Pulsed DC System

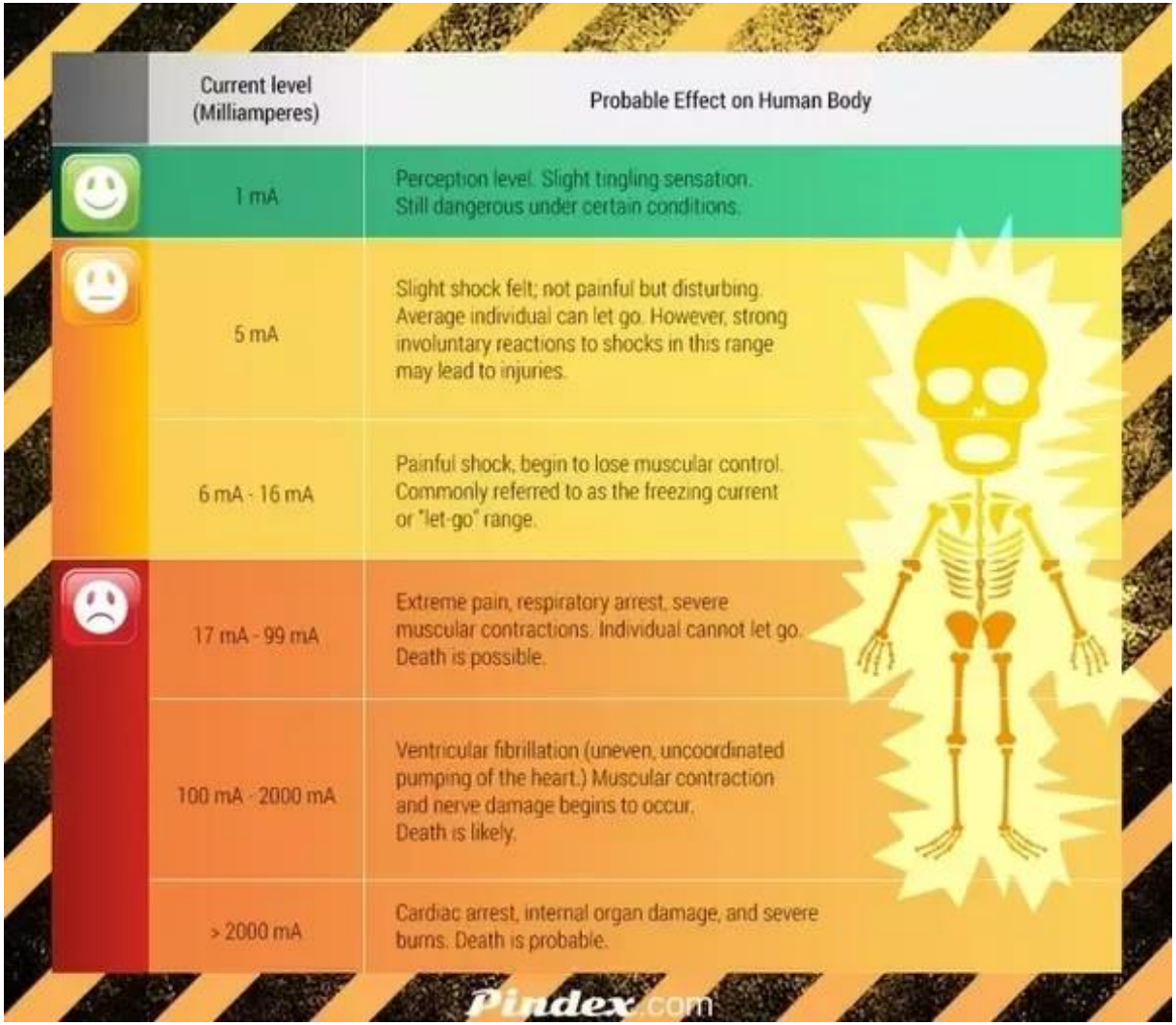
30th June 2022

Limit 1mA


fug
DC POWER SUPPLY
HCP 35-35000
0...35kV 0...1mA
VOLTAGE
SET VALUES
kV
CURRENT
mA
TEMP
CV
V-LIMIT
CC
ON
POS
BUSY
LOCAL
DIGITAL
OFF
NEG
REMOTE
POWER
OUTPUT
POLARITY
PROGRAMMING

