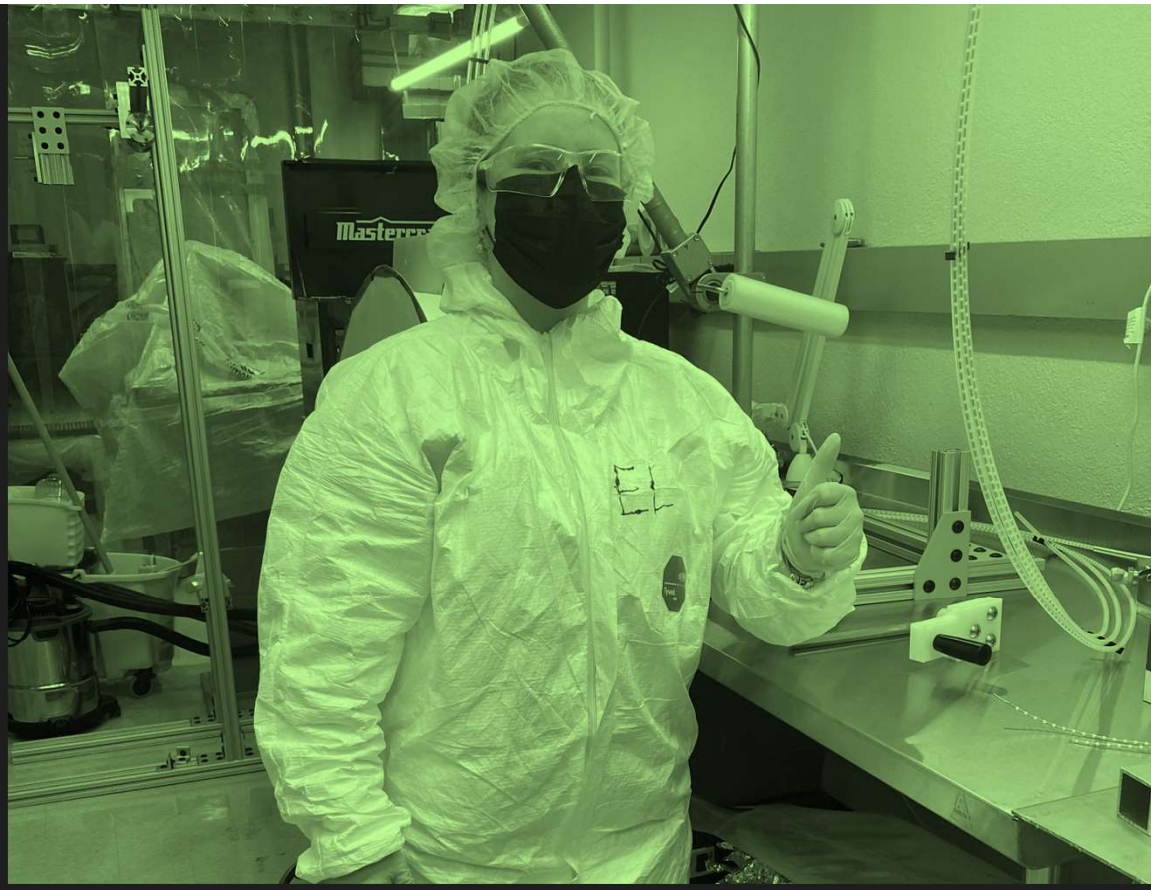
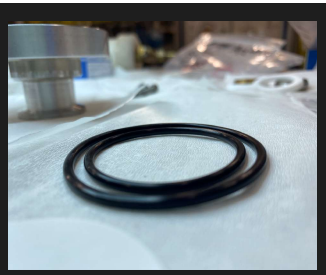


