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Exploratory experimentation in experimental mathematics: a glimpse at the PSLQ algorithm.

Löwe, Benedikt (ed.) et al., PhiMSAMP. Philosophy of Mathematics: Sociological aspects and mathematical practice. Including selected papers of the 3rd PhiMSAMP conference ‘Is mathematics special?’, Vienna, Austria, 2008. London: College Publications (ISBN 978-1-904987-95-6/pbk). Texts in Philosophy 11, 341-360 (2010).

The dual goal of the paper is to combine a historical presentation of experimental mathematics with a philosophical analysis of the concept of experimentation. Accordingly, the paper opens with a short presentation of the historical and conceptual development of experimental mathematics, and proceeds with an analysis of the philosophical ideas and epistemic standards held by the main protagonists of the field. A conceptual framework developed in order to describe experiments in physics, is introduced. This framework mainly consists of Friedrich Steinle’s distinction between theory-driven and exploratory experiments, and the concept ‘wide instrumentation’, developed by Laurs Franklin. Using the PSLQ-algorithm as an example, the paper argues firstly, that mathematicians the computers to provide wide instrumentation in order for the computer experiments to be interactive, and secondly, that computer experiments could contribute more to the conceptual development of mathematics, if they were conceived as exploratory, interactive experiments. The paper is a valuable historical introduction to experimental mathematics, and it contributes to the philosophical understanding of the field with a considerable conceptual development.

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Classification: D40 Q60

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