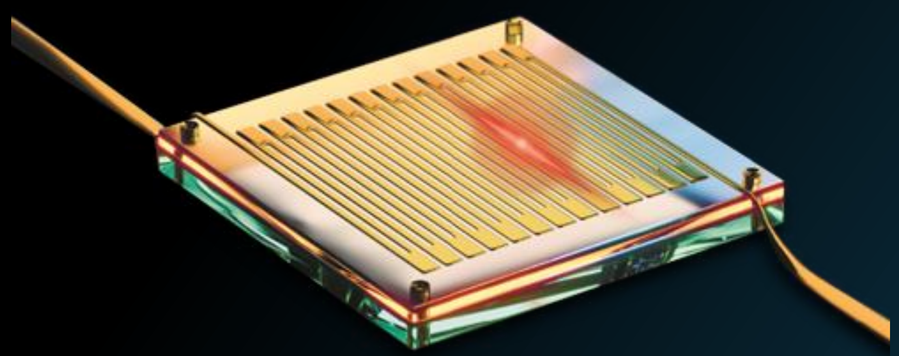
Take a bite from the Dark Side: Dark Matter detection with the QROCODILE experiment

Group of Prof. Dr. Andreas Schilling

Open Day of the Physics Institute 2025

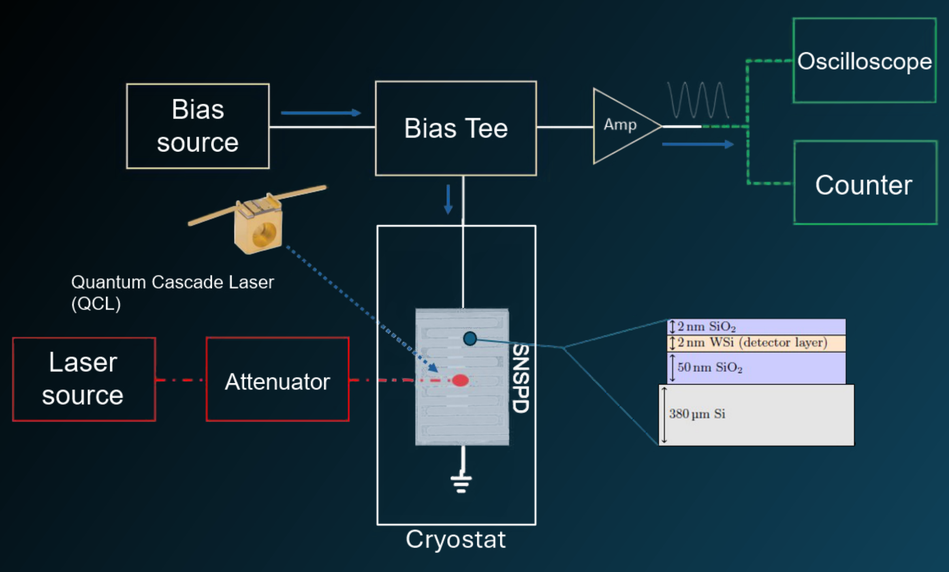
Join the Dark Matter Search!



In QROCODILE, we use superconducting nanowires not only as sensors, but also as the target material itself. These ultrathin WSi superconductors are sensitive to energy deposition down to 0.1 eV. With excellent sensitivity to small energy deposits on electrons and demonstrated low dark counts, such devices are used to probe unexplored regions of sub-MeV dark matter parameter space.

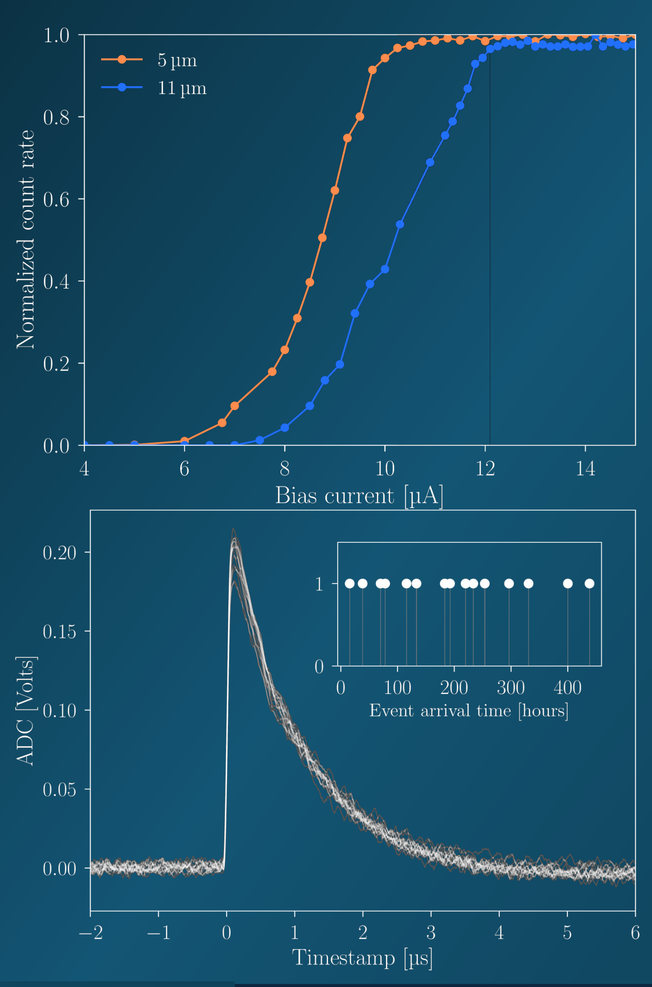
We reported the first nontrivial constraints on DM interactions at masses as low as 30 keV. Our detector has demonstrated high internal detection efficiency, but the sensitivity can be still be improved. This will require further optimization of the geometry and increasing the detector mass.

