

Superconductivity: fundamentals and applications

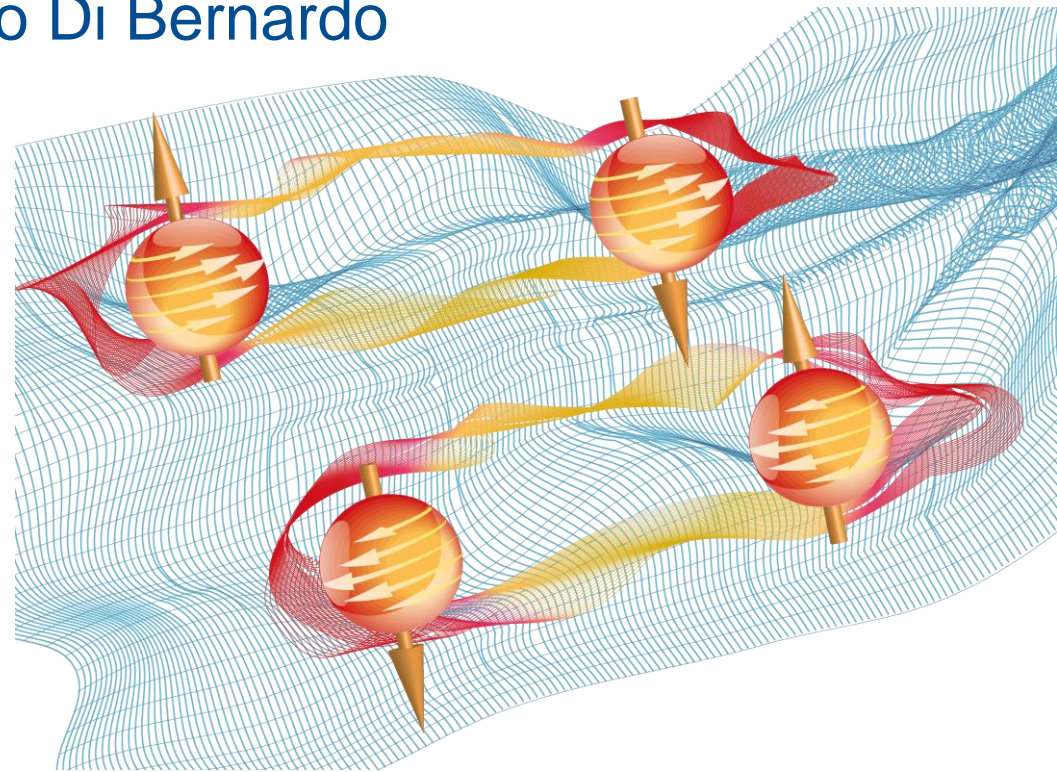
Prof. Dr Angelo Di Bernardo

Course logistics

- Total credits: 10
- Winter semester 2020/2021
- 4 hours of lectures/week
(Mon 15:15-16:45, Thur 15:15-16:45)
- plus 2 hours of exercises/week
(time to be defined with students)
- Final exam: oral examination (45 min)
- For more info please email angelo.dibernardo@uni-konstanz.de

Aim of the course

- To review the basics of superconductivity and its main technological applications



