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**Ultimate precision limit and optimal probe states for quantum metrology** HAIDONG YUAN, Chinese Univ of Hong Kong, CHI-HANG FRED FUNG, Huawei, Hong Kong Science Park — An important task in science and technology is to find out the highest achievable precision in measuring and estimating parameters of interest with given resources, and design schemes to reach it. Quantum metrology, which exploits quantum mechanical effects to achieve high precision, has gained increasing attention in recent years. Here we present a general framework for quantum metrology which relates the ultimate precision limit directly to the underlying dynamics, this framework provides efficient methods for computing the ultimate precision limit and optimal probe states. We further demonstrate the power of the framework by deriving a sufficient condition on when ancillary systems are not useful for improving the precision limit.

Haidong Yuan  
Chinese Univ of Hong Kong

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