

# Filip Misev

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nationality              Swiss

languages               German (native), English (fluent), French (fluent).

## Research interests

Low dimensional topology and geometry (knots, surfaces, knot concordance), singularity theory.

## Education

2012 – 2016              PhD in Mathematics advised by Prof. Sebastian Baader at the University of Bern.  
Thesis: *On the plumbing structure of fibre surfaces.*

2008 – 2012              MSc in Mathematics at the University of Basel, Master thesis advised by  
Prof. Norbert A'Campo on *periodic points and symplectic monodromy of singularities.*

2005 – 2008              BSc in Mathematics with minor in Physics at the University of Basel.

## Professional experience

04.2020 – present      Wissenschaftlicher Mitarbeiter, Fakultät für Mathematik der Universität Regensburg.

03.2018 – 03.2020      Postdoc at the Max Planck Institute for Mathematics, Bonn.

09.2016 – 02.2018      Postdoc at Aix-Marseille University, research group of Prof. Michel Boileau, Ana Lecuona,  
Benjamin Audoux. Funding: Swiss National Science Foundation, early postdoc.mobility.

2012 – 2016              Teaching assistant at the Mathematical Institute of the University of Bern.

2008 – 2012              Teaching assistant at the Mathematical Institute of the University of Basel.

2006                      Short term training at the cancer research laboratory at the Manitoba Institute of Cell  
Biology (MICB) in Winnipeg, Canada.

2005                      Job at Medika AG pharmaceuticals, Aesch, Switzerland (later Teva Pharma AG, Basel);  
administration of pharmaceutical registration documents.

## Teaching experience

**Advised Theses**      Bachelor's thesis *On the Alexander polynomial of satellite knots*  
Zulassungsarbeit *Evolution, Sicherheit und Effizienz moderner Verschlüsselungsverfahren*

## Lectures

2024                      Elementare Zahlentheorie (Lehramt Grund- Mittel- und Realschule)

2023                      Seminar Singularitäten komplexer Hyperflächen (together with Jonathan Bowden)  
Examenskurs Analysis (Lehramt Gymnasium)

2022                      Knot theory (together with Stefan Friedl)  
Elementare Zahlentheorie (Lehramt Grund- Mittel- und Realschule)  
Proseminar Elementargeometrie (Lehramt Grund- Mittel- und Realschule)

2021                      Examenskurs Analysis (Lehramt Gymnasium) - hybrid format  
Elementare Zahlentheorie (Lehramt Grund- Mittel- und Realschule) - online on „zoom“

2020                      Examenskurs Analysis (Lehramt Gymnasium) - online on „zoom“  
Elementare Zahlentheorie (Lehramt Grund- Mittel- und Realschule) - online on „zoom“

2019                      Algebraic curves, topics course for master students at the University of Bonn  
(2h per week, 14 weeks)

before 2019              Occasional lecture substitution in first year courses.  
90 minutes lecture on fibred knots during master course on Invariants of knots and  
3-manifolds and knot invariants at the University of Bonn, by W. Lück and P. Teichner.

**Service lectures**      Exercise classes in mathematics for natural sciences

**Exercise classes**      Linear Algebra, Analysis, Complex analysis, Geometry, Differential geometry,  
Riemannian geometry, Topology

**Seminars**                Algebraic curves, Proseminar Elementargeometrie, Seminar on singular points of complex  
hypersurfaces, following Milnor's book.

## **Publications and preprints**

- [12] (with S. Baader, L. Lewark and P. Truöl): *Minimal cobordisms between thin and thick torus knots* **preprint** (2024), arXiv:2405.13719.
- [11] (with M. Kegel, L. Lewark, N. Manikandan, L. Mousseau and M. Silvero): *On unknotting fibered positive knots and braids*, **preprint** (2023), arXiv:2312.07339.
- [10] (with S. Baader, L. Lewark and P. Truöl): *3-braids with maximal 4-genus* **Transactions of the AMS**, Series B, 11 (2024), p. 600-621, arXiv:2303.11918.
- [9] (with S. Friedl and R. Zentner): *Rational homology ribbon cobordism is a partial order* (2022), **accepted** for publication in **Algebraic & Geometric Topology**, arXiv:2204.10730.
- [8] (with S. Baader, R. Blair and A. Kjuchukova): *The bridge number of arborescent links with many twigs* **Algebraic & Geometric Topology** 23 (2023), no. 1, p.75-85, arXiv:2008.00763.
- [7] (with G. Spano): *Tight fibred knots without L-space surgeries* **Glasgow Mathematical Journal** (2020), 1-9, arXiv:1906.11760.
- [6] (with S. Baader, A. Kjuchukova, L. Lewark and A. Ray): *Average four-genus of two-bridge knots* (2019), **accepted** for publication in **Proceedings of the AMS**, arXiv:1902.05721.
- [5] (with A. Pichon): *Lipschitz normal embedding among superisolated singularities* **International Mathematics Research Notices**, (2019), rnz221, arXiv:1810.10179.
- [4] *On families of fibred knots with equal Seifert forms* **Communications in Analysis and Geometry** 29 (2021), no. 2, p.465-482, arXiv:1703.07632.
- [3] (with S. Baader): *On the stabilisation height of fibre surfaces in  $S^3$*  **Journal of Knot Theory and Its Ramifications**, 27 (2018), no. 3, p.1840001, arXiv:1607.00857.
- [2] *Hopf bands in arborescent Hopf plumbings* **Osaka Journal of Mathematics**, 56 (2019), no. 2, pp. 375-389, arXiv:1601.01933.
- [1] *Cutting arcs for torus links and trees* **Bulletin de la Société Mathématique de France**, 145 (2017), no. 3, pp. 575-602, arXiv:1409.0644.

