

TOPICS IN MODEL THEORY

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My research program is situated in model theory and its interactions with algebra and analysis, with a particular focus on o-minimality and the model theory of fields. Some active areas of my research are outlined below. A PhD project supervised by me will likely involve one or more of these topics, depending on the student's interests and background.

(1) **Model theory of Hardy fields and transseries.**

This topic investigates Hardy fields and transseries from a model-theoretic perspective, with special attention to their relationship with o-minimal structures. Background and motivation can be found in the survey by van den Dries [1], as well as my paper [3].

(2) **Model theory of differential fields.**

This area focuses on the interaction between differential fields and their underlying field structures. A guiding theme is understanding how algebraic and model-theoretic properties of a differential field reflect, or fail to reflect, properties of the base field. See [4] for some of my recent work in this area.

(3) **Expansions of o-minimal structures.**

This topic studies ordered structures that are not o-minimal but nevertheless retain some topological or combinatorial tameness properties enjoyed by o-minimal structures. An overview of this area is provided in Hieronymi's survey [2].

Contact information, along with papers and preprints, are available on my webpage: <https://elliotakaplan.github.io>. Prospective PhD students are very welcome to get in touch with questions or to discuss possible projects.

REFERENCES

- [1] Lou van den Dries, *Transseries, model theory, and Hardy fields*, Notices Amer. Math. Soc. **69** (2022), no. 4, 557–563.
<https://doi.org/10.1090/noti2459>
- [2] Philipp Hieronymi, *Tameness beyond o-minimality*, (2025).
https://www.math.uni-bonn.de/people/phierony/Tameness_Fields.pdf
- [3] Elliot Kaplan, *Liouville closed H_T -fields*, J. Algebra **628** (2023), 265–327.
<https://doi.org/10.1016/j.jalgebra.2023.03.019>
- [4] Elliot Kaplan and Christoph Kesting, *Generic derivations, differential largeness, and NTP_2* , Ann. Pure Appl. Logic **177** (2026), no. 6, Paper No. 103730.
<https://doi.org/10.1016/j.apal.2026.103730>