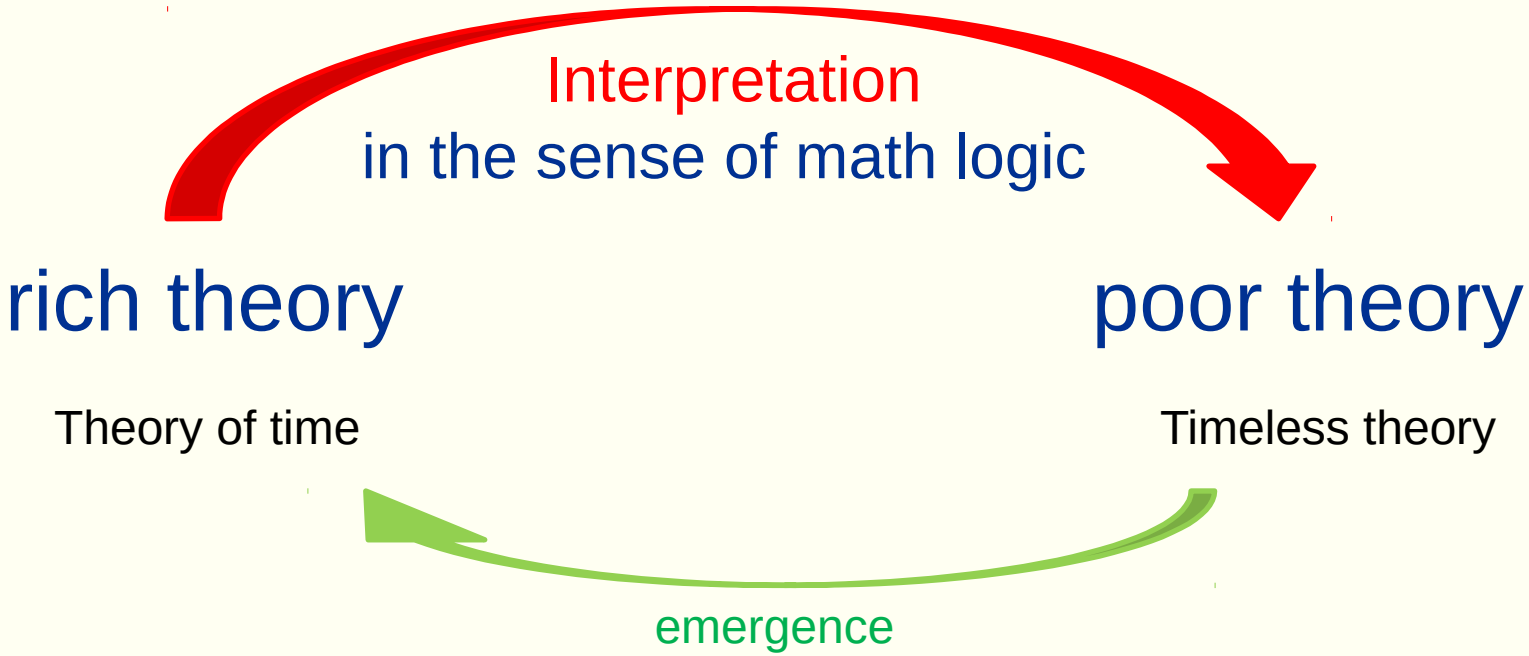
THE END OF TIME

Defining time and space experimentally.

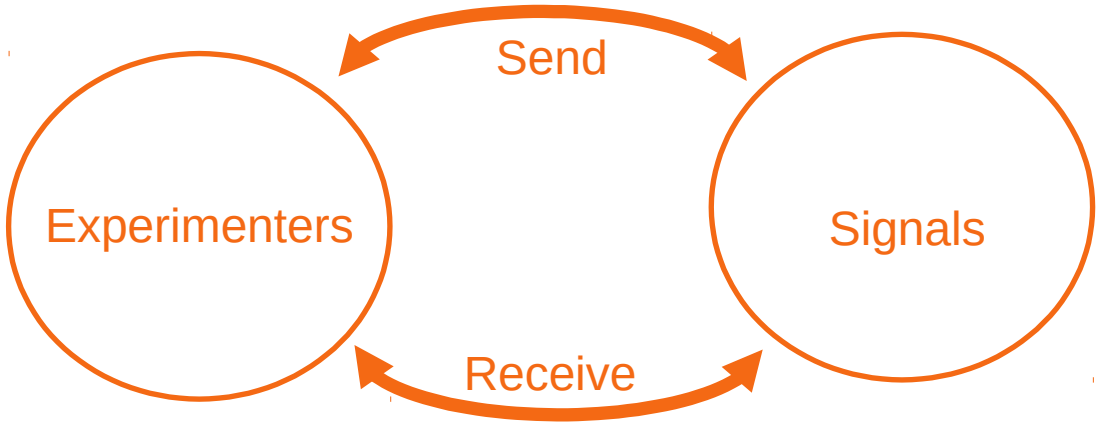
Hajnal Andréka and István Németi

a tangible mathematical model for relationist view of Mach and Leibniz:



Signaling Theory SigTh

Language:



James Ax's paper "The elementary foundations of spacetime", Foundations of Physics 8 (1978), 507-546.

