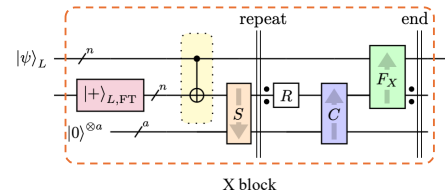


Proposte di tesi Magistrali in  
**Fisica Teorica e Quantum Science and Technology**

Si suggeriscono le seguenti proposte di tesi:

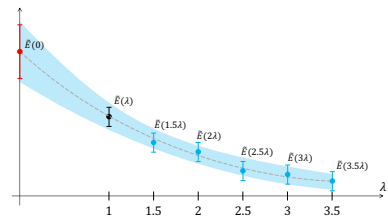
### Measurement-free Quantum Error Correction

Fault-tolerant quantum computation requires the application of quantum error correction to all the components of the quantum circuit. Recently, some proposed the possibility of removing the non-fault tolerant measurement necessary to develop the quantum error correction protocols. The thesis will focus on the development of new measurement-free quantum error correction protocols.



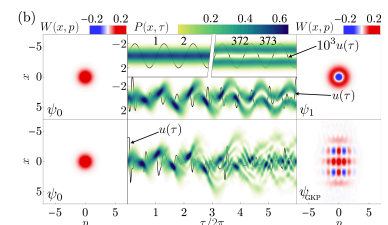
### Non-Markovian Quantum Error Mitigation

While the full development of quantum error correction requires a high number of qubits, quantum error mitigation can effectively diminish the effects of the noises via the application of manipulations or post-processing. These are however strongly noise-model dependent. The thesis will study and develop quantum error mitigation procedures for when non-Markovian noises are considered.



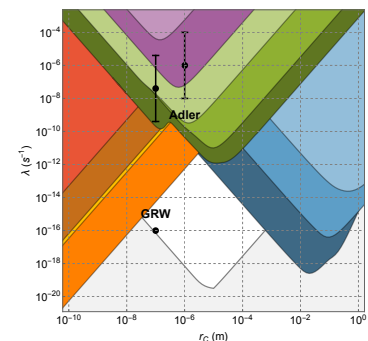
### Quantum Control in Optomechanics

Quantum optomechanics setups employ an optical field to control and measure the dynamics of a mechanical system. Only semiclassical (thermal) states can be obtained above a certain mass of the system. The thesis will focus on the theoretical application of quantum control to generate highly non-classical states.



### Testing Collapse Models

Collapse models are phenomenological models solving the quantum measurement problem. Different models are characterised by different parameters, which need to be determined via experiments. The thesis will verge on the development of a novel proposal for testing collapse models in membrane optomechanics.



### Requisiti

Le proposte di tesi richiedono una solida base di conoscenza in meccanica quantistica.

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