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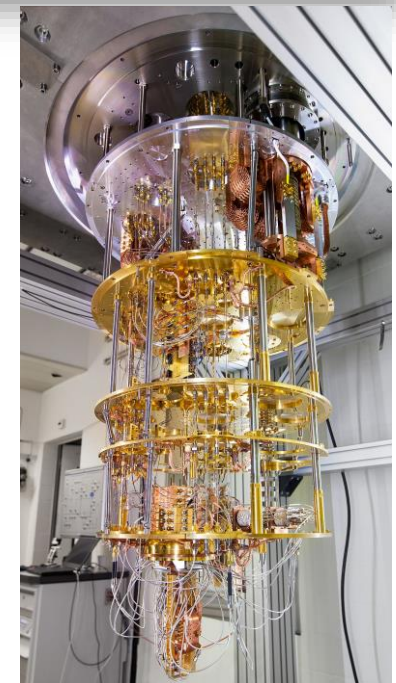
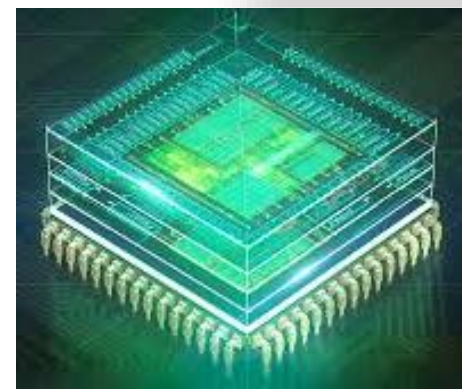
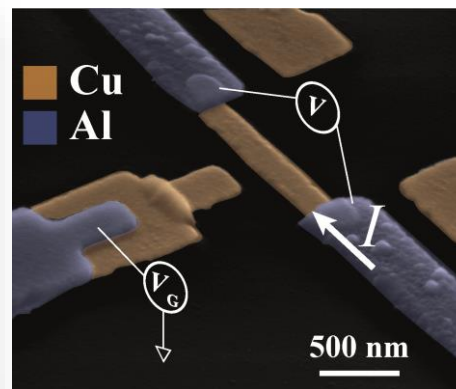
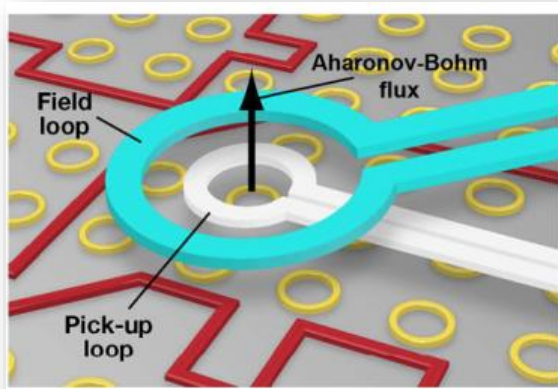
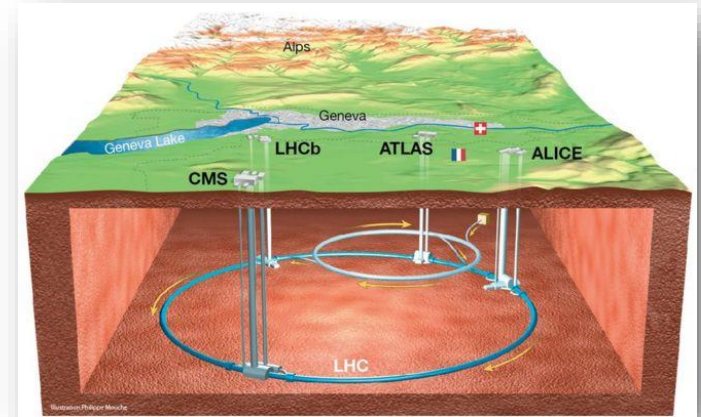
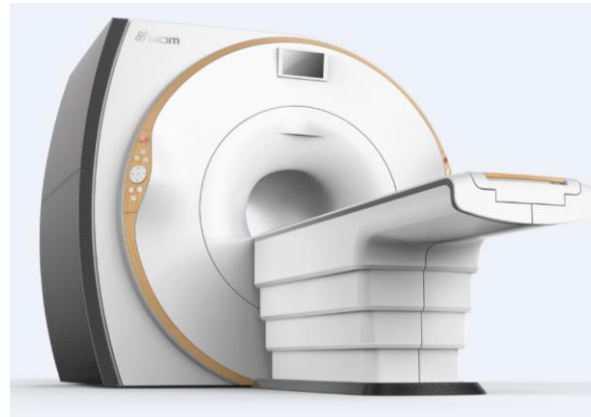
Course outline

- **Basic properties**
Superconducting transition, thermodynamics, electrodynamics, Meissner effect
type-I and type-II superconductors
- **Theoretical descriptions and models**
Microscopic Bardeen-Cooper-Schrieffer theory, phenomenological Ginzburg-Landau theory, electron tunnelling in superconductors, unconventional superconductivity
- **Josephson effect**
Basic phenomena and devices based on it
- **Applications of superconductivity (with latest research findings)**
Ultrasensitive magnetometers, particle detectors, magnetic levitation trains, RF and microwave filters, low-dissipation digital circuits and quantum computing

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<https://www.dibernardo.uni-konstanz.de/>



Sources

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<https://www.jrailpass.com/blog/maglev-bullet-train>

<https://physics.aps.org/articles/v2/24>

<https://arxiv.org/abs/1903.03435v1>

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