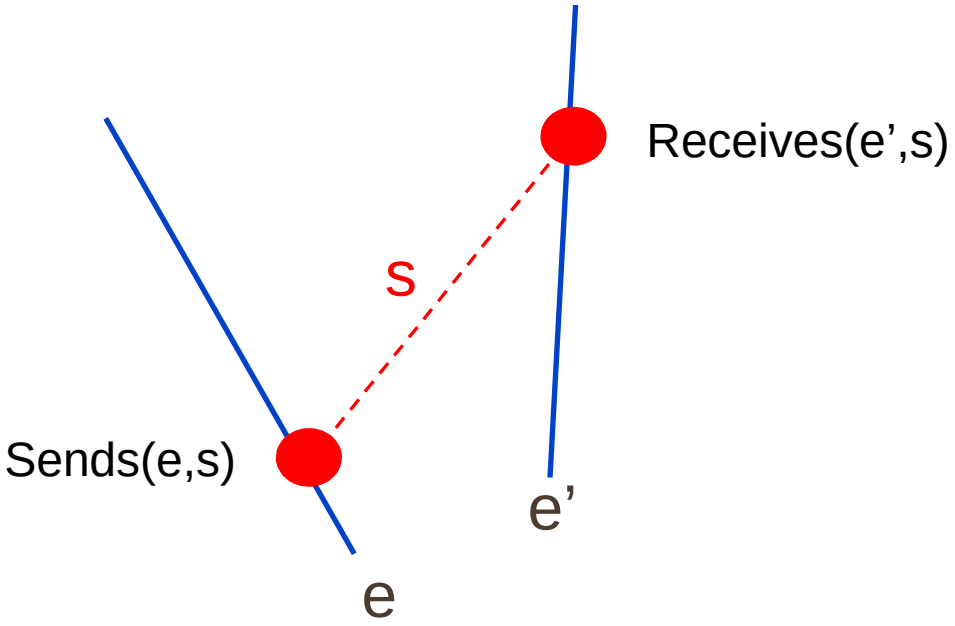
SigTh: Axioms all formulas valid in the intended model:

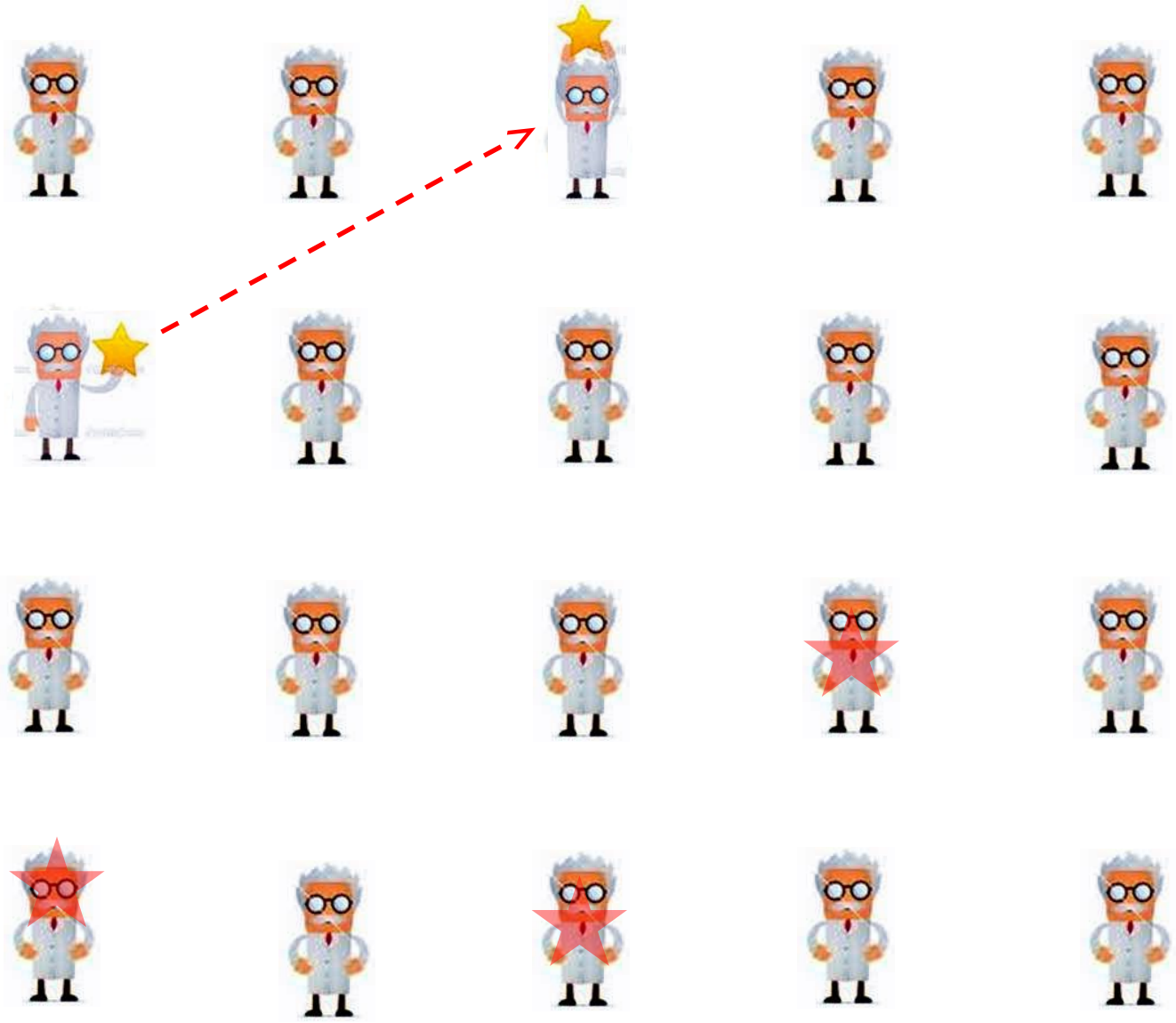
Experimenters: straight lines of slope < 1 in R^4

