John,

I have given you 3 slides:

The first is a schematic of version 1 of the DSSSD cooling mount.

The second is a schematic of the new DSSSD cooling mount, including the new circular cold plate and cylindrical shell shaped radiation shield; everything else is the same as in version 1. The shield has a 4in. diameter; this is the same as the diameter of the beamline connecting the final slit box to the end detector box. It is ~15cm long. The shell is removable and is clamped to the cold plate. It reaches nearly the same temperature as the cold plate.

The third is a plot of the temperatures of the cold plate and the center of the detector vs. Peltier voltage. The temperatures were measured with thermocouples. The min. cold plate temp. and min. detector temp. are -20.6degC and -13.5degC respectively. These temperateres are reached at V=10V on the Peltier.

With the old mount, the minimum temp. reached by the detector was around 0degC. The improvement is attributed to better contact between the cold plate and the detector, and to the new radiation shield.

Leakage current dropped by a factor of 50, from 250nA for no cooling to 5nA for maximum cooling. The large change is expected (there should be an exponential factor in the dependence of leakage current on temperature).

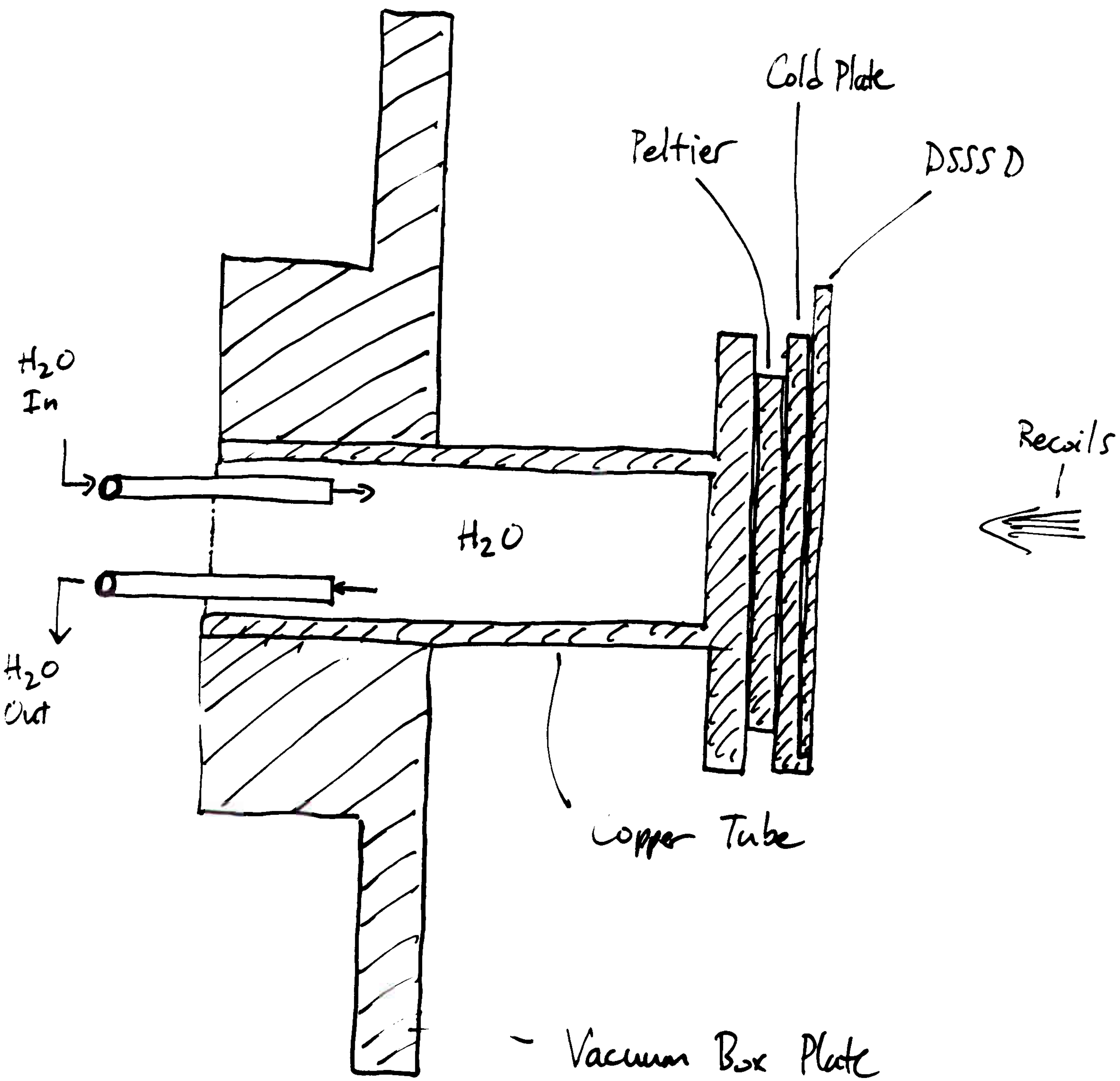
The new holder was tested with our SSSSD. At T(cold plate)=+18degC, the energy resolution of a thin Am-241 source was measured to be ~0.8% FWHM for reliable strips. At T(cold plate)= -18.8degC, the energy resolution was ~0.7%.

