Anatomy of a Scientific Revolution

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With the "Genesis of General Relativity", the Max Planck Institute for the History of Science has just published the most comprehensive study to date of the structures of a scientific revolution.

According to the study, a scientific revolution is not a simple radical new beginning, but the result of a new organisation of transmitted knowledge. The result of 10 years of research, this four-volume, 2000-page work on the origins of Einstein's General Relativity Theory - one of the most important physical theories of the 20th century - will appear in the Springer Press.

Jürgen Renn, Director at the Max Planck Institute, will present the work, of which he is also the editor, to the scientific public at the 11th Marcel Grossmann Meetings, which will take place in Berlin on 24 - 29 July, 2006.

The work, which is the result of an international team of authors, contains new insights into the premises, assumptions, and preconditions that underlie Einstein's scientific revolution, as, for instance, insights into the role of Einstein's previously largely unknown precursors and competitors for a theory which today represents the basis of modern cosmology.

"Einstein did not achieve this revolution by means of a single stroke of genius—rather, he stood on the shoulders of dwarves and giants", says Jürgen Renn. Volumes 1 and 2 contain the facsimile and transcription of, as well as a scholarly commentary on, Einstein's famous Zurich

Notebook from 1912-1913. The research by Einstein recorded in this notebook forms a pivotal part of his creation of the theory of general relativity.

Complementing this core material are essays re-evaluating the genesis of Einstein's theory in light of the analysis of this notebook. Volumes 3 and 4 contain additional sources by Einstein and his contemporaries, who from the late nineteenth to the early twentieth century contributed to this groundbreaking development. These sources, most of which are presented here in translation for the first time, are accompanied by essays by leading historians of relativity offering new insights into the broader scientific context from which Einstein's theory emerged. The result of more than a decade of research, these four volumes provide a study of unprecedented depth of one of the most important revolutions in the history of science.

The volumes will be supplemented by further sources that will be made freely available on the internet, as part of the virtual Einstein exhibition mounted by the institute (einsteinvirtuell.mpiwg-berlin.mpg.de/intro). The core results of this decades-long research - especially the insights into the mechanisms of a scientific revolution - are also available in a presentation intended for a wider public in Jürgen Renn's "On the shoulders of giants and dwarves - Einstein's uncompleted revolution", recently published with Wiley Press.

This in-depth analysis has already met with broad recognition among physicists and historians of science. Bernard Schutz, Director at the Max Planck Institute for Gravitational Physics, is of the opinion, "This account changes our ideas of how Einstein arrived at general relativity and of what physical meaning it had to him and to his contemporaries. As a physicist living at a time when physicists are re-inventing gravity once again, I find this history not only fascinating and compelling but deeply relevant." William Unruh, Professor of Physics at the University

of British Columbia, is similarly convinced: "Combining papers which interpret and explain the historical and theoretical situation with translations of most of the major papers of the time, these volumes will be indispensable for anyone with even the smallest interest in the history of that phenomenal quest which finally gave us general relativity. "Roger Stuewer, Professor at the University of Minnesota, praises the volumes as an "extraordinary intellectual achievement, one without parallel in the history and philosophy of science."

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