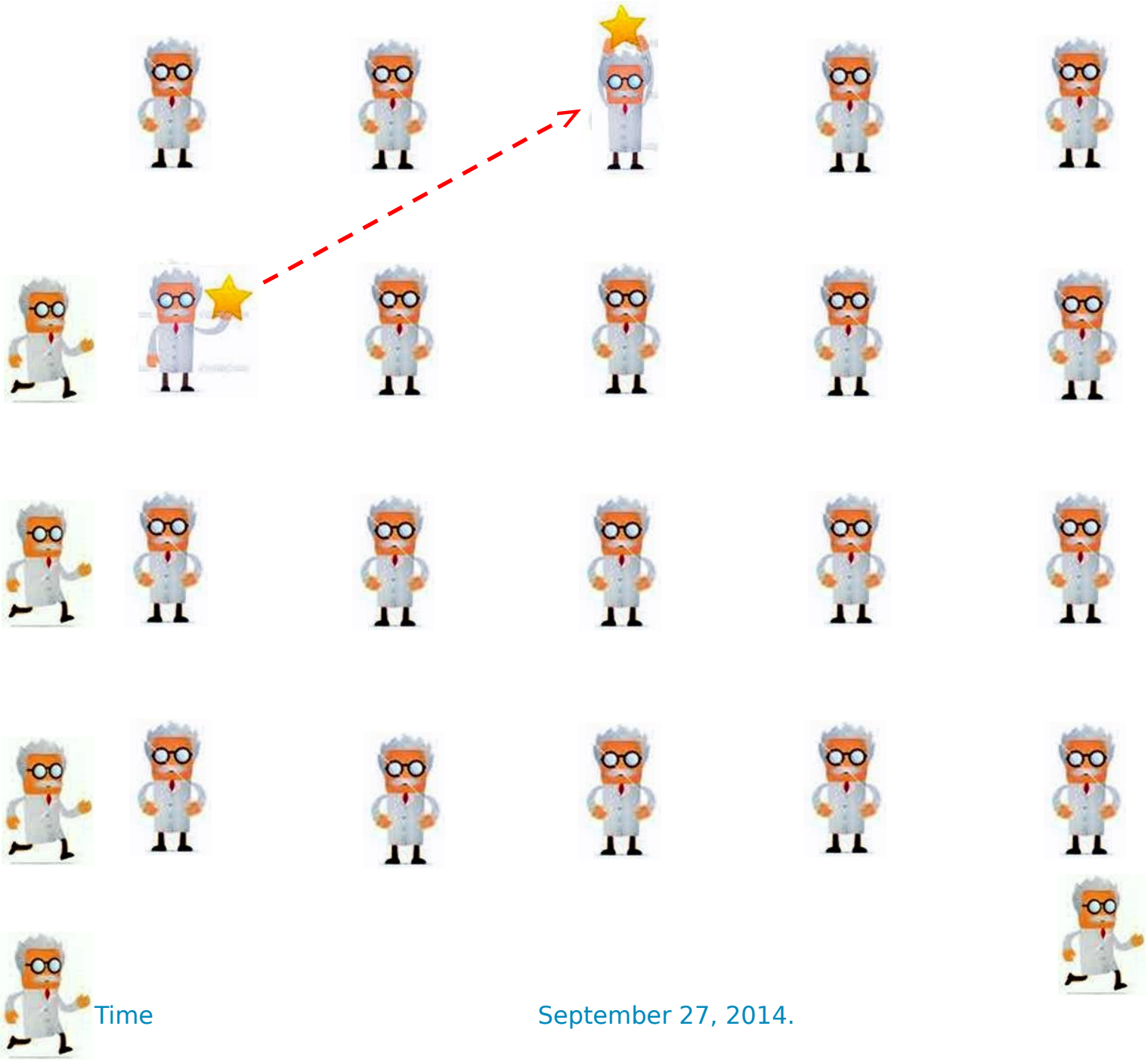
Signals: finite segments of lines of slope 1 in R^4

