Terahertz Circular Dichroism Spectroscopy

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Terahertz Circular Dichroism Spectroscopy

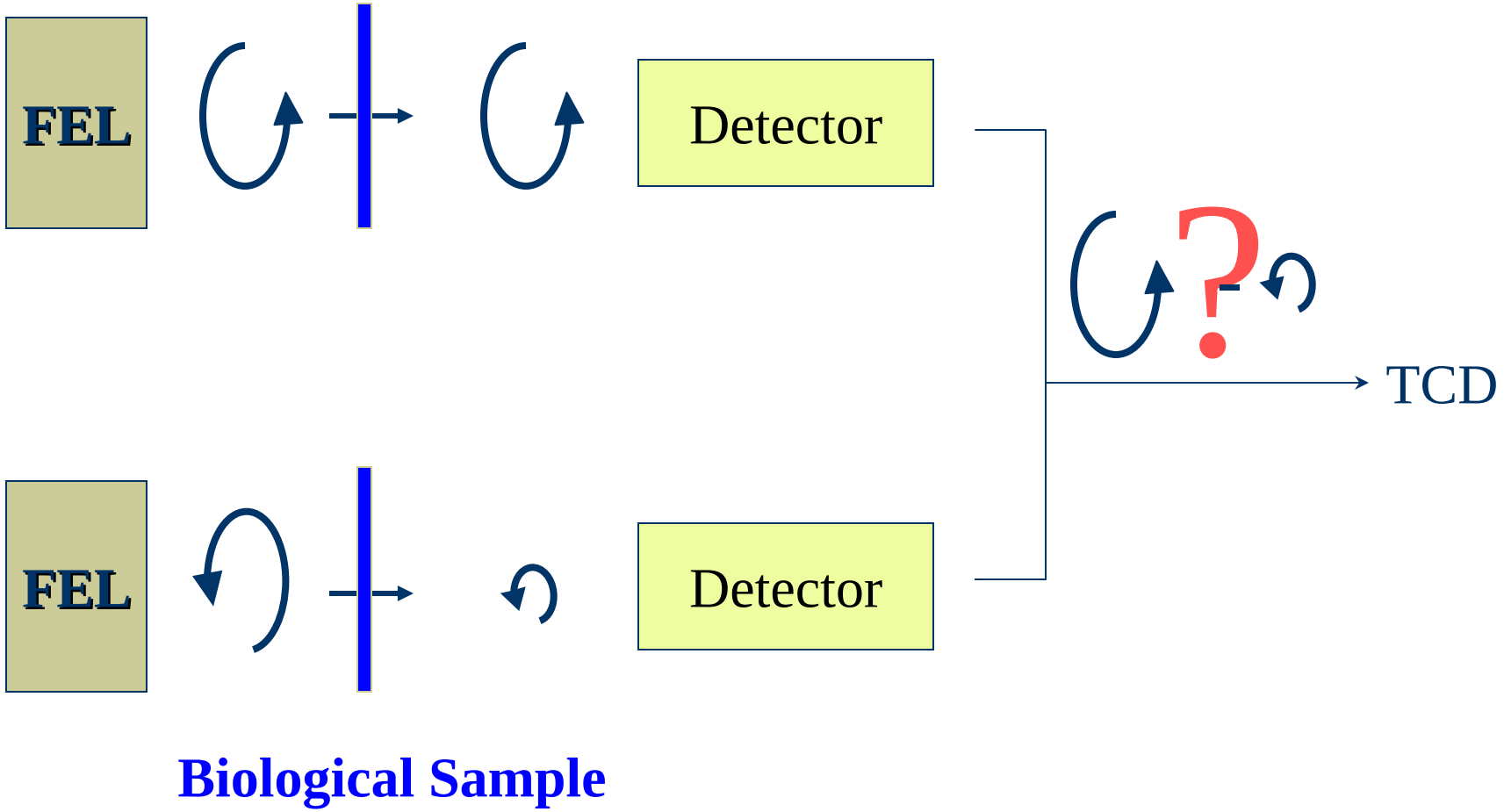
- Chirality:
  - Object lacks mirror plane symmetry
- Biology:
  - Processes handedness differently
  - Limonene: Orange vs. pine smell

Terahertz Circular Dichroism Spectroscopy

- Goal:
  - Mimic biology to
    - provide a new technology
      - in THz range.
- Applications:
  - Life detection on Mars (NASA).
  - Agent specific identification in bio-chemical warfare (ARO).
- My part:
  - Calibration of existing machine.

