

Re: Relativity as an axiomatic system

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Pentcho Valev wrote:

- > *Einstein: "Guided by empirical data, the investigator rather develops*
- > *a system of thought which, in general, is built up logically from a*
- > *small number of fundamental assumptions, the so-called axioms."*
- >
- > *What Einstein describes is an axiomatic system which, by definition,*
- > *can be presented as a sequence of propositions with the axioms at the*
- > *beginning followed by theorems (deduced propositions), where each*
- > *theorem is accompanied by an explicit authentication of the exact*
- > *deductive path leading to it. In other words, the path from the axioms*
- > *to a particular proposition (theorem) can be disintegrated into steps*
- > *each of which has the form*
- >
- > *a,b,... -> c*
- >
- > *and can undergo the scrutiny of both critics and sycophants (secretly*
- > *in the latter case).*
- >
- > *Perhaps, after 100 years of intensive begging the question, it is time*
- > *for relativists to perform this important operation. Let me suggest a*
- > *possible beginning:*
- >
- > *Axiom (1) Principle of relativity*
- > *Axiom (2) Constancy of speed of light*
- > *1,2 (3) Time dilation in BOTH inertial frames*
- > *.....(4).....*
- >
- > *The derivation is set out as a sequence of numbered lines (1), (2),*
- > *(3) etc. The fact that line (3) was obtained from (1) and (2) as*
- > *premises is shown by writing 1,2 to the left of the line number (3).*
- >
- > *According to Einstein, the sequence eventually leads to*
- >
- > *p,q,... (r) A clock in a non-rotating system undergoes time*
- > *CONTRACTION relative to a clock on the periphery of a rotating disc.*
- >
- > *x,y,... (z) Two clocks placed at different gravitational potentials*

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- > will go at different rates in accordance with $v=v_0(1+\phi/c^2)$.
- >
- > Now relativists should present all the steps leading to the above two
- > propositions and eventually replace p,q,r,x,y,z with real numbers.
- > They will fail because both (r) and (z) are just Einstein's
- > "intuitions", not theorems. Still some truth will be revealed and
- > truth should be valued in science shouldn't it.
- >
- > Pentcho Valev

Actually, the problem with SR begins much earlier than at (r) and (z) . Take a look at the parallel thread "Download a new book on quantum mechanics and relativity". I repeatedly ask relativists there to prove statement (3) from axioms (1) and (2). They can certainly do that for simple "light clock" (postulate (2) is very handy in this case), but they cannot do it for a clock of arbitrary design for which axiom (2) is of no help. So, in order to get special relativity, Minkowski space-time, etc. one should introduce somewhere in this axiomatic system an additional postulate

(?) Lorentz transformations are valid for all systems independent on their composition and interactions.

Another (correct) approach is to skip this postulate (which turns out to be wrong at closer inspection) and derive transformations of observables from solution of dynamical problem. That's what the "new book on quantum mechanics and relativity" is about.

Eugene.