Maybe can’t kill you

I still don’t recommend touching



$$\frac{1}{R^*} = \frac{1}{\mathrm{R_{osc}}} + \frac{1}{\mathrm{R_1}} + \frac{1}{\mathrm{R_2}} = \frac{1}{\mathrm{1E6}} + \frac{1}{\mathrm{R1}} + \frac{1}{\mathrm{1E7}}$$

$$R_1 = 1E5 \ \therefore R^* = 90.09k\Omega$$

$$R_2 = 1E7 \ \therefore R^* = 833.333k\Omega$$

If the resistance of the gap is 0 then the voltage potential on the ground of the chamber is:

$Outer\_Chamber\_Voltage$ =V*

$$= \frac{V}{R + R^*} \times R^*$$

$$= \frac{V}{6.36E6 + R^*} \times R^*$$

For V=10kV

$$R_1 = 1E5 \ \therefore R^* = 139.67V$$

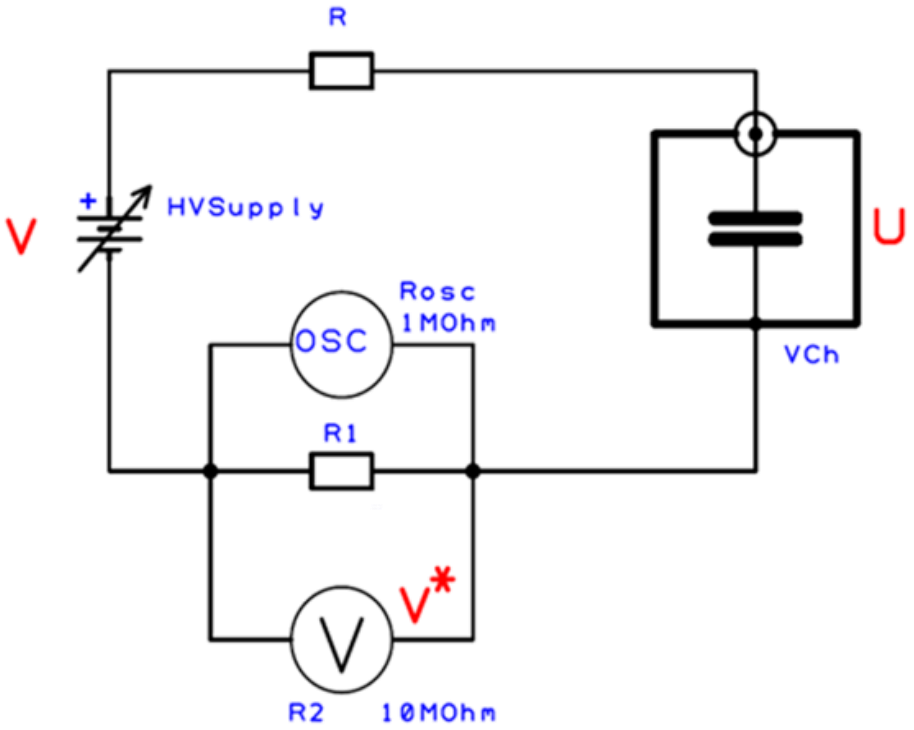
$$R_2 = 1E7 \ \therefore R^* = 1158\mathrm{V}$$

For V=6kV

$$R_1 = 1E5 \ \therefore V^* = 83.8V$$

$$R_2 = 1E7 \ \therefore V^* = 695\mathrm{V}$$

The voltage is displayed on the multi-meter and electronics inside mean results past 90V will not be true. It is never safe to touch the chamber as a BD could happen. Safe distance for Low Voltage (120V-1500V DC) is 30cm. (Maybe doesn't matter with limited supply)