CASST PRESENTATION
AUGUST 2022

JACQUES FARINE – SUPERVISOR

EMILY LAXTON – 3RD YEAR KINESIOLOGY LU

SURFACE LAB LEARNING EXPERIENCE



ESC DETAILS

- Pump
- Loop
- Chamber
- Columns
- Diode

NEW TERMINOLOGY

- O-Rings
- Becquerel
- Ferrules

COMPUTING TECHNOLOGY

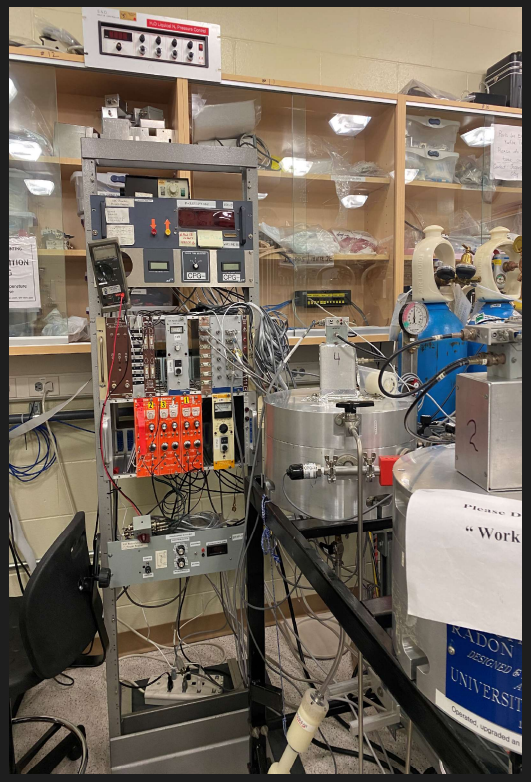
- DOS
- Coding
- MCA
- MT
- CPU

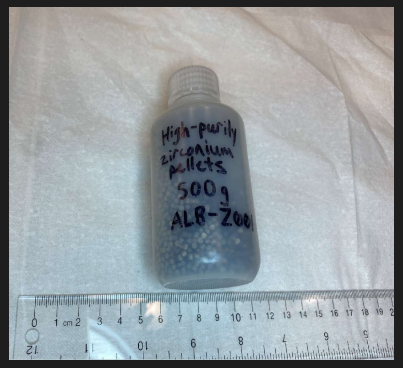
THEORY

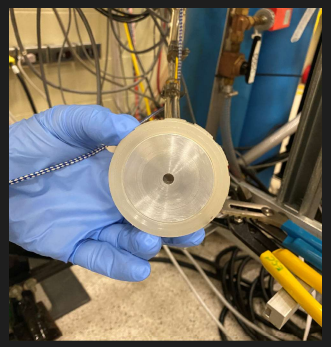
- Vacuum
- Radioactive Decay Chains
- PV=nRT
- Flow

My ESC Competency's

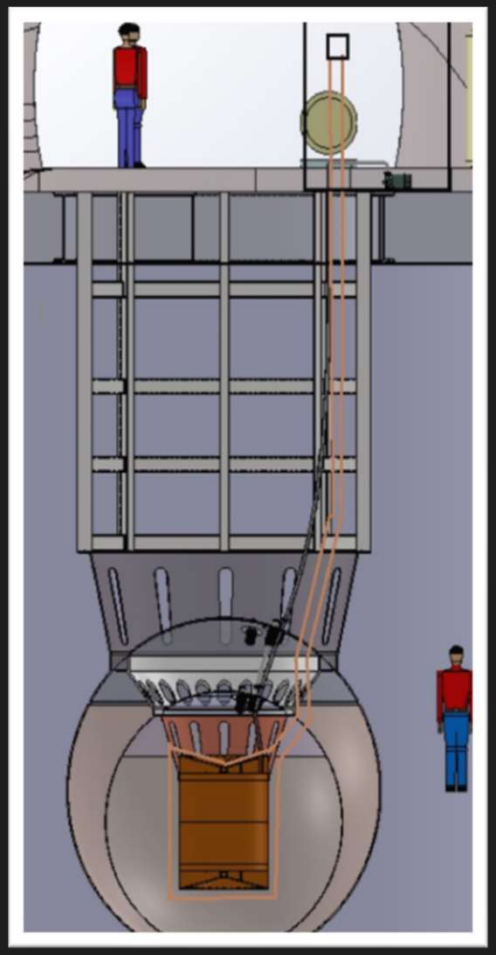
- Emanation Runs:
  - Background P & C
  - Sample
  - Blank
- Completed ESC Daily Checks (2-3 times a week)
- Handling of Samples:
  - Disassembly and Assembly of Columns
  - Recovery After Counting
  - Sample Documentation
- Samples Handled
  - Yellow Paint
  - Purifier Pellets for Noble Gases



