Potential PhD project in Mathematics Radboud University

**Supervisor**: Klaas Landsman

**Title project**: Mathematical and philosophical aspects of Emergence and Entropy

**Description**
It is fashionable, if not already a party line, to believe that both statistical mechanics and quantum mechanics are "theories of information" (instead of theories of Nature). Since this seems a mistaken or at best empty point of view, the aim of this project is to rewrite the technical underpinnings of this information-theoretic view of physics, notably considerations about entropy in its various guises, in terms of Emergence. Indeed, we believe the correct point of view to be that the theories in question are emergent from underlying theories in a precise and well-defined sense. This is much more acceptable physically and philosophically, and puts many interesting mathematical constructions information theory has given rise to in the right perspective.

References: S. De Haro, Towards a theory of Emergence for the physical sciences, arXiv:1907.10246
S. Chibbaro, L. Rondini, and A. Vulpiani, Reductionism, Emergence, and Levels of Reality (Springer, 2014)

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