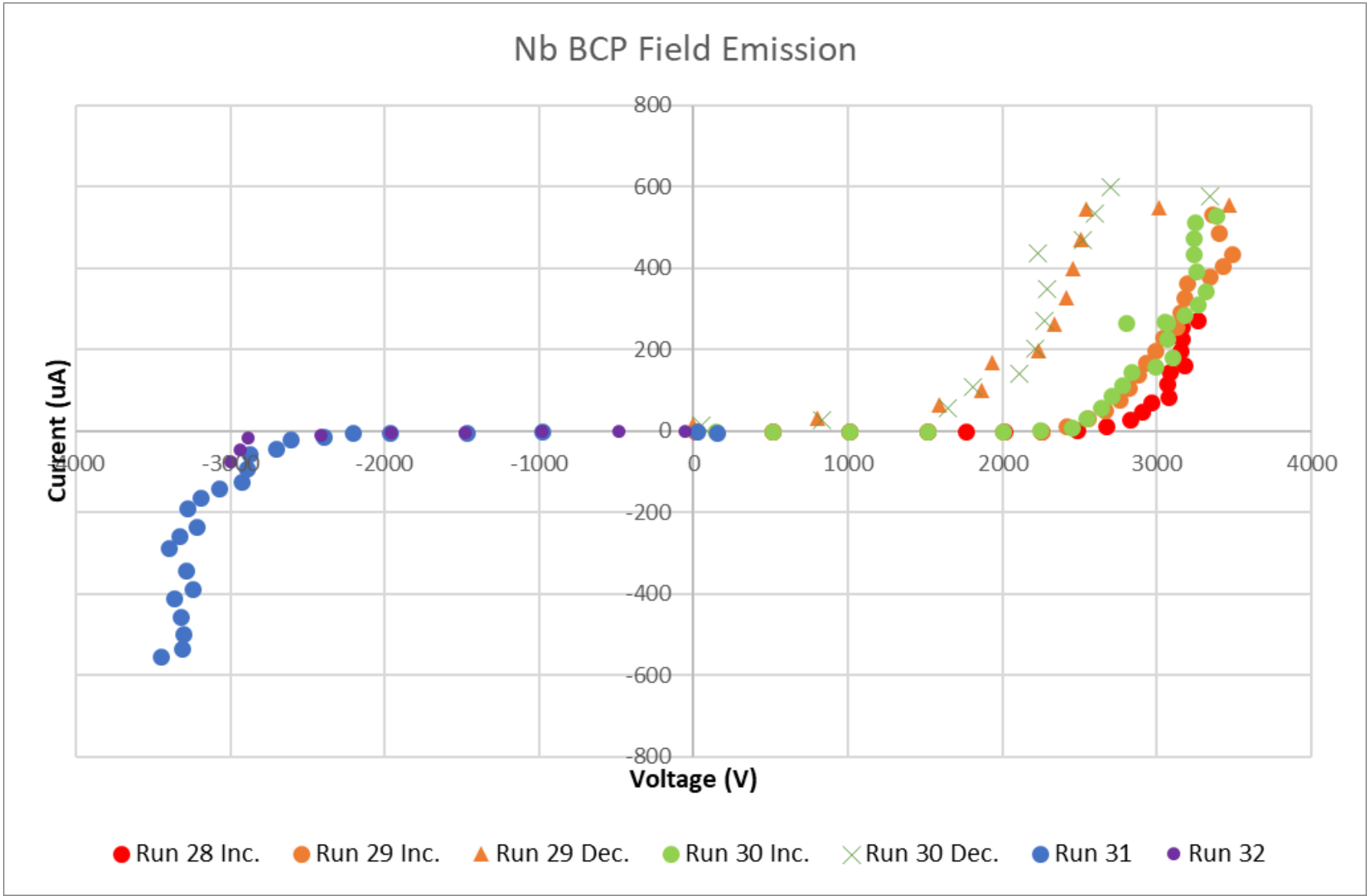
$$U = V - I \times R \quad (5.1)$$

$$I = V^*/R^* \quad (5.2)$$

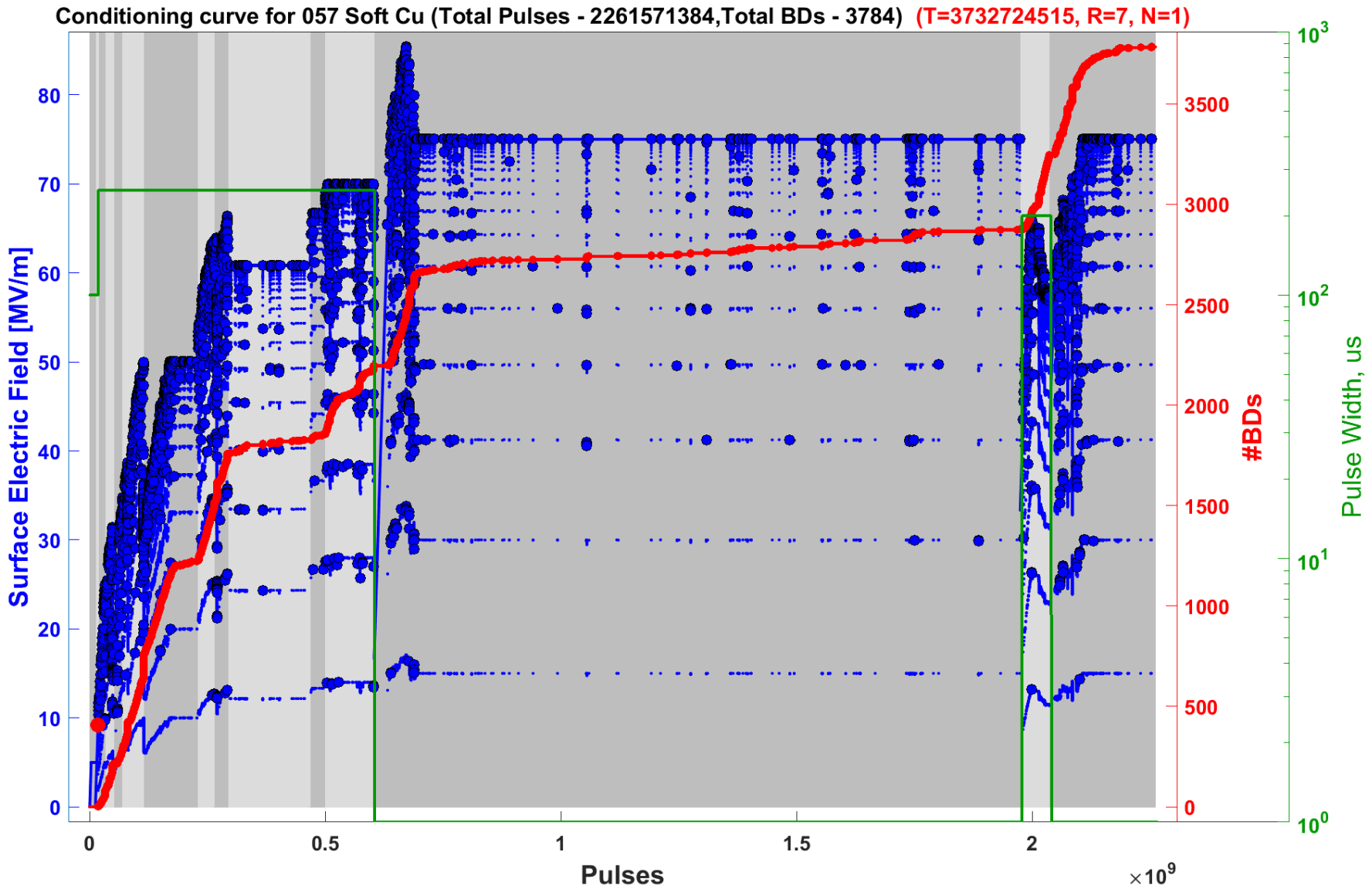
$$1/R^* = 1/R_{osc} + 1/R_1 + 1/R_2 \quad (5.3)$$

Where U = gap voltage, V = supplied voltage, I = field emission current, V* = multi-meter voltage, R* = gap resistance, R = series resistance = 6.36MΩ, $R_1 = 100k\Omega, 1M\Omega, or 10M\Omega$, therefore $R_{osc} = 1M\Omega$ = oscilloscope resistance, $R_2 = 10M\Omega$ = multi-meter resistance.

