Pulsed DC System Update

23rd June 2022

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

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

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

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

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

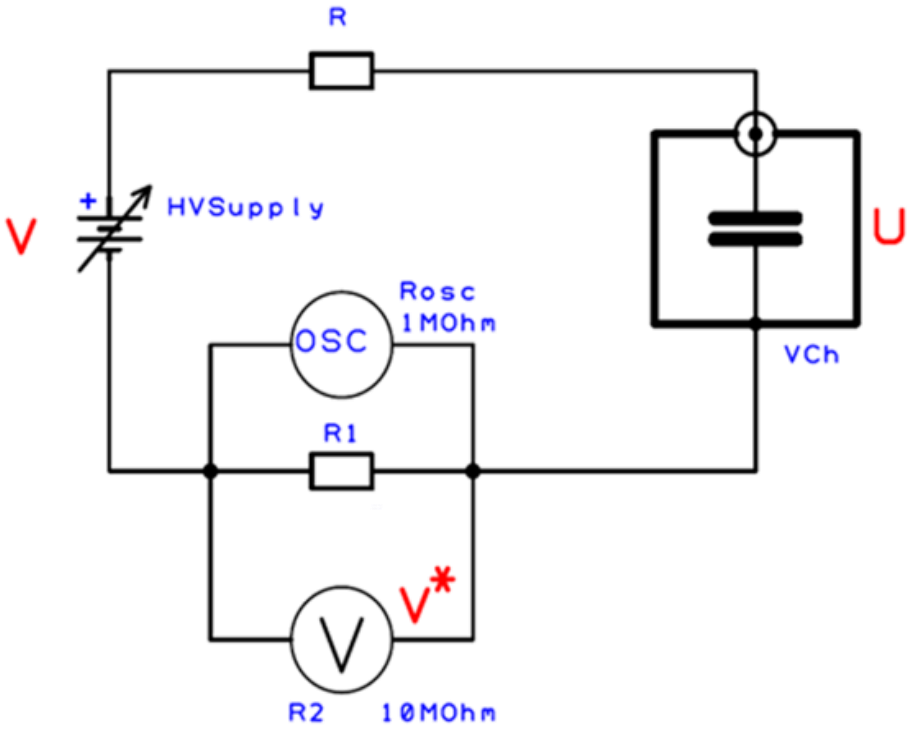
$$R_2 = 1E7 \ \therefore R^* = 1158\mathrm{V}$$

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 for safety should definitely not exceed 120V DC during field emission measurements. It is never safe to touch the chamber as a BD could happen. Safe distance for Low Voltage (120V-1500V DC) is 30cm.



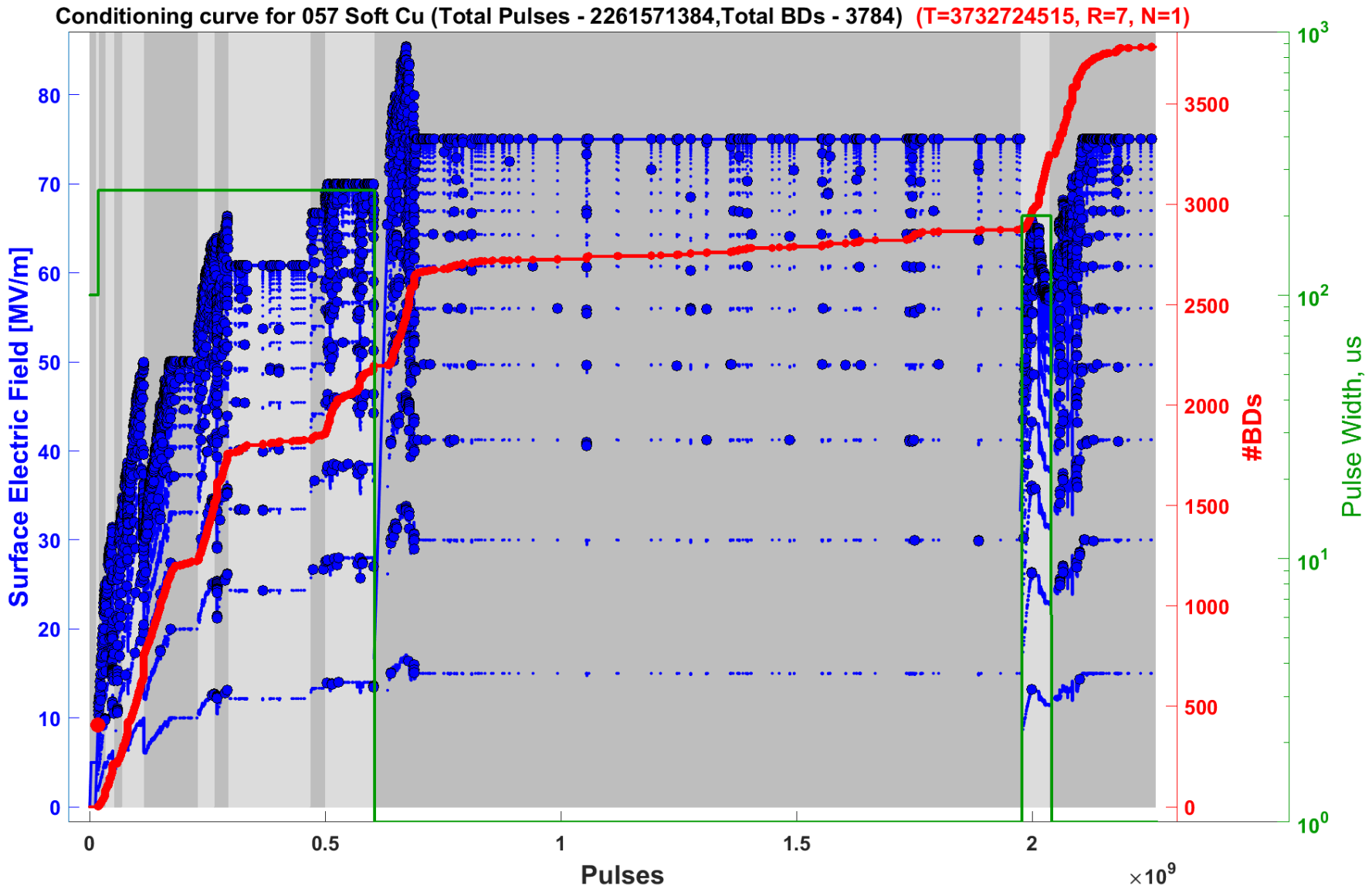
$$U = V - I \times R \quad (5.1)$$

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

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

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.

Soft Cu Conditioning



Soft Cu Conditioning