-Chris

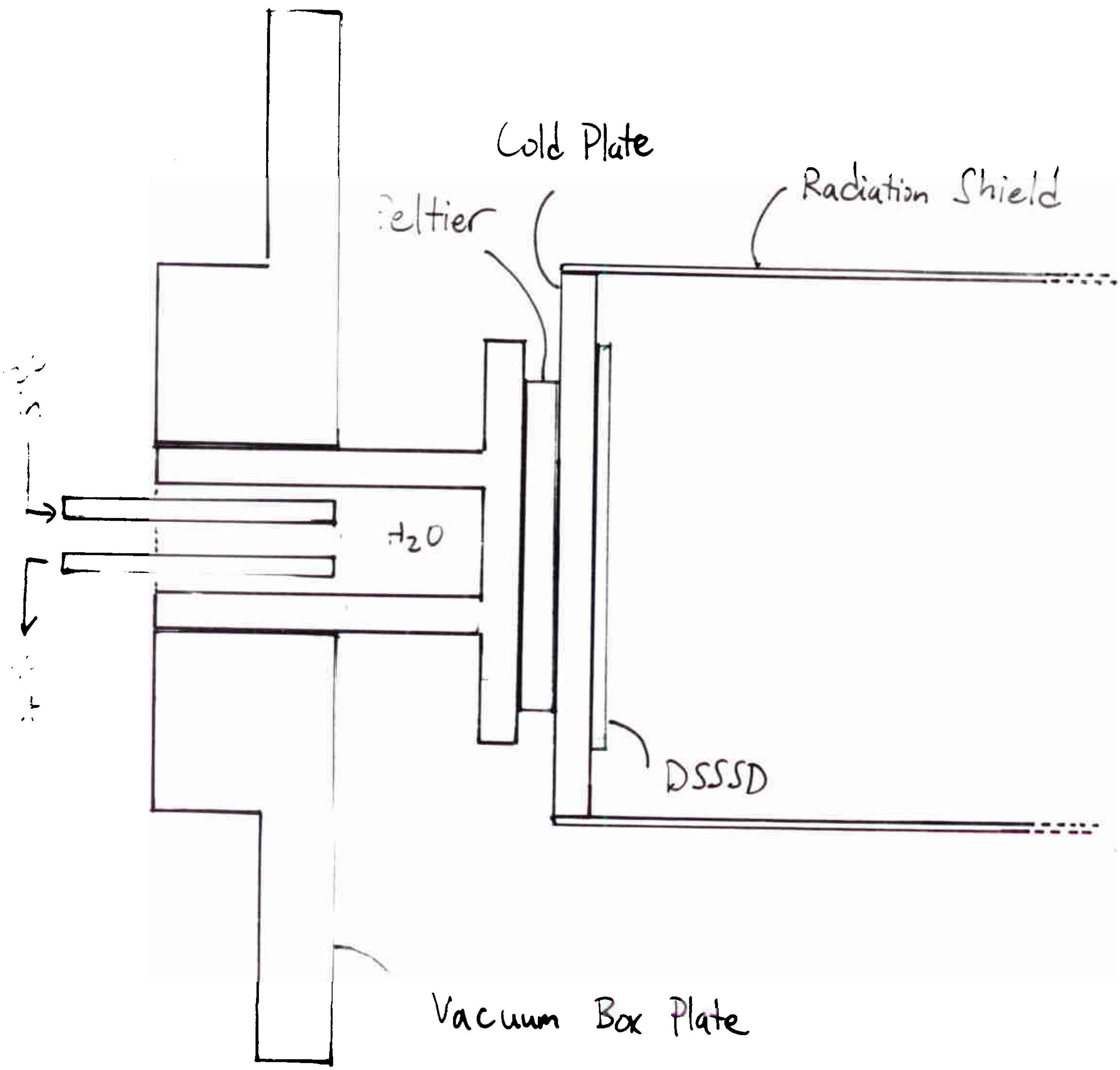
Pulser

is it optimized

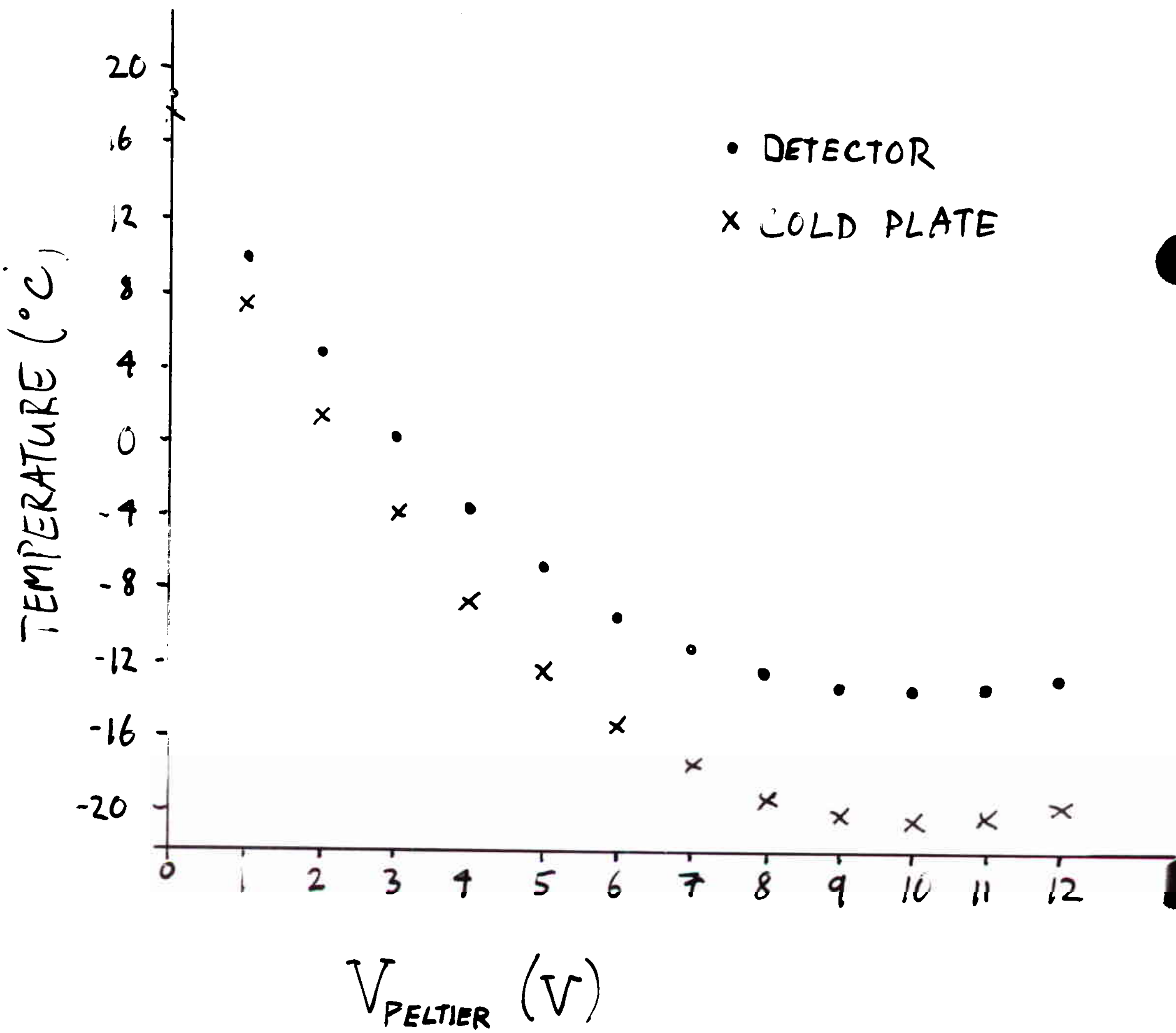
New D.S.S.S.D Holder



Newer DSSSD Holder

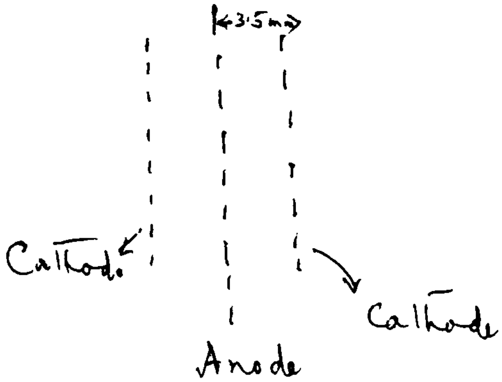


DSSD and Cold Plate Temperature vs. Peltier Voltage



(1) I could not get the full test report documents ~~at~~ on PGAC.

(2) Information Collected from Don Hunter



Anode to Cathode Distance $\approx$ 3.5 mm
Voltage between Anode + Cathode — 700 - 800V
Operational Pressure:. 5-10 torr
Dictated by the ~~[illegible]~~ Ionization Chamber requirements

Reduced Field $E/p = \frac{700 \text{ Volts}}{.35 \text{ cm}} \cdot \frac{1}{5 \text{ torr}}$

$= 400 \text{ volts cm}^{-1} \text{ torr}^{-1}$

(3) Since the Read out is the Delay line read out One needs to have very ~~high~~ small rise time < 1 ns. Position Resolution depends on time resolution.

(4) To obtain fast rise time pulses one would need

a) Some multiplication (avalanche preferably) in the drift region. That is $E/p \geq 400 \text{ Volts cm}^{-1} \text{ torr}^{-1}$ At 700 V and 5 torr, nominally this condition is satisfied. Lower pressure 3-4 torr should be tried.

b) Anode wire diameter should be very small. For Cylindrical Symm.

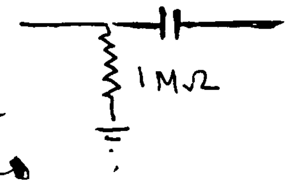
$$E = \frac{V}{r \ln a/b}$$

diameter in the range of 15-20 micron

