3-year postdoc position in mathematical physics (quantum spin systems)
Radboud University Nijmegen, The Netherlands, starting October 1, 2013

Applicants should have a PhD in theoretical physics, mathematical physics, or mathematics and should be thoroughly familiar with quantum physics and its mathematical methods (preferably including quantum spin systems, exactly solvable models, and operator algebras). A strong interest in relating theory to experiment is also mandatory.

The initial aim of this position is to adapt the remarkable "Flea on the Elephant" instability phenomenon in the theory of Schrödinger operators in the semiclassical limit (discovered by Jona-Lasinio, Martinelli, and Scoppola in 1981, named as such by Barry Simon in 1985, renamed as the "Flea on Schrödinger's Cat" and applied to the measurement problem by Landsman and Reuvers in 2013) to quantum spin systems in the thermodynamic limit. This possibility is predicated on the close mathematical analogy between the semiclassical limit and the thermodynamic limit, as well as on the groundbreaking work of Koma and Tasaki (1994) on (pre-)symmetry breaking in large (but finite) systems. Subsequently, dynamical aspects of this instability (including time-dependent perturbations and the ensuing time-evolution of the perturbed ground state) should be analysed. Last but not least, theoretical groundwork should be done for the design and preparation of experiments testing the consequences of the theory for the (im)possibility of macroscopic superpositions (to be carried out at the Department of Materials of Oxford University).

This position is part of the innovative project *Experimental Tests of Quantum Reality*, in which the University of Oxford, Princeton University, and the Radboud University Nijmegen collaborate. This project will be funded by the *Templeton World Charity Foundation*.
The PI of this project is Professor Andrew Briggs (Oxford), with co-PI's Professors Hans Halvorson (Princeton), Klaas Landsman (Nijmegen), and Andrew Steane (Oxford).

At the Radboud University Nijmegen, the position is embedded in the Department of Mathematical Physics, which is part of the Institute for Mathematics, Astrophysics, and Particle Physics (IMAPP) within the Faculty of Science. IMAPP is a lively institute performing fundamental research at the frontiers of science. Apart from Klaas Landsman (Mathematical Physics), the other full professors of mathematics are Ben Moonen (Algebra, starting 1-9-2013), Eric Cator (Applied Stochastics), Erik Koelink (Analysis), Gert Heckman (Geometry), and Spinoza Laureate Ieke Moerdijk (Topology). On the faculty, among (currently) ten other mathematicians one also finds mathematical physicists Hans Maassen, Michael Müger, and Walter van Suijlekom.
Recently, the Department of Theoretical High-Energy Physics of IMAPP started a new group in quantum gravity led by Prof. Renate Loll. The Department of Experimental High-Energy Physics of IMAPP was closely involved in the discovery of the Higgs boson.
The neighbouring Institute for Molecules and Materials (IMM) of the Faculty of Science hosts a strong group in theoretical condensed matter physics, led by the renowned graphene specialist Prof. Micha Katsnelson (who will act as consultant on this project).

Please apply before May 1st by sending a CV including a list of publications, a short letter of motivation, and the names and email addresses of two or three referees to Klaas Landsman, landsman@math.ru.nl (from whom also further information may be obtained).