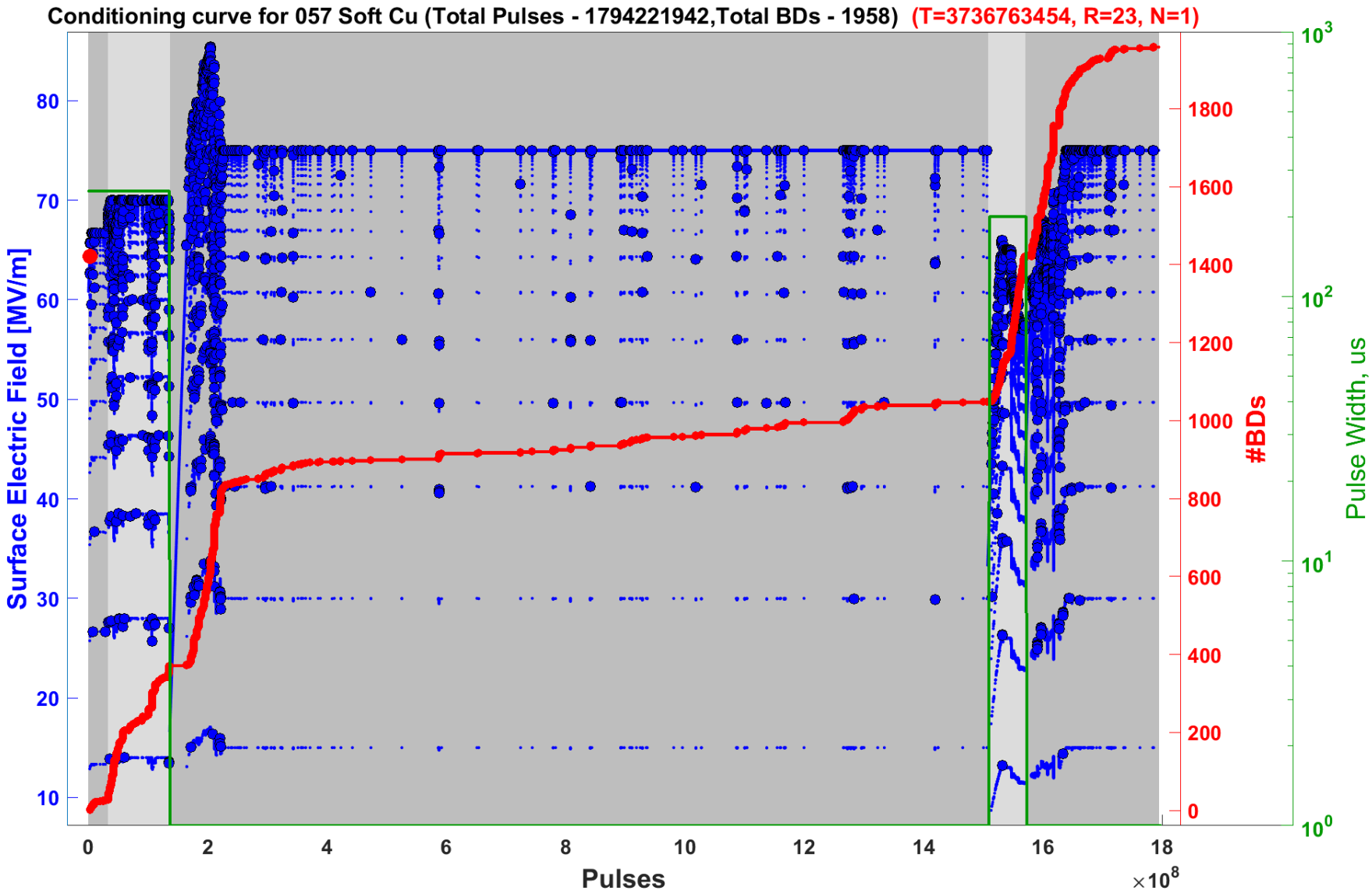
Niobium Field Emission



Soft Cu Conditioning



Soft Cu Conditioning



Cheat Sheet

AutoSave On | Something Broken • Last Modified: Tue at 09:56 | Search (Alt+Q) | Ruth Peacock

File Home Insert Draw Design Layout References Mailings Review View Help | Comments | Share

Calibri Light (Headings) 28 | Normal | No Spacing | Heading 1 | Editing | Dictate | Sensitivity | Editor

Undo | Clipboard | Font | Paragraph | Styles | Voice | Sensitivity | Editor

Something Broken?

