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The art of measuring

The rise of quantum information theory not only led to promises of unprecedented computational power, but has also enhanced our understanding of quantum mechanics and the measurement process in particular. Measuring something is now understood as a particular example of quantum information processing, and the measurement apparatus, traditionally considered as a classical device, has become a target of intense scrutiny, modelling, and experimentation. A new era of “quantum sensors” is thus being born, and may lead to enhanced sensitivities and performances in areas as diverse as brain imaging, gravitational wave sensing, or navigation. Powerful theoretical approaches allow us to analyze the ultimate performance possible of these new devices, find the optimal way of measuring a quantity in a given context, and develop new measurement principles. In my talk I will give an overview of these exciting developments and point out new perspectives on the horizon which have the potential to challenge once more the way we think about some established concepts in physics.