ANDREY GROMOV

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$ Summary

- Staff Research Scientist at Meta Superintelligence Labs.
- Current focus: autonomous institutional AI science — knowledge organization, multi-agent coordination, scalable oversight.
- Theoretical physicist by training; previously Assistant Professor at Brown and UMD.
- NSF CAREER Award ('21), Sloan Research Fellowship ('22), Simons Collaboration on the Physics of Learning ('25).

$ Research Interests

- Automating AI research & scientific discovery
- Science of LLMs: scaling laws, hyperparameter transfer, grokking and emergence, interpretability
- Science of data: model collapse, synthetic data, curricula
- Efficient adaptive architectures: pruning, quantization, distillation, distributed models
- Physics: strongly correlated quantum materials, quantum Hall effect, quantum field theory

$ Appointments

2025-present Staff Research Scientist, Meta Superintelligence Labs
Leading new sub-effort on autonomous scientific institutions; building team of 4–5.
2022–2025 Senior Research Scientist, Meta FAIR
2022–2024 Assistant Professor of Physics, University of Maryland, College Park
2019–2022 Assistant Professor of Physics, Brown University
2018–2019 Postdoctoral Fellow, UC Berkeley
2015–2018 Leo Kadanoff Postdoctoral Fellow, University of Chicago

$ Education

2009–2015 Ph.D. in Theoretical Condensed Matter Physics, Stony Brook University
2005–2009 B.Sc. in Physics (with Honors), St. Petersburg State University

$ Selected AI Publications

Science of LLMs & emergence

- **Learning to Grok: Emergence of In-Context Learning and Skill Composition** — NeurIPS '24 (Oral)
- **On the Origin of Neural Scaling Laws: From Random Graphs to Natural Language** — ICML '26 (Spotlight)
- **Grokking Modular Arithmetic** — arXiv:2301.02679
- **Critical Initialization of Wide and Deep Neural Networks** — NeurIPS '23 (Spotlight)
- **Learning Rate Transfer in Normalized Transformers** — arXiv:2604.27077
- **A Scalable Measure of Loss Landscape Curvature for LLM Training Dynamics** — arXiv:2601.16979

Data

- **Is Model Collapse Inevitable? Breaking the Curse of Recursion by Accumulating Data** — COLM '24

Architecture & efficiency

- **The Unreasonable Ineffectiveness of the Deeper Layers** — ICLR '25
- **Towards Distributed Neural Architectures** — arXiv:2506.22389
- **MobileLLM-Flash: Latency-Guided On-Device LLM Design** — ACL '26 (Industry Oral)

Complete list at Google Scholar.

$ Selected Physics Publications

- **Synthetic Landau Levels for Photons** — Nature, 2016
- **Towards Classification of Fracton Phases: The Multipole Algebra** — PRX, 2019
- **Transport Signatures of the Hall Viscosity** — PRL, 2017

$ Selected Talks

- Anthropic · *Grokking as a solvable model of feature learning* (2023)
- Google Brain · *Grokking modular arithmetic* (2023)
- Aspen Center for Physics colloquium · *Theoretical Physics and Artificial Intelligence* (2024)

70+ invited talks at major universities and conferences across physics and AI.

$ Workshops & Programs Organized

- *Fundamental Principles of Learning and Representations: from Brains to LLMs* · EPFL (2026)
- *Studying AI at Scale* · Perimeter Institute (2025)
- *Theoretical Physics for Deep Learning* · Aspen Center for Physics (2023)

$ Mentorship

Ph.D. students

- Darshil Doshi (postdoc, JHU) · Tianyu He (RS, StepFun) · Aritra Das (Ph.D. student, UMD)

Research interns

- Tianyu He (UMD) · first author on *Learning to Grok* (NeurIPS Oral 2024); now RS at StepFun
- Aditya Cowsik (Stanford) · first author on *Towards Distributed Neural Architectures*; now Jane Street
- Boris Shigida (Princeton; co-supervised w/ B. Hanin) · first author on *Learning Rate Transfer in Normalized Transformers*; joining as postdoc, 2026
- Dayal Kalra (UMD; co-supervised w/ M. Shvartsman) · first author on *Scalable Loss Landscape Curvature for LLMs*; joining as postdoc, 2026
- Tianze Jiang (Princeton), Dhruva Karkada (Berkeley) · incoming, summer 2026