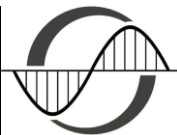




UNIVERSITÀ
degli STUDI
di CATANIA



DIPARTIMENTO DI FISICA E ASTRONOMIA
“ETTORE MAJORANA”

DOTTORATO DI RICERCA IN FISICA
CICLO XLII A.A. 2026/2027

TITLE

Selected topics in Quantum Technologies

2 CFU

Teaching staff

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Reception hours: Monday and Friday 17:00-19:00

Program of the course:

Selected topics in Quantum Technologies Quantum Technologies (QT) is an interdisciplinary subject where physics, computer science and chemistry merge. In the last decade interest has grown both for the conceptual importance of methods, requiring a deeper understanding of quantum mechanics, and for the enormous potential in applications. QTs aim at exploiting exquisite quantum behavior to perform tasks which are tackled inefficiently by that present day technologies. For instance quantum computation relies on superpositions and entanglement to achieve exponential speedup of certain algorithms, which in a standard digital computer take a time growing exponentially with the input. The course presents selected topical concepts, techniques and physical systems of interest in the field of QT.

- 1) Quantum circuits with superconductors (4 ore)
- 2) Cavity QED [2] and circuit QED (4 ore)
- 3) Quantum dynamics of driven systems (2 ore)
- 4) Optimal control Theory for quantum systems (4 ore)

Bibliography:

Scientific paper and slides provided by the teacher