



UNIVERSITÀ DEGLI STUDI DI MILANO  
DIPARTIMENTO DI FISICA  
QUANTUM TECHNOLOGY LAB

**Tuesday, 30 Oct 2018, 11:30**  
**Aula Polvani (piano 1 LITA)**

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*How to preserve optimal measurements for state discrimination over any quantum channel*

### **Abstract:**

For practical quantum information applications one has to deal with the reality of non-perfect communication channels. We consider the problem of optimal quantum state discrimination, which consists in finding the best possible measurement that allows to distinguish two or more quantum states, over arbitrary quantum channels. We find sufficient conditions on the channels that guarantee the preservation of the optimality of the measurement. In addition, we show that under mild assumptions an optimal measurement can be preserved by a protocol requiring local operations and classical communication only, without the need to verify the quantum channel.

Our protocol could be used for quantum communication applications since optimal state discrimination is key to several secure protocols such as the BB84 quantum key distribution protocol. I will present you a possible experimental implementation of our protocol for qubits using polarized photons and standard quantum optics elements. In short, the key point is to implement a twirling protocol with the help of a unitary-two design as provided for example by the elements of the Clifford group.



For further info:

<http://users.unimi.it/aqm/>