

# Some Thoughts on Relativity and the Flow of Time: Einstein's Equations given Absolute Simultaneity

Pitts, J. Brian (2004) Some Thoughts on Relativity and the Flow of Time: Einstein's Equations given Absolute Simultaneity.

Full text available as:

[PDF](#) - Requires a viewer, such as [Adobe Acrobat Reader](#) or other PDF viewer.

## Abstract

The A-theory of time has intuitive and metaphysical appeal, but suffers from tension, if not inconsistency, with the special and general theories of relativity (STR and GTR). The A-theory requires a notion of global simultaneity invariant under the symmetries of the world's laws, those ostensible transformations of the state of the world that in fact leave the world as it was before. Relativistic physics, if read in a realistic sense, denies that there exists any notion of global simultaneity that is invariant under the symmetries of the world's laws. If physics is at least a decent guide to metaphysics--as sympathies for scientific realism would suggest--then relativistic physics supports the B-theory. If there were a physically natural way to modify the symmetries of the physical laws so as to remove those that are repugnant to the A-theory, while retaining empirical adequacy, then such an altered physics might be attractive to the A-theorist and would weaken the support given by relativity to the B-theory. I exhibit a way to do so here, displaying a Lagrangian density explicitly containing distant simultaneity, yet implying Einstein's field equations. The modification involves a change in the nature of the lapse function and makes use of the Dirac-Bergmann formalism of constrained dynamics, which recently has been discussed much by John Earman. Here this formalism is adapted slightly to permit both local and global generalized coordinates. A classification of senses in which time might be absolute or not is made along the way. Some suggestions for extending the work by finding a first principles motivation are made. An appendix outlines an argument why many local presents are insufficient and a global present is attractive, while two more appendices review the Dirac-Bergmann apparatus for GTR and then apply it to the theory at hand.

**Subjects:** [Specific Sciences: Physics: Relativity Theory](#)

**ID Code:** 2760

**Deposited By:** [Pitts, J. Brian](#)

**Deposited On:** 03 June 2006

**Additional Information:** Chronos: The Annual Proceedings of the Philosophy of Time Society 6 (2003-4). Paper from Philosophy of Time Society meeting, April 2004, at American Philosophical Association, Central Division meeting, Chicago.