Cyclotron Detector Development for Antiproton Transport

Matthew Everette

Clemson University

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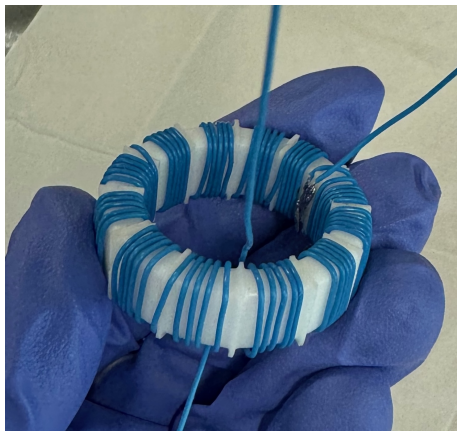
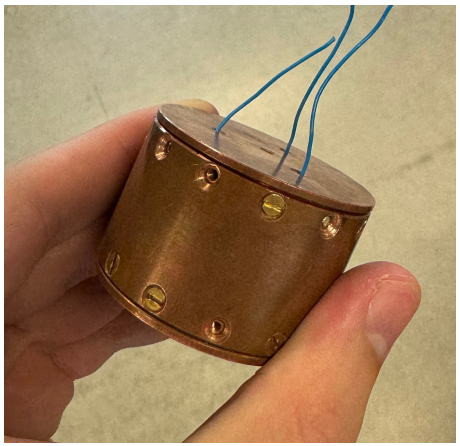
Project Change

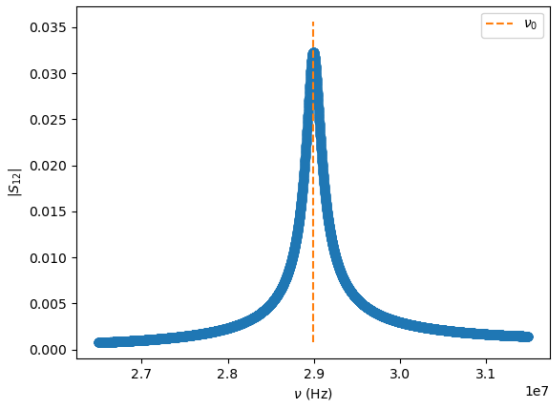
- A few days after our last meeting, my supervisor switched up my project.
- Now I am working to develop a new cyclotron detector and amplifier setup for the BASE-STEP experiment.
  - Specifically, I am working to improve the performance of the current detectors' varactors, which allow for tuning of the detectors' cyclotron frequencies.
- New varactor circuits are needed to minimize the effects of coupling between the cyclotron detectors in the catching trap and the reservoir trap.

Detector Assembly and Characterization

- My first step in this project was assembling and characterizing a new detector coil.
  - I accidentally had to do this twice because I messed up the number of windings on the first coil.
- My final assembled coil has an inductance of $3.7 \pm 0.1\mu H$ and a capacitance of $8.2 \pm 0.2pF$.

