CHALMERS
UNIVERSITY OF TECHNOLOGY

Department of Microtechnology and Nanoscience (MC2)
Quantum Device Physics laboratory

Master thesis projects in
Chip-based superconducting levitation for sensing applications

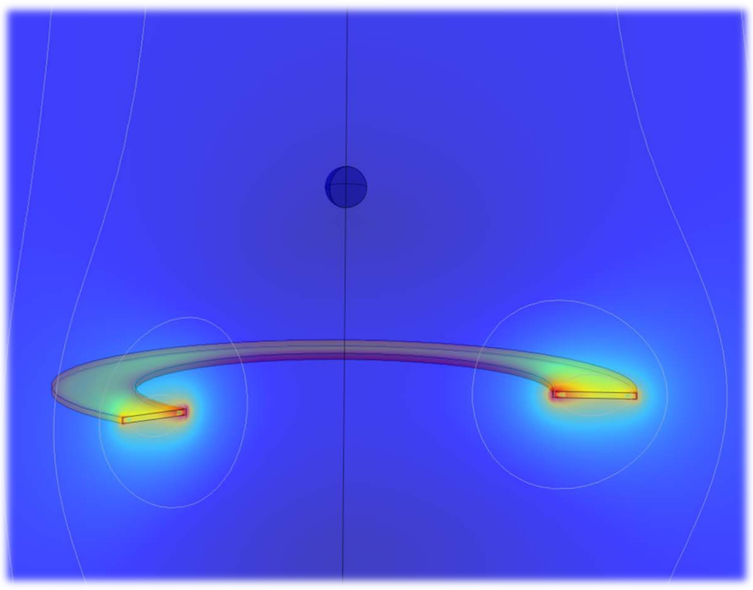
Levitation is a fascinating phenomenon in physics. It offers an excellent isolation of an object from its environment. As a consequence a levitated object can be used as an ultra-sensitive device for measuring external forces or accelerations. In our lab, we explore chip-based superconducting levitation of magnetic objects of various sizes for sensing applications and quantum experiments.

- **Simulation of chip-based magnetic trap structures for levitation and read-out of superconducting particles**

  Levitation of magnetic and superconducting particles requires obtaining extensive understanding of the magnetic environment of the system and the coupling of the levitated object to a read-out device.

  This project looks into understanding non trivial magnetic field distributions of magnetic trapping structures by means of simulation and/or derivation from fundamental equations.

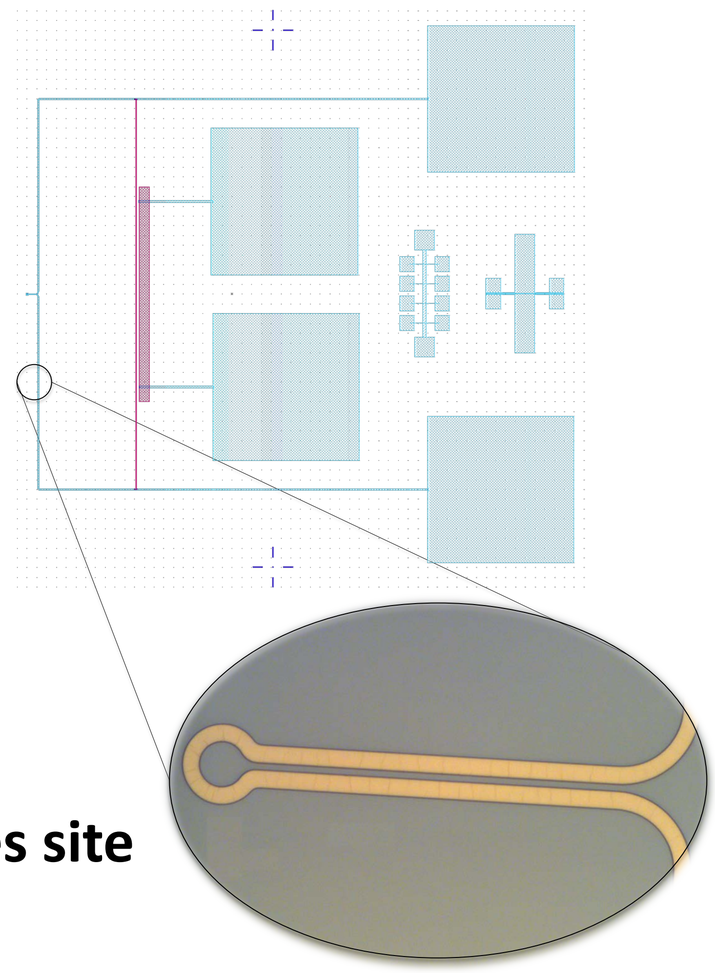
  Another project looks into understanding the coupling of the particle motion to a superconducting LC resonator or a SQUID by means of analytical calculations combined with FEM simulations.



- **Microfabrication and characterization of super-conducting structures for chip-based levitation**

  We use superconducting materials to fabricate magnetic traps and particles suitable for magnetic levitation.

  This project looks into analyzing, fabricating and characterizing superconducting structures of various sizes from novel superconducting materials.



Check the Mechanical Quantum Devices site
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