Terahertz Circular Dichroism

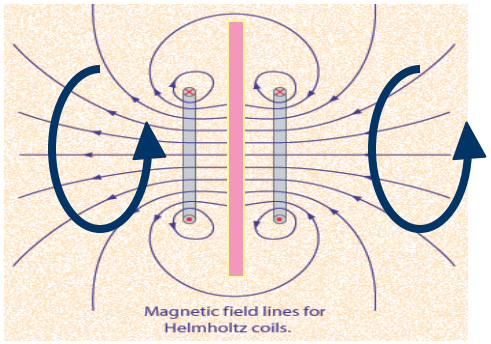
Detection: Schematics



Terahertz Circular Dichroism

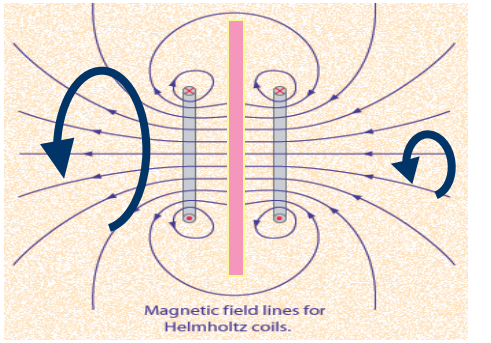
Calibration: Schematics

FEL

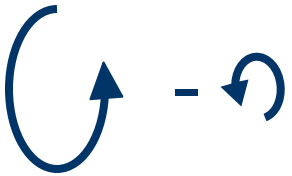


Detector

FEL



Detector



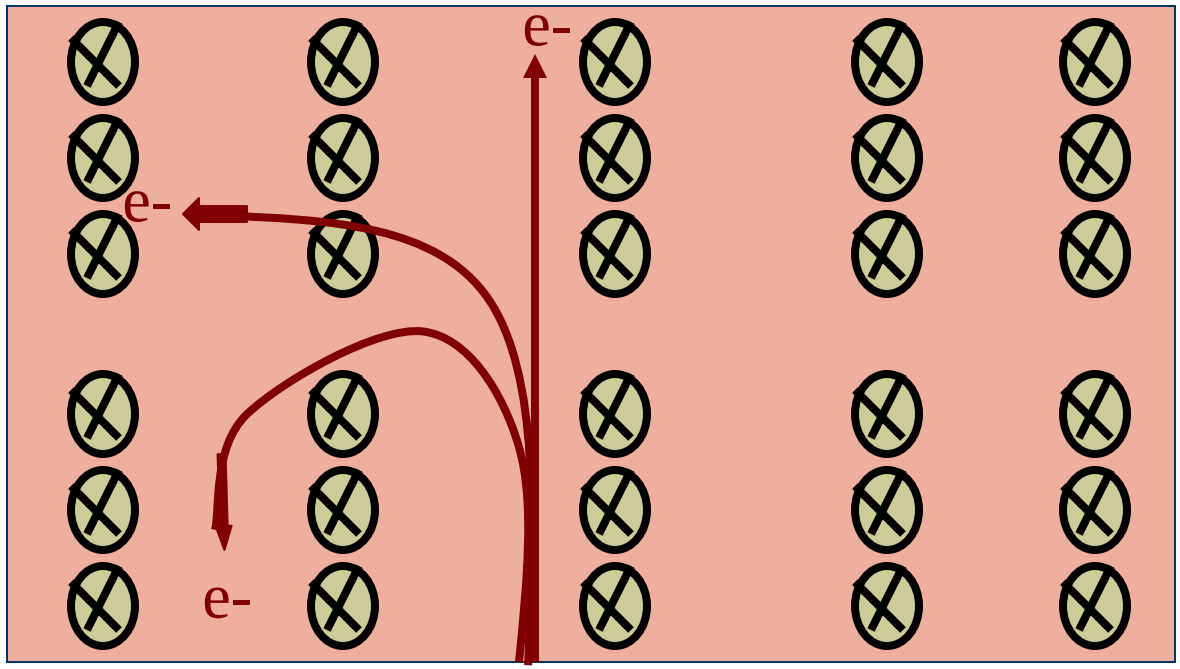
MCD

Controllable !