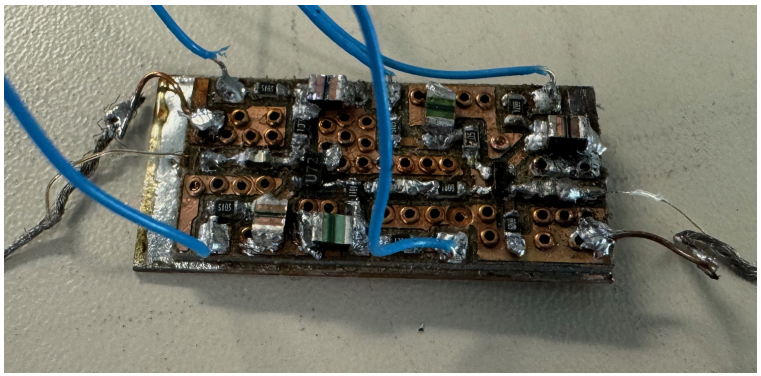


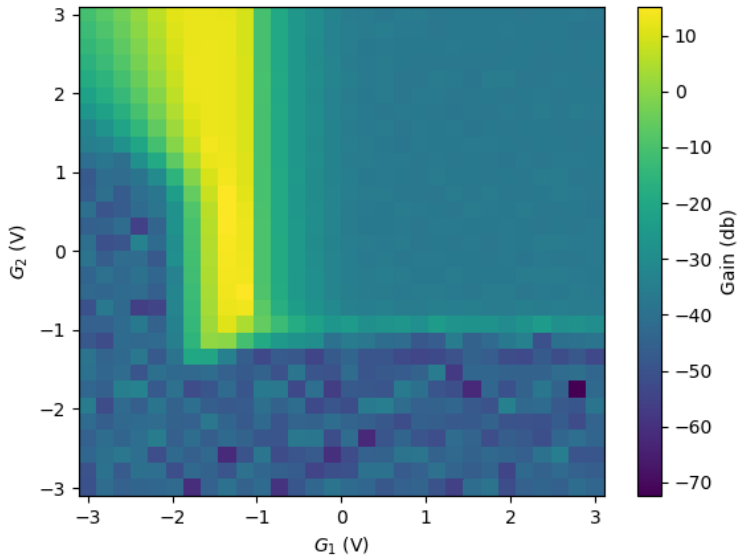




Amplifier Assembly and Characterization

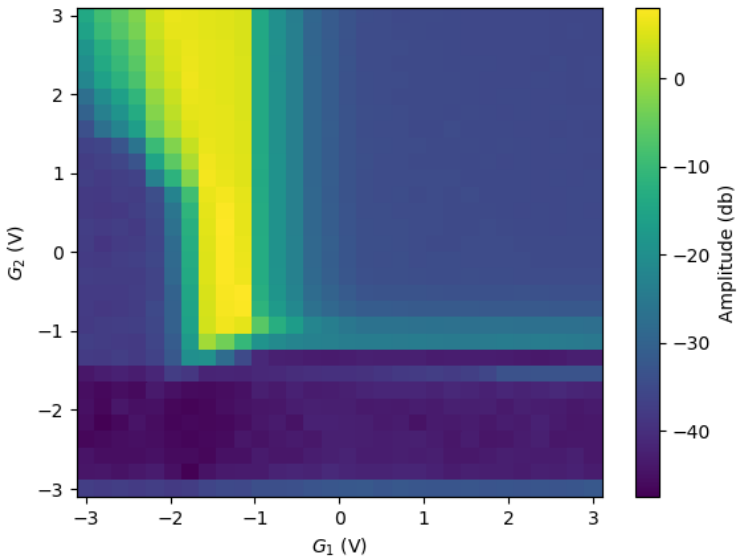
- Next I had to assemble a new amplifier circuit.
  - Lots of soldering practice!
- Amplifier characterization was done to determine the optimum gate voltages for both the gain and mitigating the Miller effect.

