



UNIVERSITY OF CRETE  
DEPARTMENT OF PHYSICS



CCN

CRETE CENTER FOR  
QUANTUM COMPLEXITY  
AND NANOTECHNOLOGY

**ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ**

## **PHYSICS COLLOQUIUM**

**Thursday, 15 May 2014**

**17:00 -18:00**

**3<sup>rd</sup> Floor Seminar Room**

**“The quantum way of sensing”**

**Prof. Jörg Wrachtrup**

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### **Abstract**

The precision of measurements is ultimately limited by quantum mechanics. However, achieving the quantum limit in practical measurement application like sensing proves to be a significant challenge. Indeed one may argue that environmental noise on the order of  $k_B T$  dominates and hence the quantum limit is never reach unless sensing resorts to exotic realms like low temperature or high energy. However, for certain types of spin-based sensors this is not the case. Although relying on inherently low interaction energies spins can be efficiently decoupled from their environment and are used as highly specific probes for their close environment. The talk shall describe nanoscale sensing of electric, magnetic fields, temperature etc. utilizing spin quantum sensors. Quantum protocols to enhance sensitivity and achieve Heisenberg scaling are described and applications even in a live cell environment will be discussed.