Indium Antimonite

Magnetic Circular Dichroism

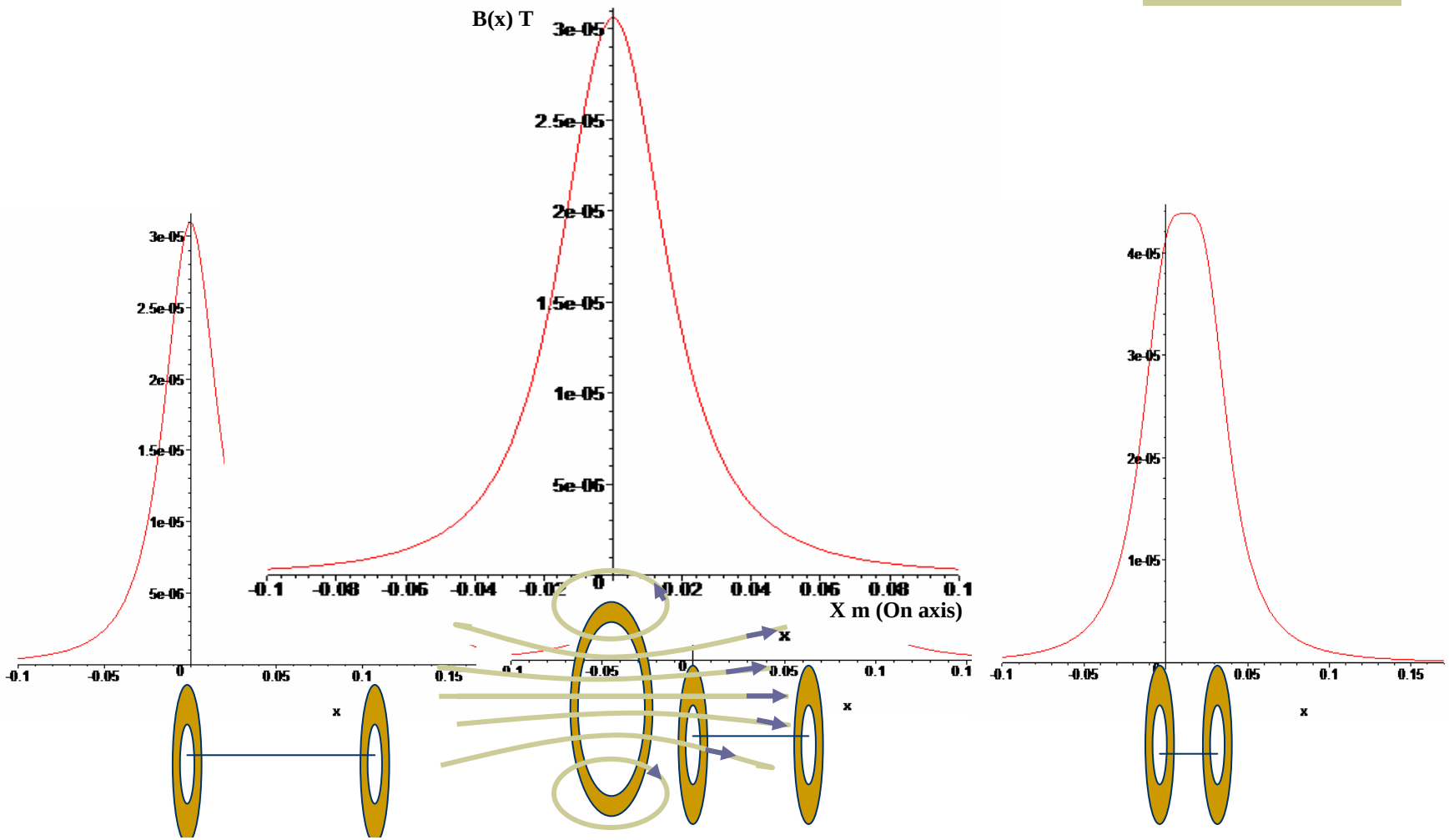
Indium Antimonite



How do we generate a tunable, uniform magnetic field?