c) Two avalanches — i) in drift region ii) near anode wire preferred

d) A sensewire plane for either of x and y coordinates may be tried. Sensewires must be very close (1.5mm) to the Anode and tapped delay line chips put on sensewire planes to get position read out from the sense wires. Sensewires register induced pulses of opposite polarity to Anode.

e) A load resistance of about a 1 megohm can be used for position read out.



f) With Sensewires the fast rise time of the shorted-anode wires pulse is taken as the start pulse and the stop pulse from the sensewire planes.

(5) Electronics is very important. Fast preamps like VT-120 (ORTEC) be used for ~~the~~ the sensewire planes. Anode Pulse usually very high to trigger the Fast discriminators.

(Charged Sensitive preamps shall Not be used Fast voltage sensitive preamps to be used.)

(6) Precaution against voltage break down — Voltage break down and large avalanche leakage current can snap the thin wires. So a protective circuit with ~~current~~ set (safe) current trip should be used to trip the H.V. and the recovery time should be short of the order of < 5 secs.

Off-Line testing Bench:

1. Off-line test bench using transparent glass dome with appropriate pumping + gas flow arrangement should be used for routine tests and improvement using both ^{241}Am α-Source and ^{252}Cf spontaneous fission + α-Source. Introduction + withdrawal of Source should be facile without disturbing gas flow.
2. If a reasonable signal/noise ratio for fast pulses can be obtained with α-s, then heavy-ions won't be any problem. To avoid risks CO_2 gas can be used on the test bench and not isobutane
3. In the test bench one should play with gas, gas pressure, Voltage, delay line taps and load resistance and coupling capacitor to obtain
   i) Fast rise time pulses
   ii) Good signal/noise ratio

Weak Points in Counter

— Sharp points or edges in Counter lead to invisible Corona discharge when H.V. is applied → Leading to large noise background.

— To avoid these weak points we tested the Counter after fabrication with "Puncture Tester" which is a H.V. leakage current measuring device. Such tests are carried out both with air at atmospheric pressure and gas at low pressure to ~~test~~ find the limits of H.V. application

— The counter performs well when the Resistive impedance at H.V. is higher than 500 MΩ

Don's Message: (e-mail)

— Mentions about contacting Robert Openshaw — which I tried. No response yet

— Marielle Goyette made the Preamps. I shall talk to her.

— Don observed that the PGAC did not function due to some short circuit in the Preamp.