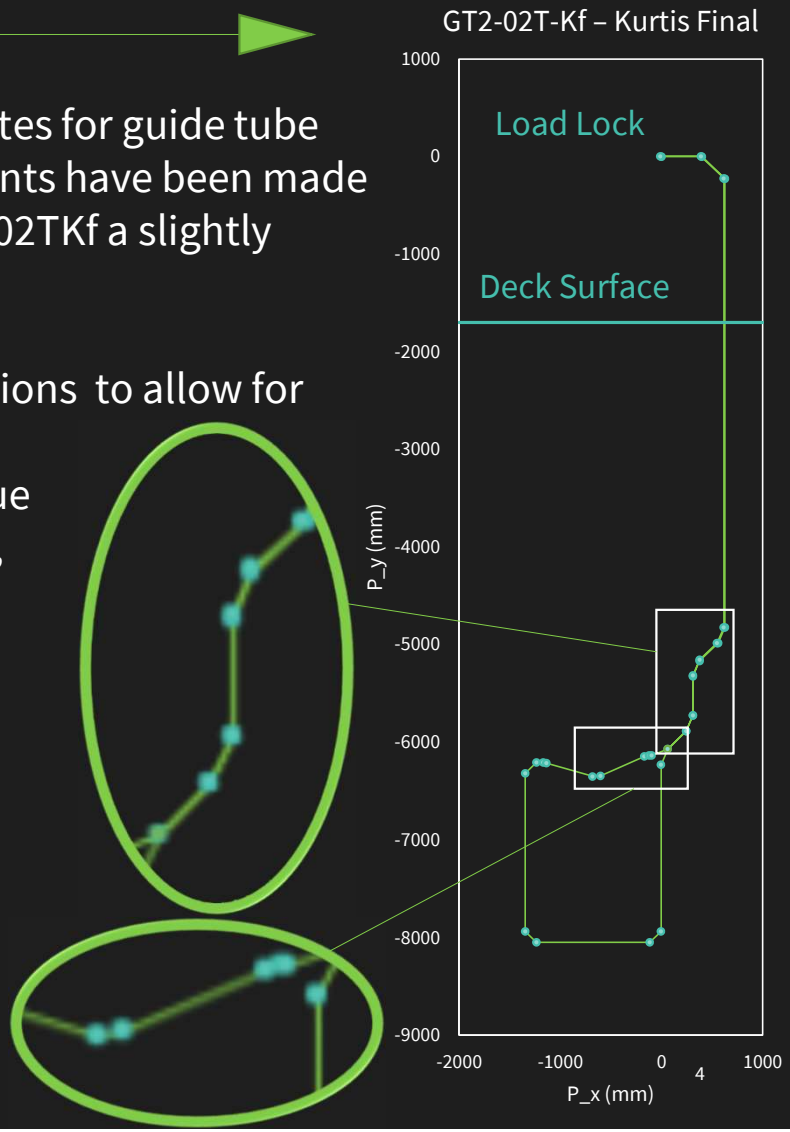




TRANSITION SUMMARY 2020 → 2022



- 2-D Cartesian centerline coordinates for guide tube design named GT2-02T, adjustments have been made to this design which created GT2-02TKf a slightly modified design to fit in the lab
  - different bend radii
  - changed bend angles at locations to allow for overlapping sections
- DAQ: LabJack and pyGUI for torque analysis is still able to record torque, distance and time data



