

# Hristo Papazov

PhD Candidate in the Theory of Machine Learning Lab at EPFL

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## Research Interests

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My research focuses on uncovering hidden algorithmic processes underlying structured data through discrete and gradient-based methods. I take broad interest in Algorithmic Learning Theory and Program Synthesis.

## Education

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2022/09 – present	<b>PhD in Theoretical Machine Learning, EPFL</b> (GPA 6.00/6.00) – Advised by Nicolas Flammarion.
2021/09 – 2022/08 Transferred to EPFL	<b>PhD in Applied Mathematics, MIT</b> (GPA 5.00/5.00) – Worked on discrete algorithms and coursework requirements.
2017/09 – 2021/05	<b>A.B. in Mathematics/Certificate in Applications of Computing, Princeton</b> (GPA 3.95/4.00) – <i>Magna cum laude</i>
2020/01 – 2020/06	<b>Exchange Semester in Pure Mathematics, Worcester College, Oxford</b> (GPA 4.00/4.00)

## Publications

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### Journal Publications

- [5] A. Logunov and **H. Papazov**, “An elliptic adaptation of ideas of Carleman and Domar from complex analysis related to Levinson’s loglog theorem,” *Journal of Mathematical Physics*, vol. 62, no. 6, 2021.

### Conference Publications

- [1] **H. Papazov** and N. Flammarion, “Learning algorithms in the limit,” in *Proceedings of Thirty Eighth Conference on Learning Theory*, N. Haghtalab and A. Moitra, Eds., ser. Proceedings of Machine Learning Research, vol. 291, PMLR, 2025, pp. 4486–4510.
- [2] **H. Papazov**, S. Pesme, and N. Flammarion, “Leveraging continuous time to understand momentum when training diagonal linear networks,” in *International Conference on Artificial Intelligence and Statistics*, PMLR, 2024, pp. 3556–3564.
- [4] A. Hristov, A. Tahchiev, **H. Papazov**, N. Tulechki, T. Primov, and S. Boytcheva, “Application of deep learning methods to snomed ct encoding of clinical texts: From data collection to extreme multi-label text-based classification,” in *Proceedings of the International Conference on Recent Advances in Natural Language Processing (RANLP 2021)*, 2021, pp. 557–565.

### Preprints

- [3] **H. Papazov**, “The role of dimension in the online chasing problem,” *arXiv preprint arXiv:2307.09350*, 2023.

## Experience

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2022/06 - 2022/09	<b>Summer Research under Reitano Fellowship, MIT</b> Wrote a paper with novel lower bounds on the competitive ratio of the Convex Body Chasing and extended the analysis of the problem to general metric spaces.
2020/06 - 2020/09	<b>ML Intern, Ontotext</b> Worked on EU research projects. Extracted disease data from medical ontologies using SPARQL queries. Expanded semantic knowledge graphs with medical data in GraphDB. Implemented a fast algorithm for ontological mappings extraction. Designed randomized natural language augmentation algorithms for creation of additional synthetic data. Ran BioBERT multi-label text classification experiments on the Dutch supercomputer Cartesius using a Unix-like batch system. Published a paper at RANLP 2021.
2019/06 - 2019/09	<b>Summer Research, Princeton</b> Generalized Levinson's LogLog Theorem to cover solutions of linear elliptic PDE with real analytic coefficients and published this research in the Journal of Mathematical Physics with Professor Aleksandr Logunov.
2017/09 - 2019/12	<b>Student Manager, Princeton Dining</b> Rose through the ranks: from student worker – to student captain – to student manager. Managed 12 student workers over 5-hour long shifts twice a week. Coordinated effort and logistics with professional dining hall staff. Coordinated and supervised dining operations for the 2018th Princeton Reunions.

## Teaching and Supervision

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Fall 2025	<b>MSc Project of Ender Isik, EPFL</b> Algorithmic Synthesis with Neural Cellular Automata
Fall 2025	<b>MSc Project of Khan Nguyen, EPFL</b> Learning Computable Functions with Polynomial-Size Characteristic Sets
Fall 2023 - 2025	<b>Teacher Assistant for Machine Learning CS-433, EPFL</b>
Spring 2024 - 2025	<b>Teacher Assistant for Theory of Computation CS-251, EPFL</b>
Spring 2023	<b>Teacher Assistant for Probability and Statistics MATH-235, EPFL</b>

## Selected Honors and Awards

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2022/09	<b>EDIC PhD Fellowship, EPFL Computer Science Department</b>
2021/09	<b>Reitano Fellowship, MIT Math Department</b>
2021/05	<b>Sigma Xi Book Award for Outstanding Research, Princeton Math Department</b>
2020/09	<b>Phi Beta Kappa, PBK, Beta Chapter of New Jersey</b>
2019/09	<b>Shapiro Prize for Academic Excellence for the Princeton Class of 2021, Princeton</b>
2017/06	<b>Bronze Medal, 58th International Math Olympiad</b>
2017/05	<b>1st Place, Bulgarian National Math Olympiad</b>
2016/06	<b>Bronze Medal, 57th International Math Olympiad</b>
2016/05	<b>Bronze Medal, 33rd Balkan Math Olympiad</b>
2013/06	<b>Bronze Medal, 17th Junior Balkan Math Olympiad</b>