What?

Marx

If the Marx is doing something that doesn't make sense:

- Turn it off and on and see if it works

Still not working:

- Restart whole computer and turn the Marx off and on

Still not working:

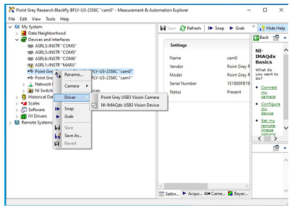
- Marx 4 and Marx 3 have different GUI
  - \\aospublic-smb\aos\project\c\clic-pulsed-dc\public\LES\Manuals, instructions and diagrams\Marx generator\Dual Marx (#4)\UCB_MARX3_v16.19\frontend_release\UCB_MARX3_v19
  - \\aospublic-smb\aos\project\c\clic-pulsed-dc\public\LES\Manuals, instructions and diagrams\Marx generator\Marx generator #3\frontend release 1.3\UCB_MARX3 1.5
- Connect to Marx com port
- Update tab at the top
- Connect bootloader
- Select file – put the appropriate hex files in the computer download folder to be able to access them, there are 2 to upload to the 2 different control chips in the Marx...
  - c0.hex
  - c1.hex
- Press upload for each file

If this doesn't work it is something else and you would need to really look at what is wrong.

Camera code

If the camera code is showing errors it is most likely that the drivers changed during the update:

- Open NI max app
- Make sure the driver selected is 'NI-IMAQdx USB3 Vision Device'



The code should now work...

35kV Fugg driver

Also associated with computer updates and will have an error on the driver of the power supply for field emission measurements. Make sure the driver is in the download folder so that you can upload it. Folder 'Probus_V1_24_drivers_GUI'

- If you have tried to update the driver the normal way and it says there is an error or just isn't working then my work around is to force the update.
- Press shift and the restart button at the same time
- Select following options
  - Troubleshoot
  - Advanced Options
  - Startup Settings
  - Restart
  - F7

- Login
- Now try to update the driver again
- Restart computer for it to work

Cable... i.e. Lots of breakdowns but no light or pressure

- If there is a large cluster of breakdowns and the voltage is now restricted, this could be the electrodes but it is very unlikely if you don't see light or pressure spikes.
- Turn off and unplug the cable from the LES and plug into the NES
- Open the code for the power supply and Marx GUI (same GUI as Marx error)
- Try a voltage above your restricted to see if it breaks down. If it breaks down it is either because the current is wrong or the cable is broken, you can check the waveform to determine if it is a real breakdown and can increase the current level trigger in the GUI (Level).
- If it is breakdown, it means it is a cable. Try a new cable.
- If it is still breaking down it is most likely the voltage probe, remove this and try again.
- If still breaking down, remove also the high voltage cable so that it is just the Marx alone, and if it still breaks down you need to contact Oleg.

Short Circuit – physical contact between electrodes due to a breakdown

- If you are getting a lot of breakdowns and see it in the pressure and/or know the cable or the Marx wasn't the issue
- Check the capacitance from the cable, it is normally 360pF for large electrodes with a 60um gap but will be in the nF range and possibly be able to measure a resistance, this means there is a short circuit.
- Open the Marx GUI and the Fugg LabVIEW code
- Set the voltage higher than the restricted voltage, you can increase if needed but better to try and avoid more damage.
- Set the pulse length to 1us and the number of pulses to 1 and then trigger the pulse
- Check the capacitance between each pulse and increase the voltage if not working, it may take a few pulses even at an appropriate voltage.
- You can do this until the capacitance is back to normal or you give up and decided to open the chamber and rotate the top electrode.
- You should start from a lower voltage and work back up to try and condition this defect and avoid further short circuits.

Page 1 of 3 | 667 words | 3791 characters | English (United Kingdom) | Accessibility: Investigate | Focus | 50%

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