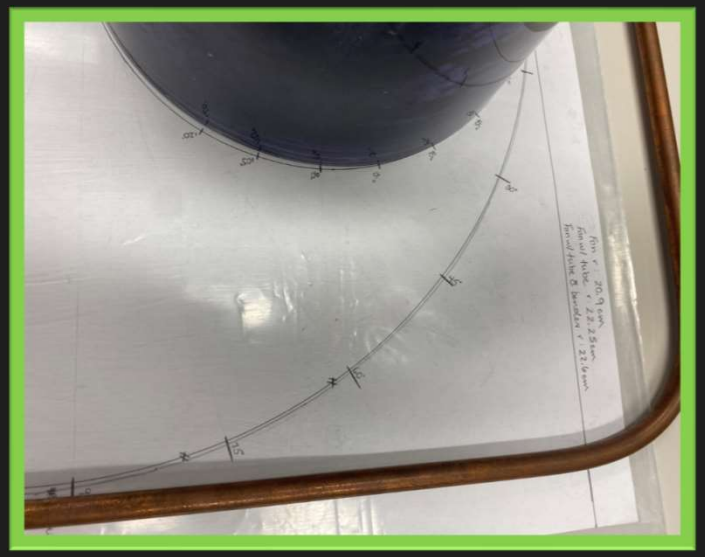
SETTING UP A FORCE TEST

- Force Test Goal: to calculate the resultant frictional forces between the crimped source cable with Teflon beads and the copper tubing
- To measure force a dynamometer was used
- First change to GT2-02T explained: the bend radii for the initial design were either listed as 10 cm or 20 cm, cylindrical objects below were found at Laurentian for tube bending of slightly different radii

FAN RADIUS = 20.9 CM

FAN RADIUS W/ TYGON TUBING = 22.6 CM

DYNAMOMETER



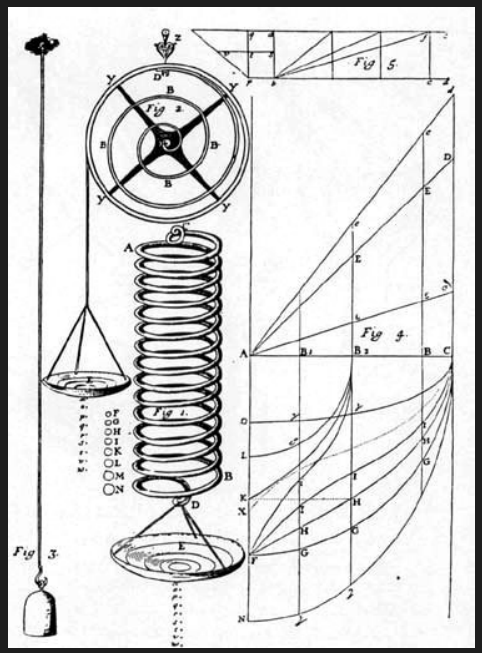
CURTAIN ROLL RADIUS = 11.1 CM

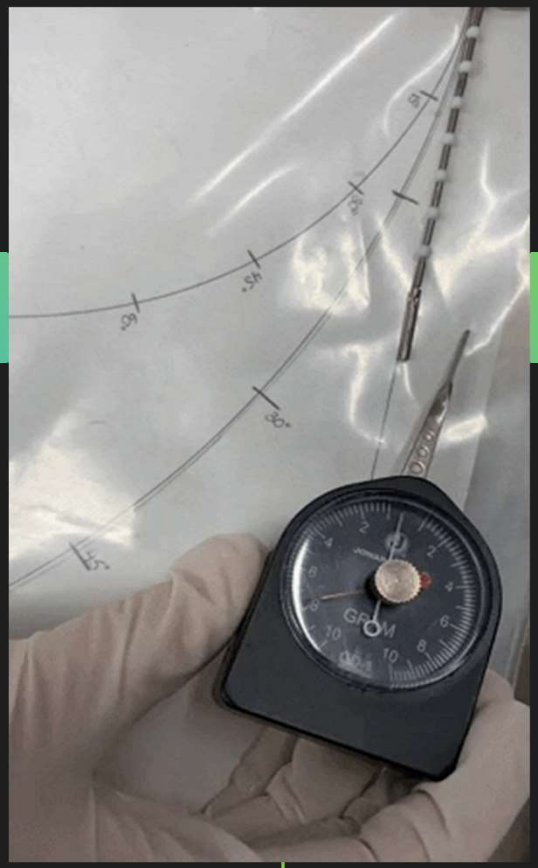
TRIAL AND ERROR : FORCE TEST

$$F = kx$$

???

HOOKE'S LAW?

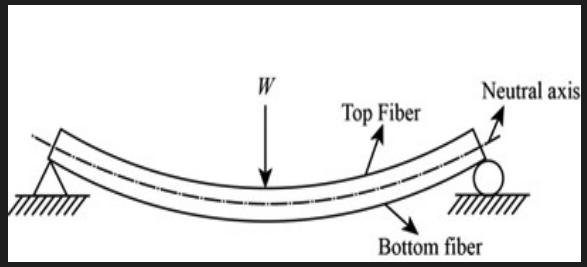




$$E = \frac{F/A}{\Delta L/L}$$

???

