

FORSCHUNGSKOLLOQUIUM ZUR WISSENSCHAFTSGESCHICHTE

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Kant and Einstein on the Causal Order of Time

The theory of space-time developed in Kant's *Kritik der reinen Vernunft* and his *Metaphysische Anfangsgründe der Naturwissenschaft* (1786) is connected to the "Kinematic Part" of Einstein's "Zur Elektrodynamik bewegter Körper" (1905) via Leonhard Euler's proof of invariance under Galilean transformations in the latter's *Analytical Mechanics* (1736).

The internal connection between the two space-time structures is that outlined in Minkowski's "Raum und Zeit" (1909), meaning in turn that the *Critique of Pure Reason's* 2nd Analogy of Experience is the dual of the Principle of Locality applied in the various Einstein-Podolsky-Rosen experiments. Thus Kant's 3rd Analogy of Experience, which defines simultaneity through instantaneous causal interactions, should fall.

I conclude by (1) assessing the significance of entanglement relations from the point of view of this "Berlin" physical tradition, (2) explaining the connection of these two theories of time to the emergence of the "phenomenology of time", in Göttingen from 1905-1910, through the work of Husserl, Einstein, Minkowski, and their junior colleague, the mathematician and physicist Hermann Weyl.

Prof. Dr. David Hyder is Professor of Philosophy at the University of Ottawa, Canada. He studied philosophy and computer science at Yale, worked in mathematical modelling on Wall Street, and did his PhD at the University of Toronto (1997), under Ian Hacking, on Wittgenstein's *Logisch-Philosophische Abhandlung* and Heinrich Hertz's *Prinzipien der Mechanik*. In 2004, he completed his Habilitation under Jürgen Mittelstraß at the Universität Konstanz, on Kant's and Helmholtz's theories of space. In 2006, he was called to the Chair of Theoretical Philosophy and Philosophy of Science at Erlangen-Nürnberg. His current research is on the role of the Causal Theory of Time in informatics, philosophy and physics.

Montag, 15. April 2019
16 Uhr c.t.
Raum H 3012

Der Vortrag ist eine gemeinsame Veranstaltung der Fachgebiete Theoretische Philosophie und Wissenschaftsgeschichte.