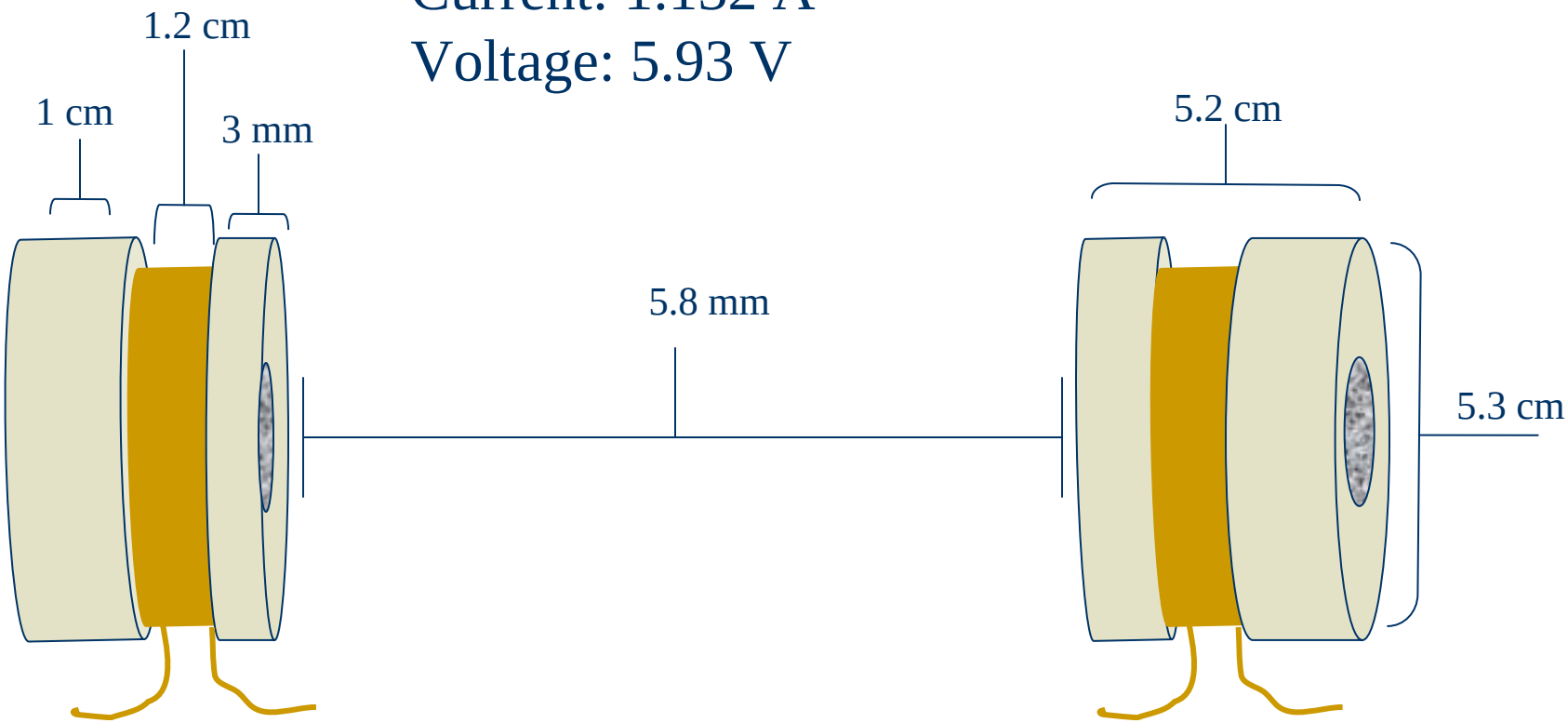
With a Modified Helmholtz Coil

Designing a Helmholtz coil

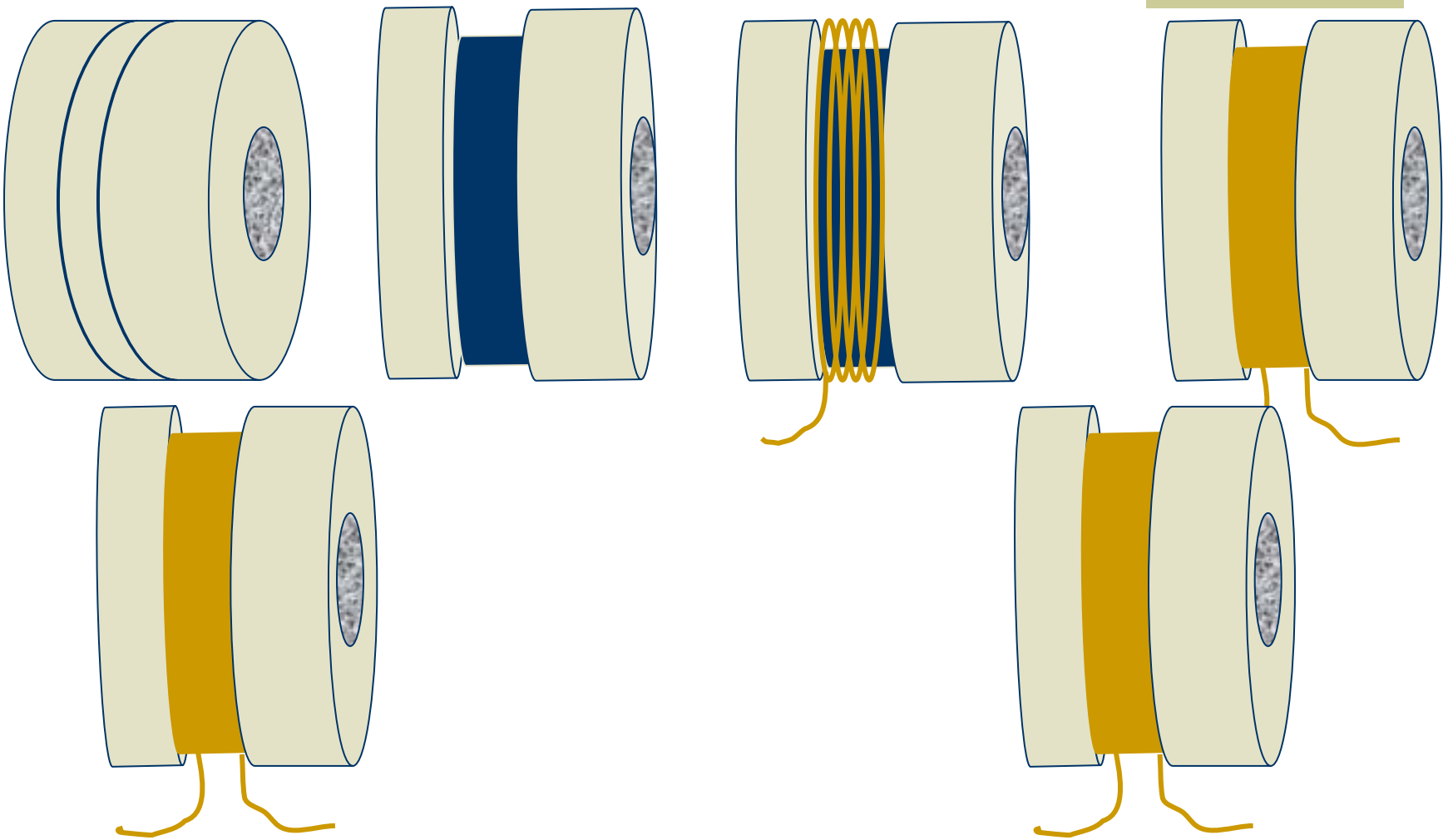


