


Andreas Klingler

Curriculum Vitae

Institute for Theoretical Physics
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Education

- 2020 – **Ph.D. candidate in Theoretical Physics**, University of Innsbruck, Austria.
Tensor Decompositions with Invariance, Positivity and Approximations
supervised by [assoz.-Prof. Gemma De les Coves](#) and [Univ.-Prof. Tim Netzer](#)
- 2016 – 2022 **Bachelor and Master in Mathematics**, University of Innsbruck, Austria.
Thesis: [The Causal Compatibility Problem in Categorical Probability](#)
supervised by [Ass.-Prof. Tobias Fritz](#)
- 2015 – 2020 **Bachelor and Master in Theoretical Physics**, University of Innsbruck, Austria.
Thesis: [Approximate Tensor Decompositions: Disappearance of Many Separations](#)
supervised by [assoz.-Prof. Gemma De les Coves](#) and [Univ.-Prof. Tim Netzer](#)

Fellowships

- 2022 – 2024 DOC Fellowship of the Austrian Academy of Sciences
- 2016 – 2020 Performance-based scholarships by the University of Innsbruck

Conferences & Workshops

Invited Talks

3. Border Ranks of Positive and Invariant Tensor Decompositions: Applications to Correlations
Analytical and Combinatorial Methods in Quantum Information Theory II. Edinburgh, Scotland. July 25, 2023.
2. Border Ranks of Locally Positive and Invariant Tensor Decompositions
SIAM Conference on Applied Algebraic Geometry (AG 23). Eindhoven, The Netherlands. July 12, 2023.
1. General tensor decompositions with invariance, positivity and approximations
Annual congress of the Real Sociedad Matemática Española (RSME). Ciudad Real, Spain (Online). Jan. 19, 2022.

Contributed Talks

3. The d -separation criterion in Categorical Probability
5th International Conference on Applied Category Theory (ACT 2022). Glasgow, Scotland. July 21, 2022 (distinguished presentation).
2. Approximate tensor decompositions: disappearance of many separations
16th Conference on Effective Methods in Algebraic Geometry (MEGA 2021). Tromsø, Norway (Online). June 11, 2021.

1. Approximate tensor decompositions: disappearance of many separations
15th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2020). Riga, Latvia (Online). June 12, 2020 (acceptance rate: 25%).

Posters

8. Many bounded versions of undecidable problems are NP-hard
18th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2023). Aveiro, Portugal (Online). July 24 – July 28, 2023.
7. Many bounded versions of undecidable problems are NP-hard
Quantum Information Theory 2023. ICMAT Madrid, Spain. Mar. 20 – Mar. 31, 2023.
6. Border ranks of positive and invariant tensor decompositions
IAMP – EMS Summer School in Mathematical Physics. TU Munich, Germany. Aug. 29 – Sep. 2, 2022.
5. Border ranks of positive and invariant tensor decompositions
5th Seefeld Quantum Information Workshop. Seefeld, Austria. June 26 – July 1, 2022.
4. General decompositions with invariance, positivity and approximations
Random Tensors and related topics. CIRM Marseille, France. Mar. 14 – 18, 2022.
3. Approximate tensor decompositions: disappearance of many separations
25th Annual conference on Quantum Information Processing (QIP 2022). Pasadena, USA (Online). Mar. 7 – 11, 2022.
2. Tensor and polynomial decompositions: making invariance and positivity explicit
Joint annual meeting of the Austrian Physical Society (APS) and the Swiss Physical Society (SPS). Innsbruck, Austria. Aug. 30 – Sep. 3, 2021.
1. General decompositions with invariance, positivity and approximations
SFB BeyondC Winter Workshop 2021. Online. Feb. 16 – 17, 2021.

Attendance

3. Tsirelson $2\sqrt{2}$ memorial workshop
Vienna, Austria. Apr. 4 – 8, 2022.
2. Geometry and Optimization in Quantum Information
Oberwolfach, Germany (Online). Oct. 3 – 9, 2021.
1. Tensor Networks: Quantum Physics, Geometry and Applications
Levico, Italy. July 26 – 28, 2021.

Seminar Talks

6. Approximate, positive tensor decompositions
Group seminar of Renato Renner's group (ETH Zürich, Switzerland), May 13, 2022.
5. General tensor decompositions and their border ranks
Group retreat of Tim Netzer's and Gemma De las Cuevas' groups (Maria Waldrast, Austria), Feb. 16, 2022.
4. On the computational complexity of chess: Going beyond P and NP
Group retreat of Hans Briegl's, Gemma De las Cuevas' and Thomas Müller's groups (Oberurgl, Austria), Sep. 28, 2021.

3. Tensor decompositions in the light of invariance, positivity and approximations
Ghent Junior Algebra and Geometry Seminar, July 12, 2021. (Virtual)
2. Approximate tensor decompositions: disappearance of many separations
Group seminar of Martin Kliesch's group (University of Düsseldorf, Germany), May 7, 2021. (Virtual)
1. Approximations of tensor decompositions
Seminar of Hans Briegel's group (University of Innsbruck, Austria), Mar. 31, 2020. (Virtual)

Teaching experience

Thesis Supervision

2023 Lukas Berger
Matrix ranks in quantum information (Bachelor Thesis)

Courses

2023/24 Linear Algebra 1 (Exercises)
2021 Mathematical Methods of Physics 1 (Exercises)
2018/19 Analysis 1 (Practice)
2017/18 Analysis 1 (Tutorial)

Languages

German (mother tongue) English (C1) Spanish (A2)

References

Gemma De les Coves

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Tim Netzer

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List of Publications & Preprints

8. **Border Ranks of Positive and Invariant Tensor Decompositions: Applications to Correlations**
A. Klingler², T. Netzer, G. De les Coves
[arXiv:2304.13478](#) (2023)
7. **Many bounded versions of undecidable problems are NP-hard**
A. Klingler², M. van der Eyden, S. Stengele, T. Reinhart, G. De las Cuevas
[SciPost Physics](#) **14**, 173 (2023). [arXiv:2211.13532](#)
6. **The d -separation criterion in Categorical Probability**
T. Fritz, A. Klingler^{1,2}
[Journal of Machine Learning Research](#) **24** (46), 1–49 (2023). [arXiv:2207.05740](#)
5. **Polynomial decompositions with invariance and positivity inspired by tensors**
G. De las Cuevas, A. Klingler², and T. Netzer¹
[arXiv:2109.06680](#) (2021)
4. **Approximate Pythagoras numbers on $*$ -algebras over \mathbb{C}**
P. Abbasi, S. Gribling, A. Klingler, and T. Netzer¹
[Journal of Complexity](#) **74**, 101698 (2023). [arXiv:2109.04772](#)
3. **Approximate completely positive semidefinite rank**
P. Abbasi, A. Klingler, and T. Netzer¹
[Linear Algebra and its Applications](#) **677**, 323–336 (2023). [arXiv:2012.06471](#)
2. **Cats climb entails mammals move: Preserving hyponymy in compositional distributional semantics**
G. De las Cuevas, A. Klingler, M. Lewis, and T. Netzer¹
[Journal of Cognitive Science](#) **22** (3), 311–353 (2021). [arXiv:2005.14134](#)
1. **Approximate tensor decompositions: Disappearance of many separations**
G. De las Cuevas, A. Klingler², and T. Netzer¹
[Journal of Mathematical Physics](#) **62** (9), 093502 (2021) (**Editor's pick**). [arXiv:2004.10219](#)

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¹Authors listed alphabetically.

²Corresponding author.