Sends: starting point of segment lies on line

Receives: end point of segment lies on line

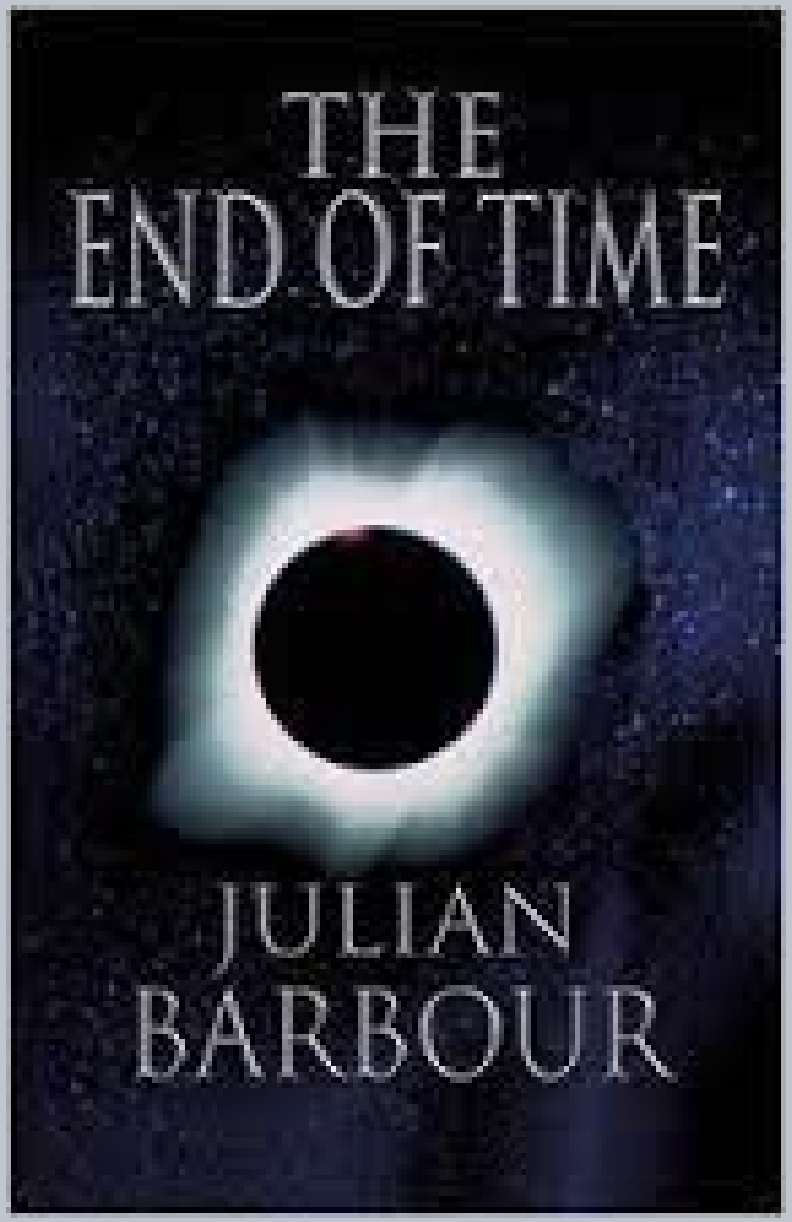






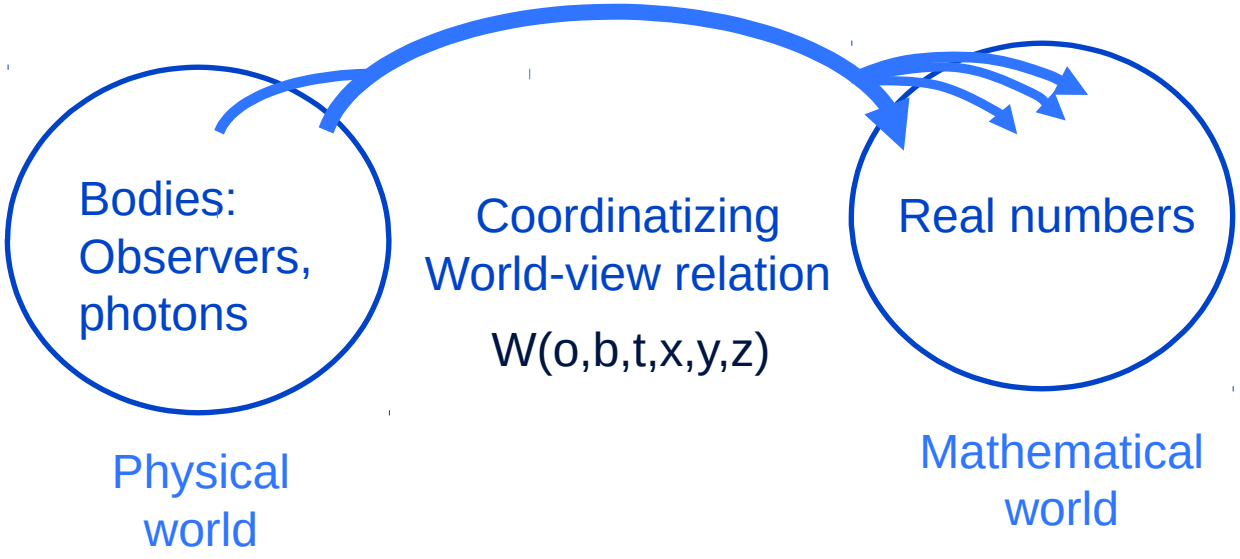
No clocks

No meter rods


THE
END OF TIME
JULIAN
BARBOUR

Special Relativity SpecRel

Language:



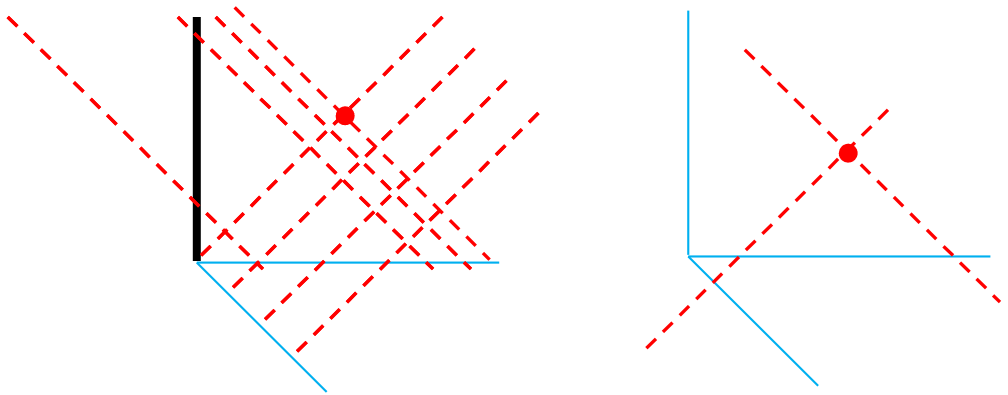
SpecRel: Four axioms

Photon Axiom: the world-lines of photons are exactly the straight lines of slope 1, in each worldview

Event Axiom: all observers coordinatize the same physical reality

Self Axiom: the owner of a reference frame sits tight at the origin

Number Axiom: the structure of our numbers forms a real closed field



Thm:

SpecRel can be interpreted in SigTh. Moreover, they are definitionally equivalent theories.

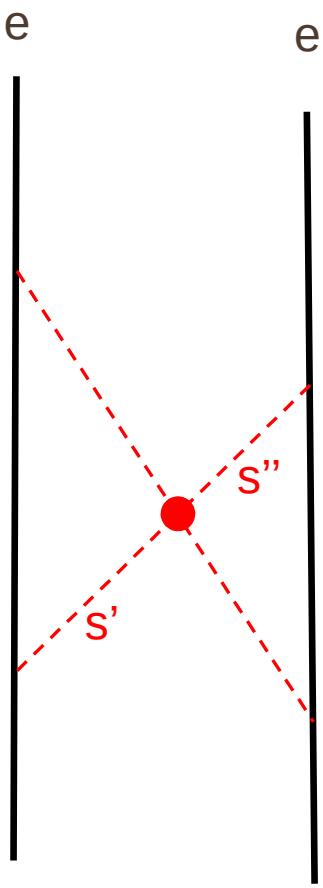
On the proof:

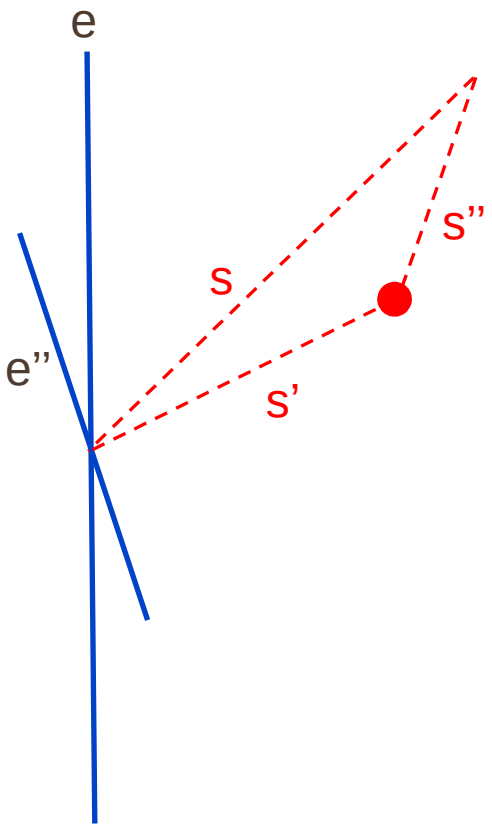
Key point of interpretation is algorithm for setting up coordinate systems in terms of signaling.

Comparing theories: dynamics of changing vocabularies, our paper in Johan's Outstanding Logician Volume.

WHAT IS SPACE?