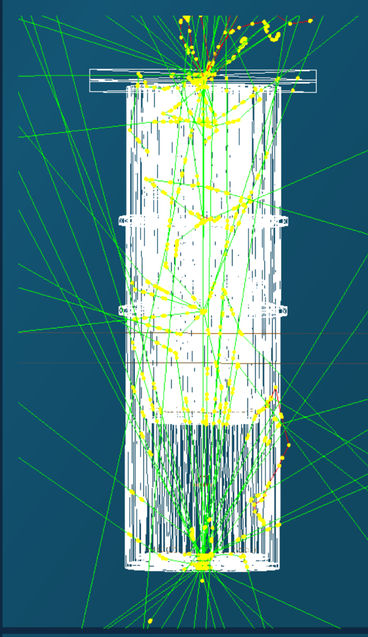
Experimental Setup and Measurements



Cryogenics:

- Excellent temperature control down to 100mK
- Low vibration and noise
- External magnetic field up to 8T
- Single and Multimode fibers in the range of 400nm – 11000nm
- Multiple readout channels for simultaneous measurements





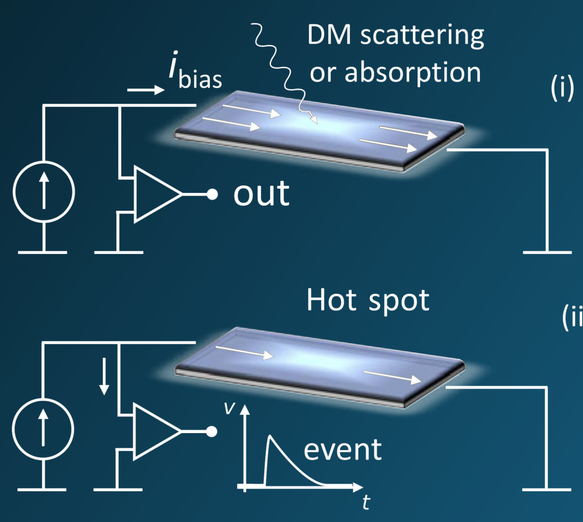
Simulations

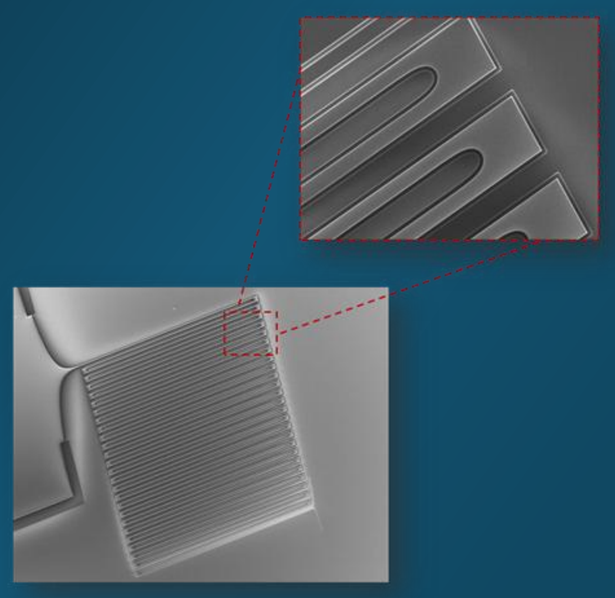
- Background simulations
- Estimate impact of cosmic rays
- Additional research with radioactive sources
- Accurate energy deposition measurements
- Use of advanced toolkits provided by CERN

Laboratori Nazionali del Gran Sasso

- Underground measurement to reduce background
- ~2km below the surface
- Science run in 2026
- Cryostat down to 8mK

Superconducting Nanowire Single-Photon Detectors





Study and work with multiple languages and toolkits used all over Physics!

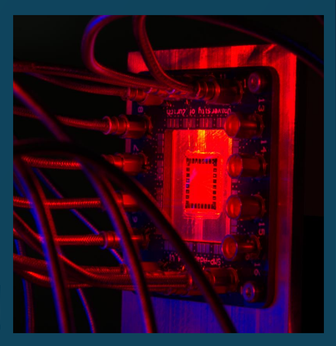
GEANT4 A SIMULATION TOOLKIT · ROOT Data Analysis Framework · C++ · python

Interested ? Reach out to us !

Interested to work in a small team at UZH ?

- Always open for Bachelor and Master projects
- Smaller semester projects also possible
- Work can be focused on a coding project or lab work !

Join us in the hunt for Dark Matter !



Global Collaboration

For more information, visit our webpage:

qrocodile.uzh.ch

Let us talk !

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