Making a Helmholtz coil

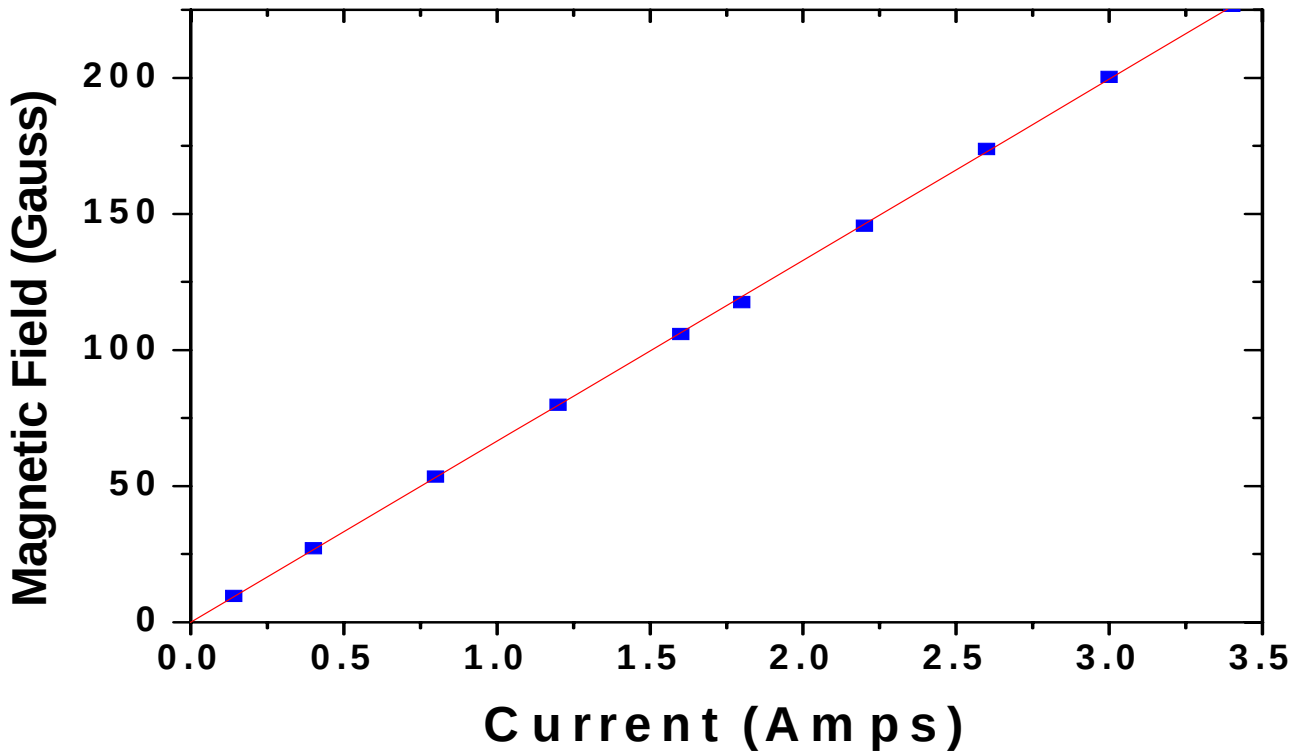
Coil: 393 turns #22 wire
Current: 1.132 A
Voltage: 5.93 V



Making a Helmholtz coil



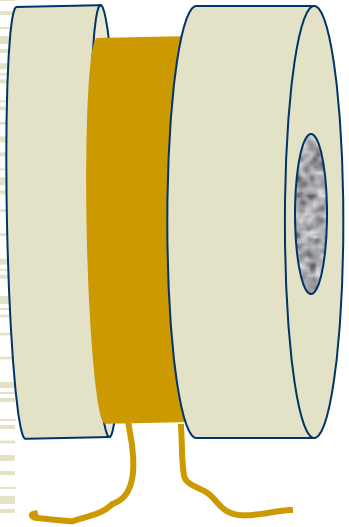
My Data: Magnetic field vs. Current



We can control B field very well!

