

Plenary Talk

PV VIII Wed 9:15 B Audimax

Quantum metrology gets real — ●KONRAD BANASZEK — Centre of New Technologies, University of Warsaw, Warsaw, Poland

Quantum physics holds the promise of enhanced performance in metrology and sensing by exploiting non-classical phenomena such as multiparticle interference. Specific designs for quantum-enhanced schemes need to take into account noise and imperfections present in real-life implementations. This talk will review selected recent results in realistic quantum metrology, starting from interferometric phase estimation with common impairments, such as photon loss, and ending

with general scaling laws implied by the geometry of quantum channels. In many practical situations, although qualitatively improved asymptotic scaling of ideal noise-free protocols is lost, quantum physics can offer performance beyond the standard shot noise limit. As a concrete example, the fundamental quantum interferometry bound is compared with the recently achieved sensitivity of the squeezed-light-enhanced GEO600 gravitational wave detector, indicating nearly optimal operation given the present amount of optical loss. Finally, the potential of mode-engineering techniques for quantum-enhanced sensing is highlighted.