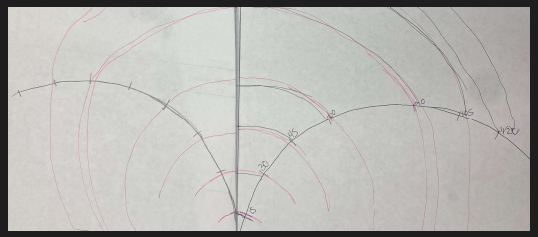
YOUNG'S MODULUS?

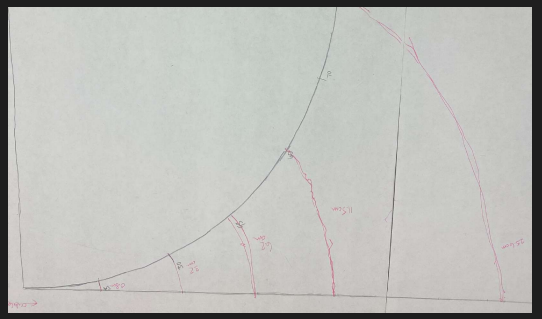


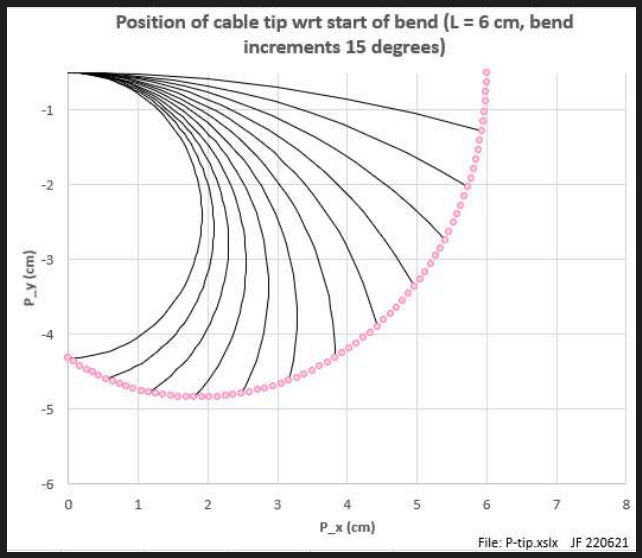
FORCE TESTS:

SHEAR MODULUS (G) = $\frac{F/A}{\Delta h/L}$

- Experimentation: Δh (cable path distance) - was calculated by the understanding that the cable naturally takes a spiral path
- Results: determined that bending of the source cable (sc) does not adhere to the shear force properties of a steel rod
- Future: the properties of the rope–like designed source cable may explain its flexibility and low G, but future experimentation awaits to explore this concept







Shear Modulus Results From Force Test:

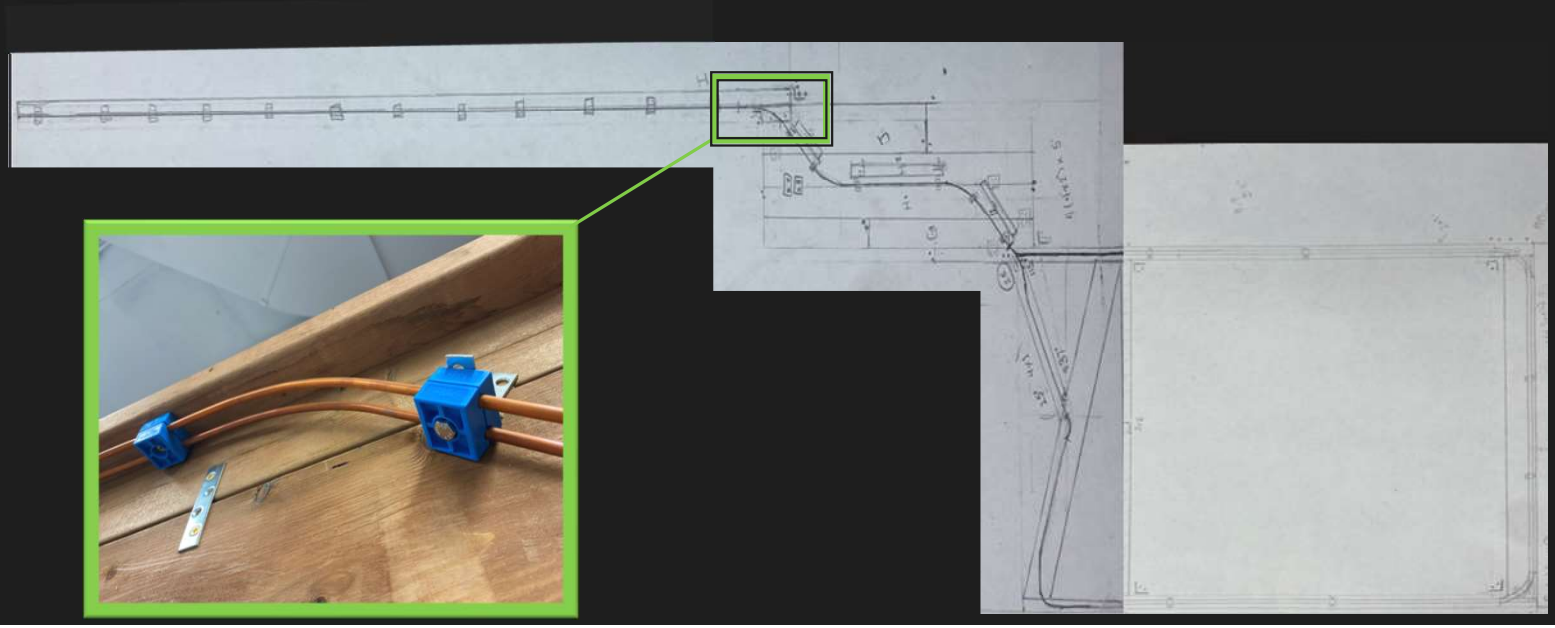
G (Pa)
7.19E+05
2.59E+05
2.44E+04
4.00E+04
3.73E+04
1.33E+06
2.18E+05
9.32E+04
3.62E+04
2.10E+04

