

# DIESE WOCHE

## PHYSIKALISCHES KOLLOQUIUM

des Fachbereichs Physik  
der Johann Wolfgang Goethe-Universität Frankfurt

Mittwoch, den 28.01.2015, 16 Uhr c.t.  
Großer Hörsaal, Raum \_0.111,  
Max-von-Laue-Str. 1

### Prof. Dr. Dieter Schuch

Institut für Theoretische Physik, Goethe-Universität  
Frankfurt am Main

### *„Was die Welt im Innersten zusammenhält – Is it linear, nonlinear or even both?“*

Quantum mechanics is, so far, the most successful theory scientifically as well as economically. Mathematically, it is linear, time-reversal and conservative. However, our everyday world is distinguished by a prevailing direction of time, dissipation of energy and phenomena (like the weather) that can rather be described in terms of nonlinear theories. Should physicists therefore have dual personalities, or is there a way out of this dilemma?

Extending quantum mechanics simply by adding nonlinear terms apparently does not solve the problem. Therefore, in this talk, a different approach will be presented, namely, a nonlinear (but linearizable) reformulation of quantum mechanics with the help of an “equation of motion” known for more than 250 years.

The advantages over linear theory are that information is gained, there is a straightforward extension to open dissipative systems as well as formal compatibility with other fields of physics. Such benefits are not possible along the lines of the established formalism of quantum mechanics. This will be demonstrated with examples from statistical thermodynamics via nonlinear dynamics and soliton theory through to Bose–Einstein condensates and cosmology. Finally, this approach also allows one to generate Pythagorean triples, a problem already known to and tackled by the Sumerians.

Die Dozenten der Physik

# Kolloquium