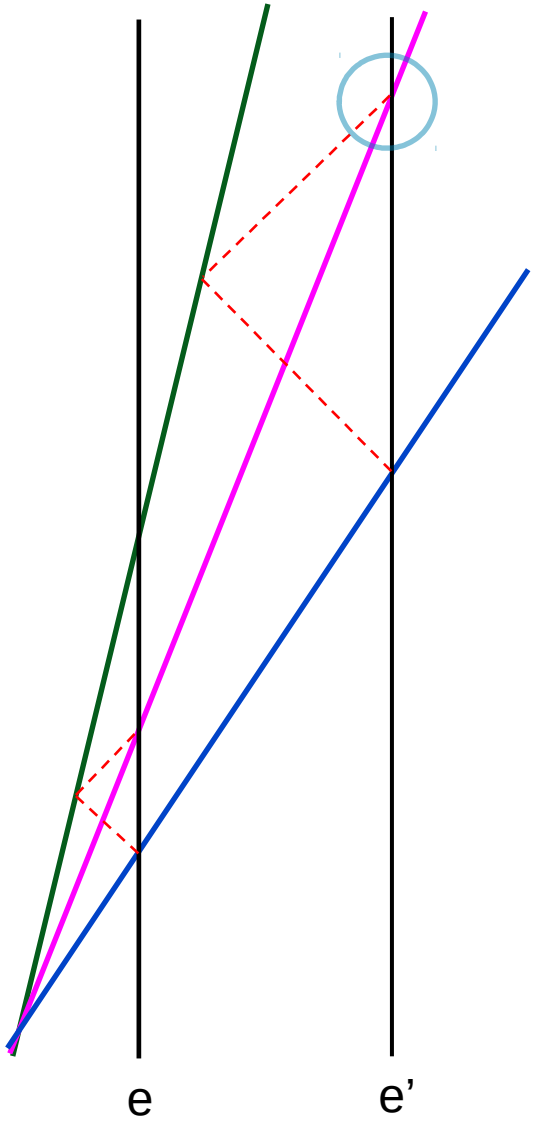
MOTIONLESS 1





MOTIONLESS 2

Desargue's theorem



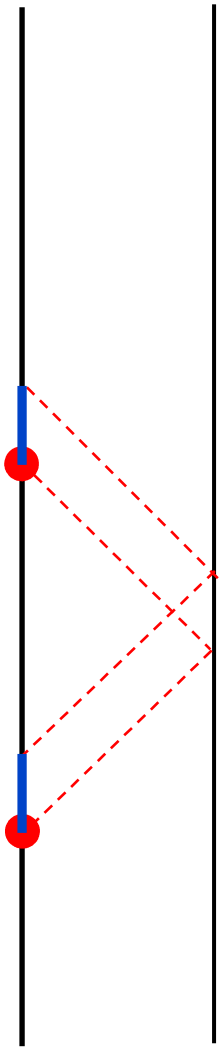
WHAT IS TIME?

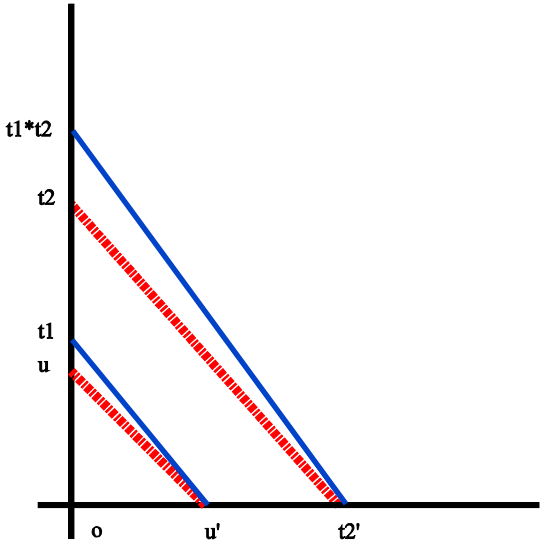
Order of events

Equi-duration of time-lapses

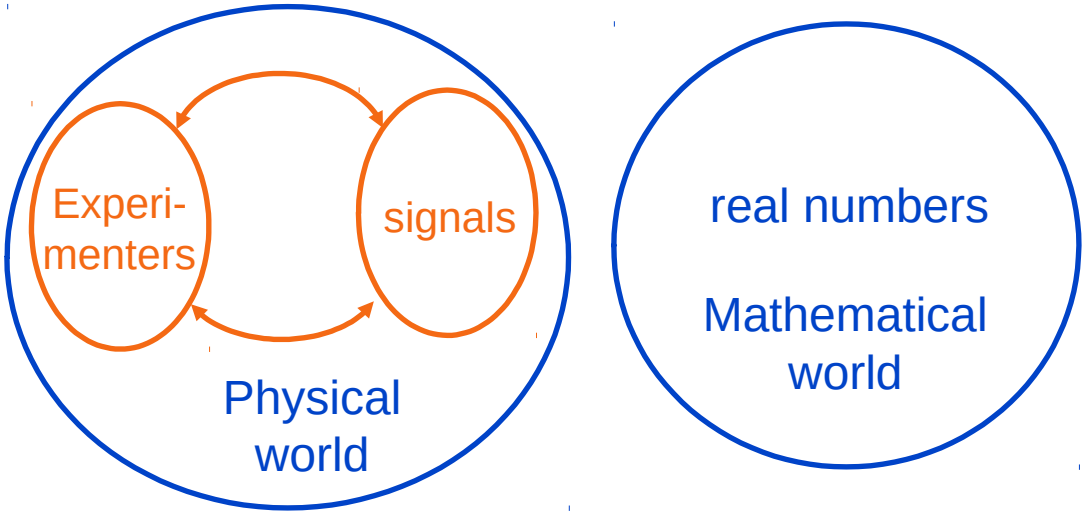
Addition

Multiplication.