$$G_{rod} = 7.2\ x\ 10^{10} Pa$$

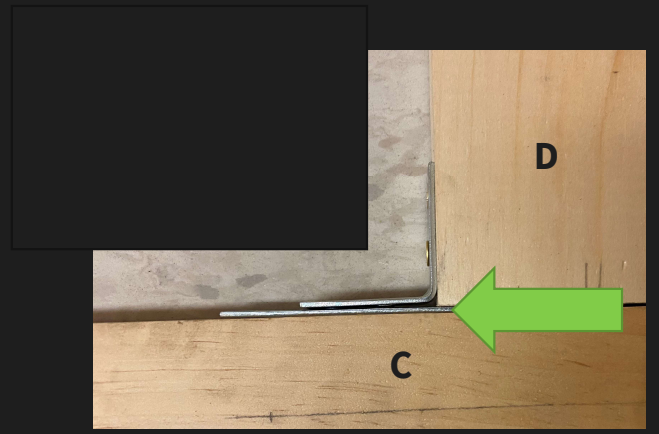
$$G_{ave.sc} = 2.8\ x\ 10^{5} Pa$$

THE PLAN: GT2-02TK

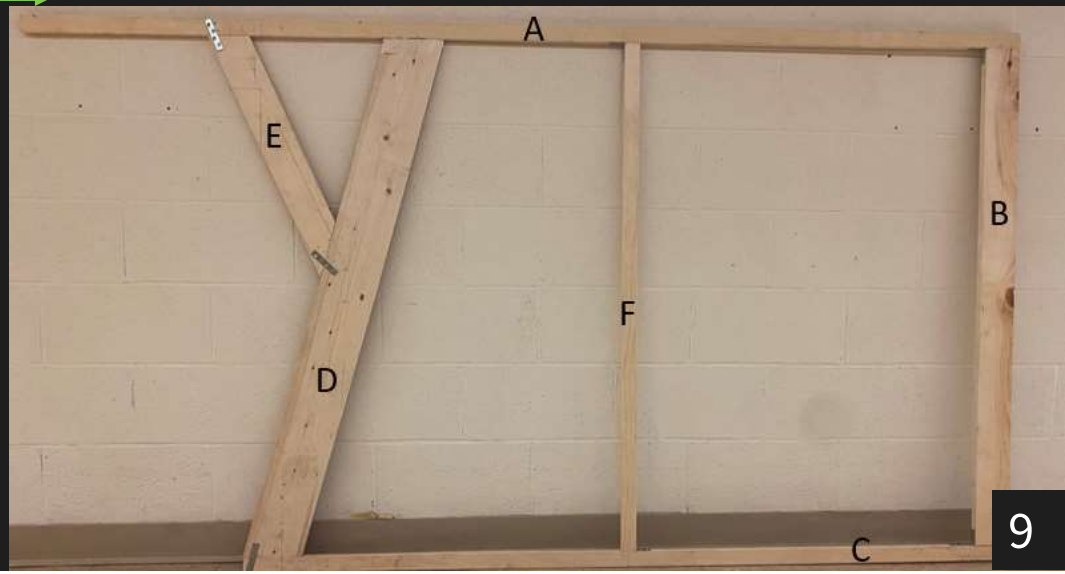
- Slight change was made to two bend angles in Kurtis' design GT2-02T to GT2-02TKf to allow for the ascending and descending guide tubing stemming away from the TPC to overlap
- Designed a wooden frame to support the integrity of the guide tube path
- Next Steps: to build the wooden support frame, bend the copper tubing in accordance with GT2-02TKf, transfer the structure into the clean room with D-140 at Laurentian and start data collection



BUILDING THE SUPPORT STRUCTURE

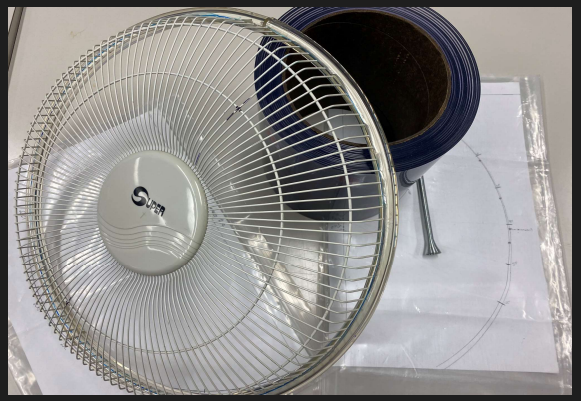


- Wood from Pine Hill Lumber and, Hardware (plate-brackets, L-brackets and screws) from McMaster Carr
- Assembled the Y-Knot and the Raft separately on 5th floor of Fraser
- Straightness was relative to the floor tiles
- There are three separate assembled pieces of wooden structures that were all connected in the end, as if connected it would not fit in the elevator
- The lumber piece labelled “C” was not straight, solution to fix the misalignment