### Talks upon invitation and talks at conferences

- 04 / 2024 **Regensburg** – *On the unknotting number and the genus*, 12<sup>th</sup> Bavarian Geom. & Top. Meeting.
- 02 / 2024 **Fribourg** – *Braids on three strings with maximal four-genus*, Oberseminar Geometrie.
- 11 / 2023 **Dijon** – *Les tresses à trois brins de 4-genre maximal*, uB, Séminaire GADT.
- 05 **Montpellier** – *Audition maître de conférences*, IMAG, **job interview**.
- 02 **Notre Dame IN, (USA)** – *Ribbon cobordism between knots and 3-manifolds*, Topology seminar.
- 09 / 2022 **Berlin** – *Ribbon cobordism between knots and 3-manifolds*, FU, **DMV-Jahrestagung 2022**.
- 09 **Montpellier** – *Cobordismes ribbon entre nœuds et entre variétés de dimension trois*, IMAG.
- 09 **Marseille** – *Cobordismes ribbon entre nœuds et entre variétés de dimension trois*, I2M.
- 07 **Grenoble** – *Meridional rank of arborescent links with many twigs*, **AMS-EMS-SMF Meeting**.
- 01 *Families of fibred knots with the same Seifert form*, [K-OS] **Knot Online Seminar, virtual**.
- 2020 *Meridional rank of arborescent links with many twigs*, **Boston College GTD virtual seminar**.  
*Fibred knots, positivity and L-spaces*, **virtual, NCSGT** (two pre-recorded 30 minute talks).
- 2019 **Bern** – *Positive fibred knots and the unknotting number*, Mini Swiss Knots workshop.  
**Neuchâtel** – *Positive fibred knots and the unknotting number*, InterCity Seminar.  
**Regensburg** – *An introduction to knot concordance*, Low-dimensional topology workshop.  
**Bonn** – *Unknot positive knots!*, MPIM, **5 min talk at 4-manifolds workshop**.  
**Bonn** – *Fibre surfaces, knots, and elastic strings*, MPIM, Oberseminar-Kolloquium.  
**Regensburg** – *Fibred knots, positivity and concordance*, Oberseminar Globale Analysis.  
**Zürich** – *Algebraic knots, L-spaces and concordance*, ETH, **Swiss Knots 2019**.  
**Reims** – *Lipschitz normal embedding among superisolated singularities*, **WinterBraids IX**.  
**Bern** – *Metric distortion of algebraic varieties*, Mathematisches Kolloquium.
- 2018 **Marseille** – *Nœuds fibrés, positivité et concordance*, I2M, Séminaire GDT.  
**Oaxaca** – *Lipschitz normal embeddings among superisolated singularities*, **CMO-BIRS**, workshop on Lipschitz geometry of singularities.  
**Bonn** – *Fibred knots and concordance*, MPIM, MPI-Oberseminar.  
**Caen** – *Sur la concordance des nœuds fibrés*, LMNO, Séminaire Algèbre et Géométrie.  
**Marseille** – *Sur les points périodiques d'une monodromie*, I2M, Séminaire Singularités.
- 2017 **Grenoble** – *Sur la concordance des nœuds fibrés*, Institut Fourier, Séminaire de Topologie.  
**Köln** – *The stabilisation height of fibre surfaces*, Mathematisches Institut, Oberseminar GTA.  
**Köln** – *Introduction to fibred knots*, Mathematisches Institut, **graduate lecture**.  
**Montpellier** – *Sur la concordance des nœuds fibrés*, IMAG, Séminaire Topologies.
- 2016 **Marseille** – *La structure de plombage des nœuds fibrés*, I2M, Séminaire GDT.  
**Strasbourg** – *Hopf bands and quadratic forms*, IRMA, Séminaire GT3.
- 2015 **Grenoble** – *Hopf bands and quadratic forms*, Institut Fourier, Séminaire de Topologie.  
*Knots and surfaces*, uB Dijon, Séminaire étudiants.  
**Paris** – *Bandes non-nouées, surfaces fibrées et groupes de Coxeter*, IMJ-PRG, Sémin. Top.  
**Pau** – *Cutting and glueing fibre surfaces*, **Winterbraids V**.
- 2014 **Rennes** – *Nœuds fibrés*, Séminaire "Pampers" des jeunes chercheurs en géométrie.
- 2013 **Zürich** – *What is...Monodromy?* ETH, Graduate colloquium.