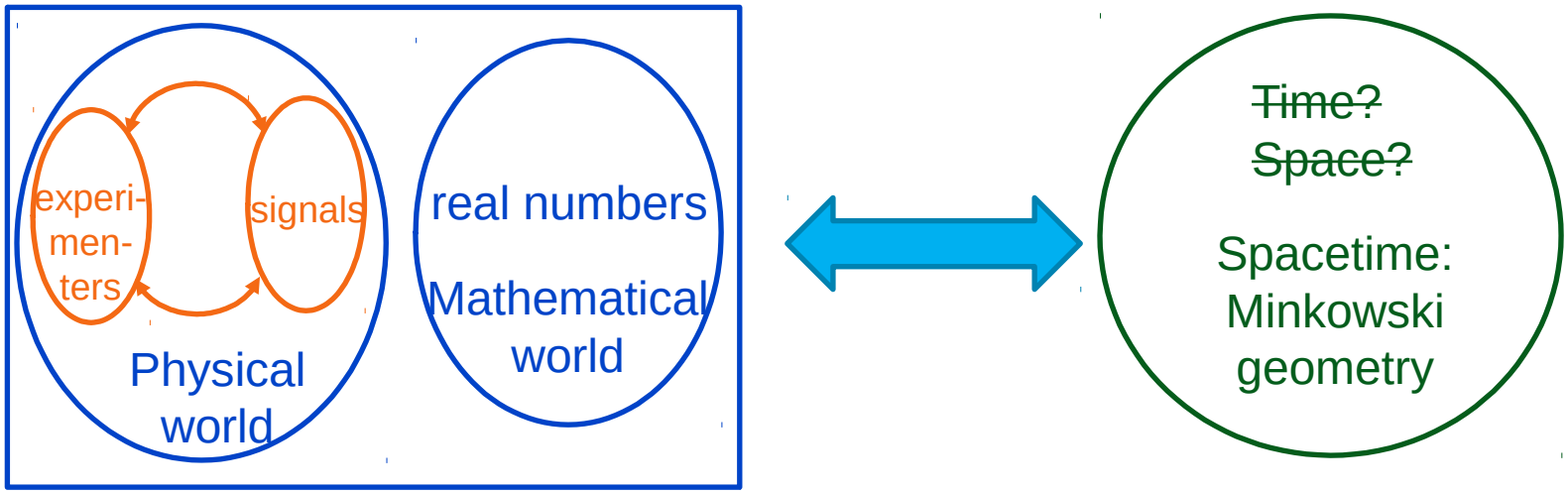


FEEDBACK TO DEFINABILITY THEORY: DEFINING NEW UNIVERSES AND NEW ENTITIES



Defining new universes, new entities in many-sorted logic.
Preprint, Andréka, H., Madarász J., Németi, I.

FEEDBACK TO DEFINABILITY THEORY: DEFINING NEW UNIVERSES AND NEW ENTITIES



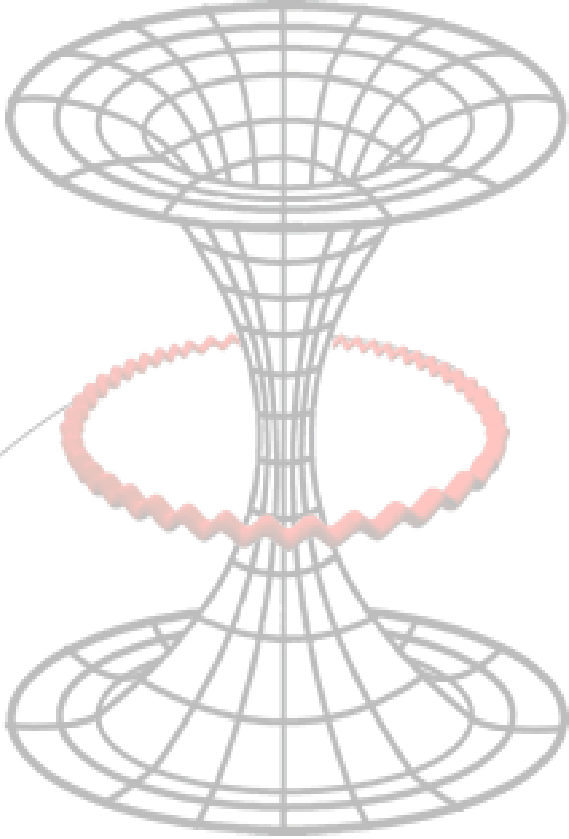
Logic and relativity (in the light of definability theory).
Madarász J., PhD Dissertation, ELTE Budapest, 2002.