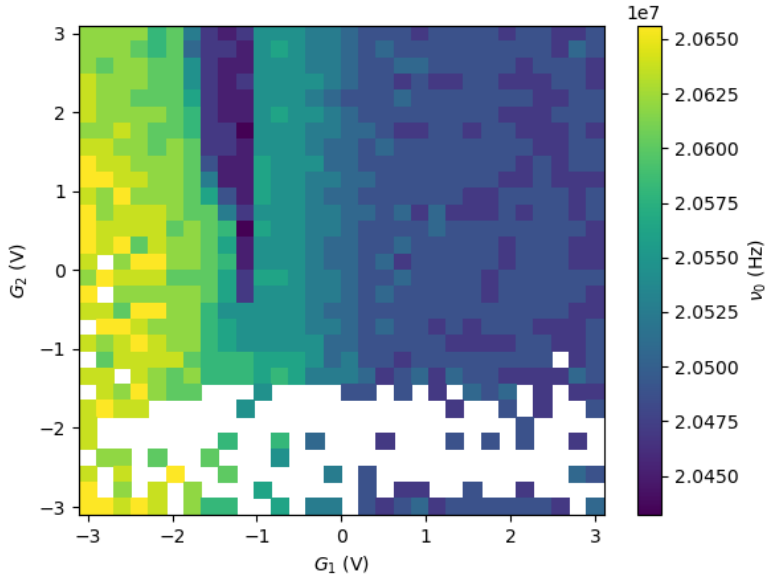


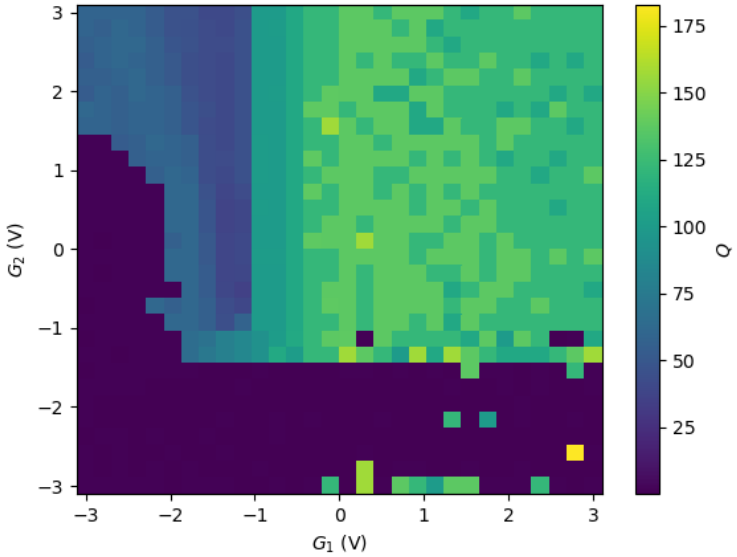


- The effective input noise of the amplifier still needs to be determined

(Preliminary) Miller Effect Measurements

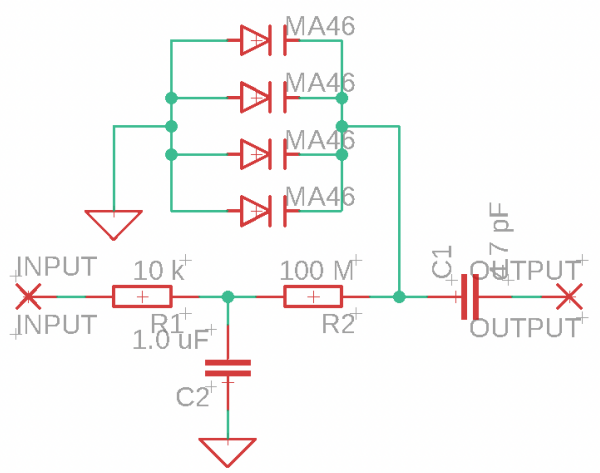


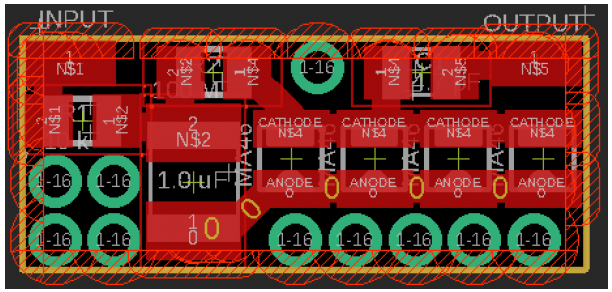


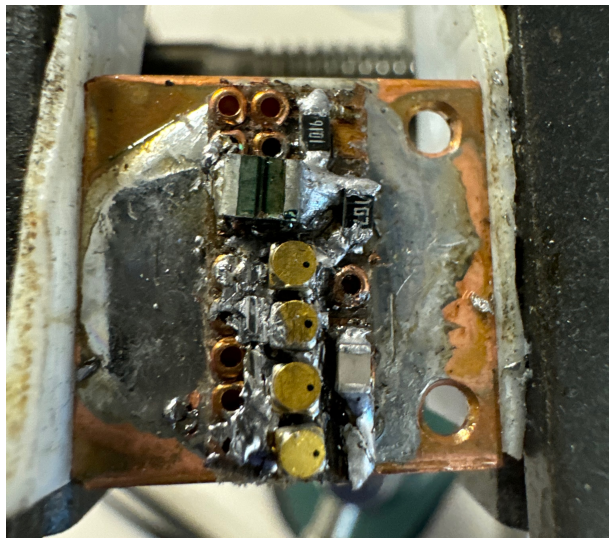


Varactor PCB Design and Assembly

- I developed and assembly a new varactor circuit for the detector.
- Varactor circuit testing and characterization still needs to be done.







Final Steps

- I still have a few measurements to complete before the end of my project, but I am done assembling all of the components.
- Measurements left to do:
  - Amplifier input noise.
  - Varactor characterization.
  - Low temperature (4K) measurements.

New Travel Pics