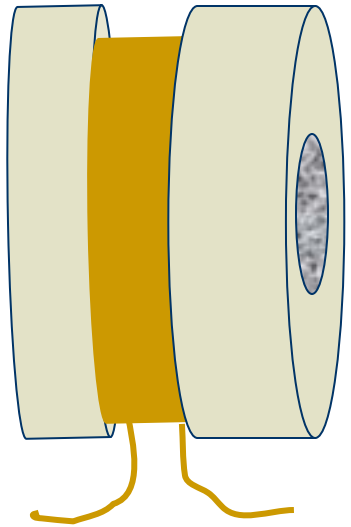
Calibration: Recap

Provide tunable uniform magnetic field



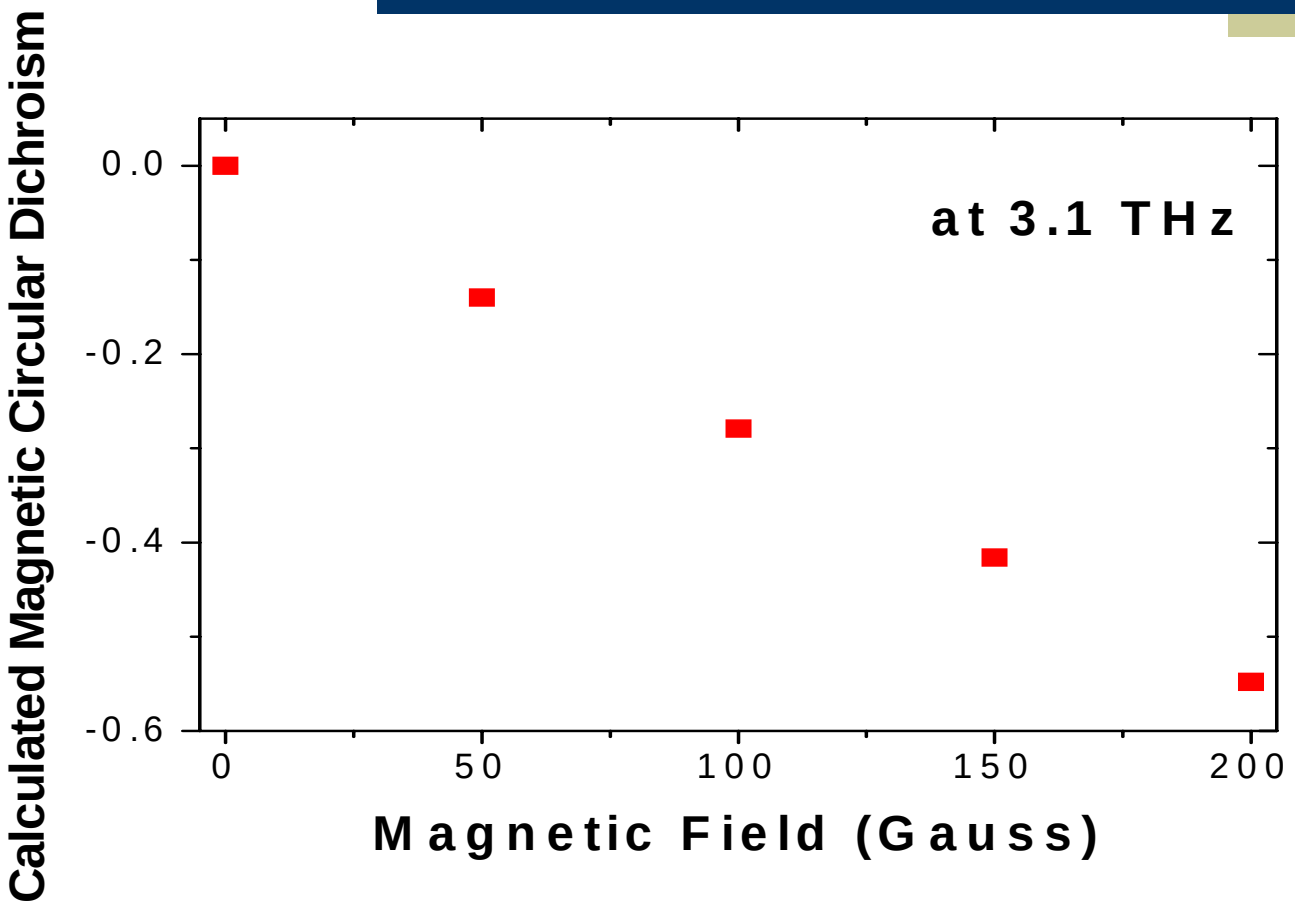
Control motion of e-
in semiconductor

Preference for absorption of
differently polarized light



Create a controllable signal:
magnetic circular dichroism

Next Big Step: Measure MCD



Will we see this? Stay tuned…