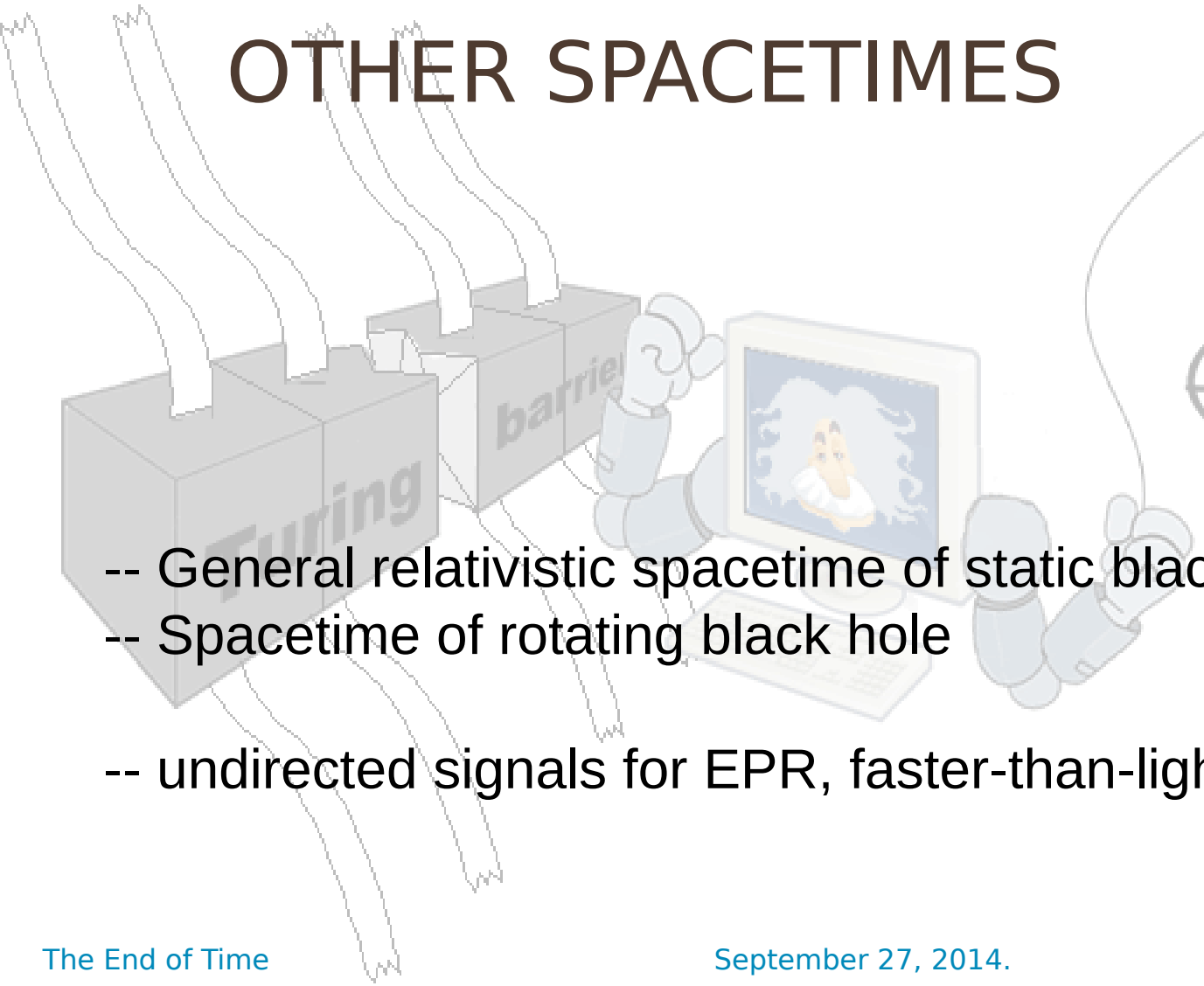
RICHARD FEYNMAN (LECTURE GIVEN ON RECEIVING THE 1965 NOBEL PRIZE FOR PHYSICS:)

Theories of the known, which are described by different physical ideas may be equivalent in all their predictions and are hence scientifically indistinguishable. However, they are not psychologically identical when trying to move from that base into the unknown. For different views suggest different kinds of modifications which might be made and hence are not equivalent in the hypotheses one generates from them in one's attempt to understand what is not yet understood.

I, therefore, think that a good theoretical physicist today might find it useful to have a wide range of physical viewpoints and mathematical expressions of the same theory (for example, of quantum electrodynamics) available to him. … there is always a range of applications and problems in this realm for which the special viewpoint gives one a special power and clarity of thought, which is valuable in itself.

OTHER SPACETIMES





-- General relativistic spacetime of static black hole
-- Spacetime of rotating black hole

-- undirected signals for EPR, faster-than-light experimenters

THE END OF TIME

as a primitive notion