"MAGIC with trapped ions"

PROGRAMME

11:30: Colloquium
13:00: Lunch with the speaker (all participants are invited at LENS)

Enrico Fermi Colloquium

Friday 20 Feb. 2015 11:30 am

LENS - Via Nello Carrara 1

Sesto F.no (Firenze)

Conference room Querzoli

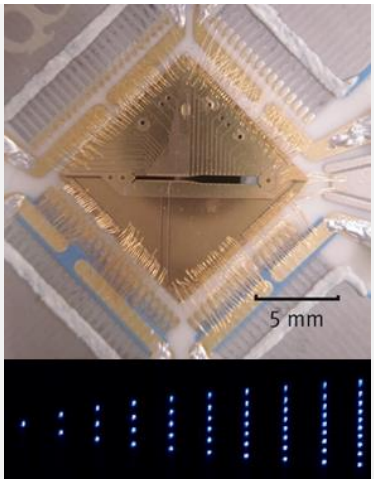
Prof. Christof Wunderlich

Department Physik, Naturwiss.-

Techn. Fakultat,

Universitat Siegen,

57068 Siegen, Germany



ABSTRACT

Trapped atomic ions are a well-advanced physical system for investigating fundamental questions of quantum physics and for quantum information science and its applications. Here, the concept of magnetic gradient induced coupling (MAGIC) between trapped ions used in our investigations shall be introduced first. Then, I shall report on recent experimental progress using atomic ions confined in a Paul trap that interact via MAGIC and are coherently manipulated using exclusively radio-frequency (RF) radiation. In particular, conditional quantum gates between non-neighbouring ions and their adjustable spin-spin interaction will be presented. Addressing of individual ions in a quantum byte (eight ions) with cross-talk of order 10^{-5}, thus allowing for fault-tolerant scaling, will be shown. Furthermore, experimental results on continuous and pulsed dynamical decoupling (DD) for protecting quantum memories and quantum gates against decoherence will be discussed. Finally, I report on using continuous DD to realize an ultrasensitive single-atom magnetometer.

Klein Colloquium by Sandra Doria: **"Ultrafast electronic processes in a novel Zinc Phtalocyanine"**