### Seminar talks

- 2011 – now Seminar and graduate colloquium contributions on various topics, among others:
- |                               |  |                            |
|-------------------------------|--|----------------------------|
| Lefschetz fixed point theorem | quasimorphisms and laws after D.Calegari           | monodromy of singularities |
| plane algebraic curves        | vector bundles and K-theory                        | fibred knots               |
| h-principle                   | twisted bands in embedded surfaces                 | Mostow's rigidity theorem  |
| trisections of 4-manifolds    | hyperbolic volume of alternating knots             | Basel problem              |
| Murasugi sums and fibrations  | ribbon concordance is a partial order after I.Agol |                            |
| Conical structure theorem     | Theorem of Whitney on (non-)singular varieties     |                            |

### **Selected conferences attended**

- 04 / 2024 Regensburg: 12<sup>th</sup> Bavarian Geometry & Topology Meeting (**plenary talk**)
- 09 / 2023 Regensburg: SwissKnots 2023
- 07 / 2023 Regensburg: Gauge theory and its applications to geometry and low-dimensional topology
- 2022 Berlin - FU: Jahrestagung der DMV 2022 (**plenary talk** in the geometry/topology section)  
Grenoble: AMS-EMS-SMF meeting (**plenary 20 min talk** in the low-dim. topology section)  
Regensburg/Creswick: Dynamics, Foliations, and Geometry II (MATRIX workshop, hybrid)
- 2021 Dijon: WinterBraids XI  
Regensburg: Perspectives on quantum link homology theories  
Fribourg: Swiss Knots 2021  
[virtual] Regensburg: Seminar on foundations in 3-manifold topology IV (**shared talk** with L. Lewark)
- 2020 [virtual] NCNGT: Nearly Carbon Neutral Geometric Topology Conference (**two pre-recorded 30 min talks**)  
Pisa: WinterBraids X
- 2019 Bern: Mini Swiss Knots, one-day workshop (**plenary talk**)  
Regensburg: Arbeitstagung on foliations  
Regensburg: Low-dimensional topology workshop (**plenary talk**)  
Bonn - MPIM: Workshop on 4-manifolds (**plenary 5 min talk**)  
Zürich - Swiss Knots 2019 (**plenary talk**)  
Le Croisic (Nantes) - Knot concordance and low-dimensional manifolds  
Reims - LMR-FRE: WinterBraids IX (**plenary talk**)
- 2018 Oaxaca - CMO-BIRS: Workshop on Lipschitz geometry of singularities (**plenary talk**)  
Marseille - CIRM: Knotted embeddings in dimensions 3 and 4  
Marseille - CIRM: Winterbraids VIII  
Marseille - CIRM: Representation spaces, Teichmüller theory, and their relationship with 3-manifolds from the classical and quantum viewpoints
- 2017 Marseille: Lipschitz geometry of singularities  
Bern: Swiss Knots 2017  
Marseille: Workshop on profinite groups and topology  
Cambridge - INI: 3-manifold workshop
- 2016 Bonn - MPIM: Conference on 4-manifolds and knot concordance  
Dubrovnik - IUC: Perspectives in topology and geometry of 4-manifolds
- 2015 Edinburgh - ICMS: Topological methods in singularity theory  
Genève - Swiss Knots 2015  
Pau: Winterbraids V (**plenary talk**)
- 2014 Providence - ICERM: Combinat. Link Homology Theories, Braids, and Contact Geometry  
La Llagonne: Winter school on Jones polynomial and hyperbolic volume
- 2013 Toulouse - Low-dimensional Topology and Geometry in Toulouse  
Cortona - INdAM Meeting: Geometric topology in Cortona
- 2012 Bern - Workshop: Algebra and Geometry  
Les Diablerets - The h-principle Seminar and autumn school  
Strasbourg: 89<sup>e</sup> rencontre entre physiciens théoriciens et mathématiciens: Invariants quantiques des 3-variétés en mathématiques et en physique
- 2011 Mainz - Autumn School: Topology of Singularities  
Aberdeen - LMS-EPSRC: Short Course on Symplectic Geometry
- 2010 Higashi-Hiroshima - Graduate School of Advanced Sciences of Matter, Hiroshima University -  
Workshop: Branched Coverings, Degenerations and Related Topics 2010
- 2009 Edmonton - University of Alberta: PIMS Algebra Summer School
- 2008 Strasbourg: Semaine spéciale Géométrie et Théorie des Groupes