

**Fakultät
für Physik**

Physikalisches Kolloquium

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**Factorization of numbers,
Schrödinger cats and the Riemann
hypothesis**

In this talk we connect the three different topics of factorization of numbers, Schrödinger cats and the Riemann hypothesis. The bridge between these areas is the concept of a Gauss sum.

Gauss sums manifest themselves in various phenomena such as the Talbot effect, wave packet dynamics or quantum carpets. Moreover, Gauss sums can be used to efficiently factor numbers. In the meantime five experiments have used such an approach. They rely on NMR techniques, the physics of cold atoms and femtosecond pulses. At the moment the largest number that was factored using a Gauss sum algorithm is a 17 digit number. The talk summarizes these activities.

Moreover, we propose an elementary quantum system which provides us with the Riemann Zeta function. We show that its zeroes are a consequence of the interference of two quantum systems with opposite phases. However, the preparation of such a superposition state (Schrödinger cat) is impossible unless one takes advantage of entangled quantum systems. In this sense analytic continuation familiar from complex analysis finds entanglement as its analogue in quantum mechanics.

Montag, 01.05.2010, 14:15 Uhr
Ort: Hörsaal 6