

Visualizations of Relativity, Relativistic Hypercomputing

Renáta Tordai

renatatordai@yahoo.co.uk

Rényi Institute of Mathematics

This talk is strongly related to the school directed by Hajnal Andr eka and Istv an N emeti at the R enyi Institute of Mathematics, see the abstracts of Istv an N emeti, Hajnal Andr eka, Judit X. Madar asz and Gergely Sz ekely. We will present visualizations of relativity. For example, we will present a movie showing what an astronaut would see while flying through a huge Kerr-Newmann wormhole or any other kind of wormhole. We will also outline the ideas of relativistic hypercomputing, i.e., how Malament-Hogarth spacetimes can be used for designing artificial systems computing beyond the Turing barrier. Any spacetime admitting a *CTC* (closed timelike curve) is suitable for constructing such a hypercomputer, but the existence of *CTC*'s is not really needed for this. A much milder condition called Malament-Hogarth property is sufficient. We refer to [1], [2], and [3] for more detail. (The most satisfactory solution to the so called blue-shift problem is available in [4].)

References

- [1] D avid, Gy., N emeti, I., *Relativistic computers and the Turing barrier*. Applied Mathematics and Computation 178 (2006). <http://www.math-inst.hu/pub/algebraic-logic/beyondturing.pdf>
- [2] Andr eka, H., N emeti, I., N emeti, P., *General relativistic hypercomputing and foundation of mathematics*. Natural Computing, to appear.
- [3] Etesi, G., N emeti, I., *Non-Turing computations via Malament-Hogarth space-times*. International Journal of Theoretical Physics 41,2 (2002). <http://www.math-inst.hu/pub/algebraic-logic/turing.html>
- [4] Andr eka, H., N emeti, I., N emeti, P., *Presentation in The science and philosophy of unconventional computing* SPUC 2009, Cambridge, March 2009