Fully optimized quantum metrology: ultimate precision and optimal protocols

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Abstract

One of the main quests in quantum metrology is to attain the ultimate precision limit with given resources, where the resources are not only of the number of queries, but more importantly of the allowed strategies. With the same number of queries, the restrictions on the strategies constrain the achievable precision. In this talk, I will introduce a systematic framework to identify the ultimate precision limit of different families of strategies, including the parallel, the sequential and the indefinite-causal-order strategies, and provide an efficient algorithm that determines an optimal strategy within the family of strategies under consideration. With this framework, we can show there exists a strict hierarchy of the precision limits for different families of strategies.

Biography

Yuxiang Yang （杨宇翔） is an assistant professor at Department of Computer Science, the University of Hong Kong. He worked as a postdoctoral fellow at ETH Zurich. He holds a PhD in Computer Science from The University of Hong Kong and a BS in Physics from Tsinghua University. He was awarded a Microsoft Research Asia Fellowship in 2017 and featured by Journal of Physics A as one of the Emerging Talents 2021. His research aims to identify quantum advantages in metrology and computation, and to design optimal protocols for the next generation of quantum computing devices.