Quantum correlation is a fundamental resource in many quantum information processes. Although quantum entanglement has been considered as a representative example of quantum correlation, it has been known that there are different kinds of quantum correlation. From the information theoretic view, Ollivier and Zurek introduced quantum discord which captures all the nonclassical correlation. It is notable that quantum discord provides more broad concept of quantum correlation than entanglement. Therefore, all the entangled states have non-zero discord, however, there exist separable non-zero discord states. Due to the wide coverage of discord, it has been actively studied in various fields of quantum information including quantum communication, and quantum computation.

It is interesting to investigate quantum discord in terms of interference because interference is a fundamental phenomenon which can induce correlations. There have been a few studies which link interference to discord, however, none of them directly shows the role of interference for generating discord.

In this presentation, we investigate entanglement and discord of bipartite systems in the context of interference. In particular, we show that one can generate non-zero discord state via classical second-order interference while entangled state cannot be generated with the same interference. The theoretical and experimental results suggest that the classical second-order interference can have an important role for generating non-zero discord bipartite states.

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