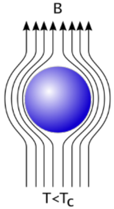
MEISSNER EFFECT

In 1933, Hans Meissner and Robert Ochsenfeld found that superconductors below their critical temperature exclude magnetic fields. They this by producing a "magnetic mirror" - surface, currents which exactly counter the external field. The phenomenon is the Meissner-Ochsenfeld effect.



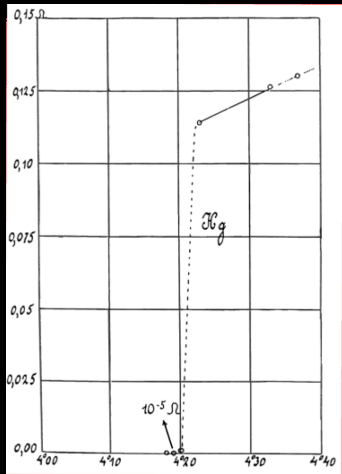
FLUX PINNING

In 1935 a new type of superconductors was discovered by Shubnikov & Rjabinin. They noticed that in some cases magnetic fields gradually penetrate into the superconductor. This was explained by Ginzburg & Landau and later by Abrikosov who showed that in certain superconductors magnetic fields do penetrate the material in the form of quantized flux tubes or fluxons.

Depending on the superconductor's properties, these flux tubes can be pinned inside the material. This locking of magnetic flux, or Quantum Locking, allows a superconductor to stably levitate above or below a magnet. It also means that a superconductor will move freely, without friction, along a path of identical magnetic field.

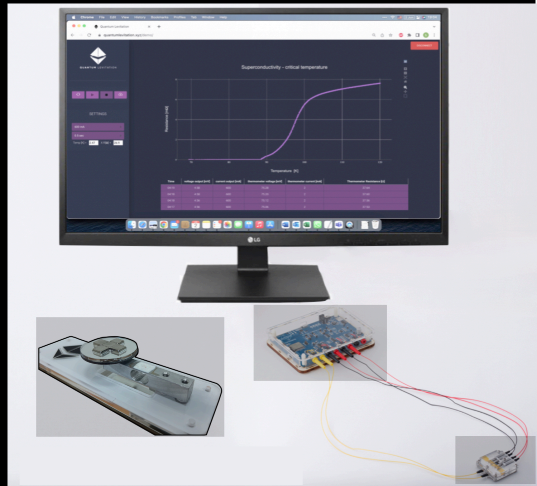
MEASURING SUPERCONDUCTIVITY

Superconductivity introduces one of the most difficult challenges for physicists - how to sensitively measure the high resistance (measured in volts) of the normal state and the infinitesimally low & zero resistance of the superconducting state at the same time.



The original graph from Onnes's publication from 1911 showing the resistance of mercury as a function of its temperature. (H. K. Onnes, Comm. Leiden, 124c, 1911).

QUANTUM LEVITATION

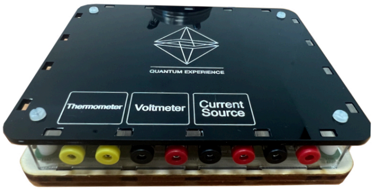


Superconductivity Experiment kit

quantumlevitation.xyz

MULTI-TEST UNIT

The multiple testing unit (MTU) includes all the measurement devices needed for the critical temperature & magnetic force experiments.

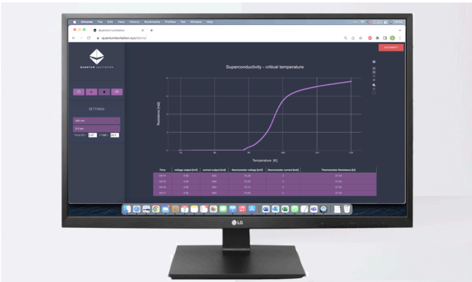


The unit includes the following capabilities:

- Current source
- Extremely accurate micro-voltmeter
- Ohmmeter
- Data logger w/ online control
- Force sensor (optional)

The MTU connects to a computer through a USB-C cable on the back and is fully controlled by an online website (no additional software needed):

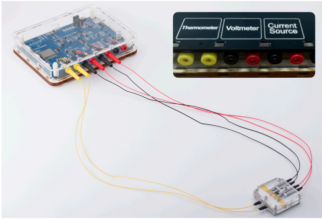
https://quantumlevitation.xyz/



ONLINE EXPERIMENTS

QUANTUMLEVITATION.XYZ

1) Connect the experiment setup (4-point / force sensor) to the MTU
2) Connect the power supply to the MTU and turn it on (on the back of the device).
3) Using a USB-C cable connect the MTU to a computer.



4) Launch a Chrome browser and browse to: **quantumlevitation.xyz**
5) Press the 'CONNECT' button on the top right.
6) Choose the USB-serial port from the popup menu and confirm.
7) Pick the wanted experiment.
8) Configure the experiment parameters.
9) Begin the experiment / data-logging.
10) Download the data in csv (comma separated values) format and use any spreadsheet software to read and plot the data.