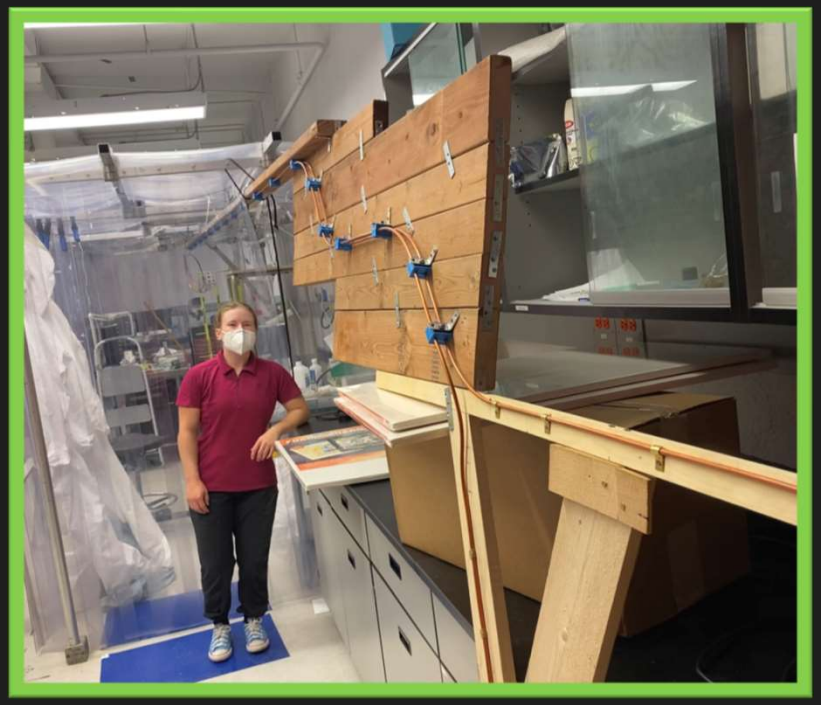
TUBE BENDING

- Used the Fraser Lobby floor tiles as a straight reference for the tarps placement and drawing out the GT2-02TKf design
- Bent the copper tubing relative to the coordinate system and used the fan shell and curtain roll for the tubing to bend around
- Three separate sections of the wooden frame were connected together
- The guide tube was secured onto the wooden frame using brass routing clamps and Swagelok clamp kits



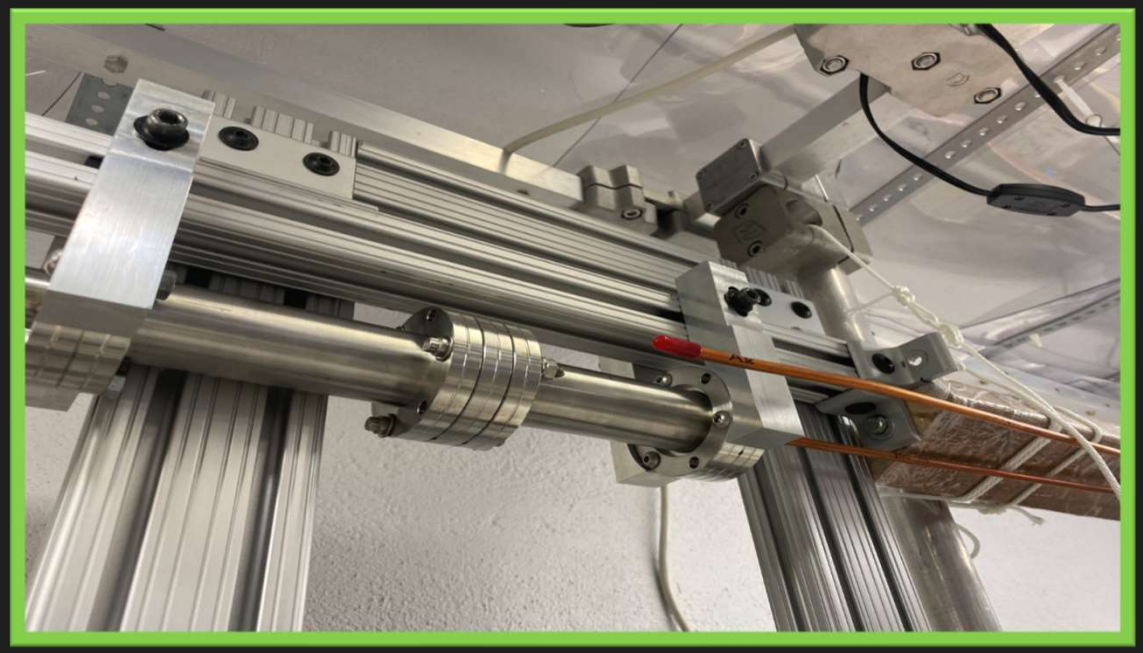
TRANSFERRING TO D-140

- As seen below the large wooden structure with the guide tube which its total length is over 26ft has been safely moved into D-140
- Most of the 16ft board is in the clean room which as been cleaned and covered in tape in order to reduce particle emittance
- The box was a temporary hold until a stand was built to support the wooden frame



FUTURE PLANS

- The guide tube is now ready to test the source cables ability to travel through its geometry, setting up the telescope, cassette, torque sensor and LabJack are works in progress
- The descending path of GT2-02TKf is assembled to the load-lock
- Future Work: to record Torque vs Position data on the source cables journey through the guide tube to determine how smoothly it moves through the bends and straight sections



THANK YOU FOR LISTENING