

## Logic and relativity theory

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István Németi, together with Hajnal Andréka founded and lead the Hungarian logic and relativity school. They have made numerous significant contributions both in logic and in relativity theory and in their interconnections. To celebrate their contributions, on the occasion of István's 70th birthday, a series of conferences focusing on logic and relativity theory, and beyond, was inaugurated by [The First International Conference on Logic and Relativity \(2012\)](#). The aim of this conference series is to bring together mathematicians, physicists, philosophers of science, logicians and computer scientists from all over the world to exchange and debate new ideas, problems and results in this area. This special issue collects together some of the papers presented at this inaugural logic and relativity conference.

The axiomatic roots of relativity theory go back to the birth of special relativity [Einstein 1905](#); [Reichenbach 1924](#), and many logic-based formal axiomatic approaches have since been developed for both the special and general theories (see, e.g., [Andréka et al. 2006](#) and references therein). The study of axiomatic foundations for relativity theories is still evolving and active, and not only has logic been applied to relativity, but also in the other direction relativity theory is being applied to logic. In particular, one intensively investigated and rapidly developing research area at the borderline of logic and relativity is relativistic computation.

Like quantum computation, relativistic computation uses predictions of a physical theory to motivate more powerful models of computation. While quantum computation uses such features of quantum theory as superposition and entanglement to enhance the power of computers, relativistic computation exploits the prediction of relativity

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theory that the flow of time depends on the worldlines followed by the computer and its user.

Several papers in the present volume shed more light on these perspectives (e.g., the papers of [Wüthrich 2014](#) and [Friend 2014](#)).

## References

- The first international conference on logic and relativity. Budapest: Alfréd Rényi Institute of Mathematics. (pp. 8–12) September 2012. <http://www.renyi.hu/conferences/nemeti70/>.
- Andréka, H., Madarász, J. X., & Némethi, I. (2006). Logical axiomatizations of space-time: Samples from the literature. *Non-Euclidean geometries mathematics and its applications*, 581, 155–185.
- Einstein, A. (1905). Zur Elektrodynamik bewegter Körper. *Annalen der Physik*, 17(10), 891–921. (English translation: On the Electrodynamics of Moving Bodies. Translation by Megh Nad Saha in *The Principle of Relativity: Original Papers by A. Einstein and H. Minkowski*, University of Calcutta (1920) pp. 1–34).
- Friend, M. (2014). On the epistemological significance of the Hungarian project, in this volume. doi:[10.1007/s11229-014-0608-x](https://doi.org/10.1007/s11229-014-0608-x).
- Reichenbach, H. (1924). *Axiomatik der relativistischen Raum-Zeit-Lehre*. *Die Wissenschaft* (Vol. 72). Braunschweig: Friedrich Vieweg und Sohn. (English translation: *Axiomatization of the Theory of Relativity*. Translation by Maria Reichenbach, Berkeley and Los Angeles: University of California Press (1969)).
- Wüthrich, C. (2014). A quantum-information-theoretic complement to a general-relativistic implementation of a beyond-Turing computer, in this volume. doi:[10.1007/s11229-014-0502-6](https://doi.org/10.1007/s11229-014-0502-6).