Steps to Gain Match BBCal PMTs using cosmic:

Step -1: Load default 25mV HV setting at the beginning of every configuration:

The name of the default 25mV HV set file is: ***hv_updated_sh_ps_25mV_11_6_21.set***

To load, open a terminal in any CH machine and execute: `vncviewer tedbbdaq:4`

- A GUI should be up in the vncserver. If not, then follow the instructions in https://userweb.jlab.org/~efuchey/SBS_BB/Documents/Howto_BB_HV.pdf.
- Navigate to the "File" tab [top left corner] and from there "Load settings". Choose the above written HV set file and load.

Step 0: Take a cosmic run with all the magnets ON:

- *Follow the steps written in page 2 [Cosmic run for BBCal Gain Matching].*
- *Try to make it a* ***single run****, it's very important. For multiple runs the following steps will not work. In case of multiple runs, shoot an email to provakar.datta@uconn.edu.*

Assuming Step -1 and 0 were executed properly and we have a single cosmic run. Open a terminal in any CH machine and login to aonlX [X=1,2, or 3] machine as a-onl. Then execute:

```
gobbcal
```

Step 1: Replay the cosmic run:

```
[a-onl@aonlX BBCal_replay]$ ./run_cosmic_replay.sh <nrun> <nevents>
```

Step 2: Analyze the replayed data:

```
[a-onl@aonlX BBCal_replay]$ ./run_cosmic_analysis.sh <nrun> <nevents>
```

Step 3: Generate calibrated HVs for BBCal:

```
[a-onl@aonlX BBCal_replay]$ ./get_calibrated_hv.sh <nrun> <des_trig_amp>
```

This script will prompt the following message after first time execution:

```
-----
 Was the defalut 25 mV HV setting used for this run? [Y/N]
 [i.e. hv_set/hv_updated_sh_ps_25mV_11_6_21.set]
```

This is a check for proper execution of ***Step -1.*** *Just enter* ***Y*** *or* ***y*** *to acknowledge and hit return.*

Step 4: Load the generated HV to the HV (JAVA) GUI:

Login to ***tedbbdaq*** *as* ***daq*** *[Password: D4q!23].*

```
[daq@tedbbdaq ~]$ cd slowc/BBCAL/hv_set/
[daq@tedbbdaq ~]$ scp /adaqfs/home/a-onl/sbs/BBCal_replay/macros/hv_set/
<gen_calib_HV_file> .
```

*After successful execution follow the instructions written in **Step -1** to load the generated HV file.*

The entries in **red bold** font indicate arguments. Here is what they represent:

<nrun> : The run number of the cosmic run one wants to look at.
<nevents> : The number of events to be (or has been) replayed.
<des_trig_amp> : Amplitude in mV at which one wants to align the signal peaks at trigger.
<gen_calib_HV_file> : The file name format will be the following:
hv_calibrated_run_**<nrun>**_**<des_trig_amp>**mV_**mm_dd_yyyy**.set

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Cosmic Run for BBCal Gain Matching:

Step 1: Adjust the trigger rate:

Adjust the BBCal Hi threshold by tweaking **BBCal Hi Discriminator 1** & **BBCal Hi Discriminator 2** set values. The goal is to get **~220 Hz** BBCal Hi trigger rate [**BBCALTRG**].

** Please Make sure that in the threshold GUI, the read backs for BBCal Hi Disc 1 & BBCal Hi Disc 2 are equal.

Step 2: Use the following CODA Prescale setting:

PS1	**0**
PS2	-1
PS3	-1
PS4	-1
PS5	-1
PS6	-1
PS7	-1
PS8	-1

Step 3: Start a run and Log it:

Start a run and take data for **30 mins.** Our goal is to get around **400K** events. **Please try to make it a single run.**