analysis 2 3/0

exercise Harmonic analysis 2 0/1

exercise Linear algebra II 0/2

exercise Linear algebra II 0/2

Advanced topics from group theory for physicists 2/0

winter semester

exercise Linear algebra I 0/2

exercise Linear algebra I 0/2

exercise Linear algebra I 0/2

seminar in Philosophy problems of Computer sciences 0/1

Harmonic analysis 1 3/0

exercise Harmonic analysis 1 0/1

2016

summer semester

Harmonic analysis 2 3/0

exercise Harmonic analysis 2 0/1

exercise Linear algebra and geometry II 0/2

exercise Linear algebra and geometry II 0/2
seminar Philosophy problems of Computer science 0/1

winter semester

Harmonic analysis 1 3/0
exercise Harmonic analysis 1 0/1
exercise Linear algebra and geometry I 0/2
exercise Linear algebra and geometry I 0/2
seminar Philosophy problems of Computer science 0/1

2015

summer semester

Theory of invariants 2/0
exercise Theory of invariants 0/2
exercise Linear algebra II 0/2
exercise Linear algebra II 0/2
seminar Philosophy problems of Computer science 0/1

winter semester

Mathematics for Physicists III 4/0
exercise Mathematics for physicists III 0/2
exercise Linear algebra I 0/2
seminar Philosophy problems of Computer science 0/1

2014

summer semester

Mathematics for Physicists II 3/0
exercise Mathematics for physicists II 0/2
Theory of Invariants 2/0
exercise Theory of invariants 0/2
seminar Philosophy problems of Computer science 0/1

winter semester

Mathematics for Physicists I 4/0
exercise Mathematics for physicists I 0/2
seminar on Philosophy problems of computer science 0/1

Taught lectures, seminars and proseminars – summary

Seminar in Differential Geometry (repeatedly)
Vector bundles and Gauge theories
Mathematical analysis 1 (repeatedly)
Mathematical analysis 2
Mathematics for Physicists I
Mathematics for Physicists II
Mathematics for Physicists III
Riemannian geometry 1
Riemann surfaces
Differential geometry of curves and surfaces
Proseminar to differential geometry of curves and surfaces (repeatedly)

Proseminar to geometric methods of Hamiltonian mechanics (in winter semester 1999/2000)
Representations of Lie groups 1 (repeatedly)
Representations of Lie groups 2
Representations of Lie groups 3 (repeatedly)
Representations of Lie groups 4
Theory of invariants (repeatedly)
Harmonic analysis 1 (repeatedly)
Harmonic analysis 2 (repeatedly)
Advanced topics from group theory for physicists (repeatedly)
Linear algebra I (repeatedly)
Seminar Philosophical problems of Computer science (with a colleague 2013–2018)
Students seminars on topics of current mathematical physics of strings and conformal field theory (2005 – 2011) – not outscribed at the fac. level

Taught exercises – summary

Linear algebra I, II (students of physics) - repeatedly
Linear algebra and geometry I, II (students of mathematics) - repeatedly
Mathematical analysis I, II (students of physics), Mathematics for physicists 1, 2 a 3 - repeatedly
Representation Theory of Lie groups 1 – 4 – parts of them more times
Harmonic analysis 1, 2
Riemannian geometry 1
Theory of Invariants - repeatedly