Status report - Thursday, April 23nd

Threshold Scans and Data Evaluation

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How things have been done

General Process - Flow Diagram

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General Process - Flow Diagram

Perform a set of measurements in lab (Python) $\rightarrow$ Write results to .csv (done by hand) $\rightarrow$ Plot results (Python)

Working on a solution

Problem: Usually quite large set of data

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Simplyfying the process by writing a script that

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- Extracts the **timestamp** for each measurement and properly relates the .cfg to the .dat files
- performes analysis on ALL of the measurement data at once
- writes result to a csv file

Scripting in Bash

ScanConfig_**200121_193551**.cfg
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```bash
for i in $(ls $PATHTOFILES | grep '.dat'); do
#Extract Timestamp
TIMESTAMP=$(echo $i | tail -c 18 | head -c 13)
CONFIG="ScanConfig_$TIMESTAMP.cfg"

#Then extract Parameters from config file (Later add VBB)
VCASN=$(cat $PATHTOFILES$CONFIG | grep 'VCASN' | awk -F ' ' '{print $2}' | head -1)
ITHR=$(cat $PATHTOFILES$CONFIG | grep 'ITHR' | awk -F ' ' '{print $2}')

TRSH=$(./thresh.py $PATHTOFILES$i)

# Write to csv file
printf '%s\n' "$TIMESTAMP" "$VCASN" "$ITHR" "$TRSH" | paste -sd ',' >> output.csv
done
```

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```

```
Timestamp,VCASN,ITHR,Threshold [DAC]
200121_193551,47,51,13.60355155825141
200121_193951,47,60,15.953068558715911
...
```

Plotting

New Problem

Data is not ordered, and the csv contains multiple entries for the same values of VCASN and ITHR

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Approach

Write a ”sorting” algorithm, that automatically identifies the ranges chosen for VCASN and ITHR.

```
Timestamp,VCASN,ITHR,Threshold [DAC]
200323_134855,53,51,6.725833998523066
200323_135218,53,60,8.186236372633545
200323_135541,53,70,9.833234746846962
200323_132837,50,51,9.335578330893117
200323_133200,50,60,11.202496464178642
200323_133523,50,70,13.211766207119839
```

$\rightarrow$

```
VCASN = array([50,53])
ITHR = array([51,60,70])
```

plotting

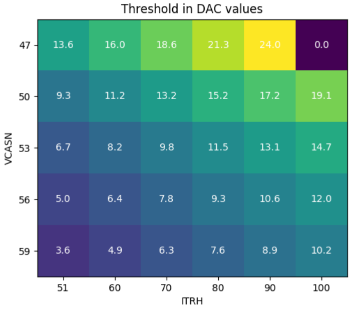
```
VCASN, ITHR, TRSH = np.loadtxt(csv, skiprows=1, usecols=(1,2,3), delimiter=",", unpack=True)

def getValues(array):
    #Create a temporary list
    temp = []
    #Write each unique entry into the temporary list
    for i in array:
        if i in temp: continue
        else: temp.append(i)
    #Since the array of values in this case is quite small, we can use temp.sort
    temp.sort()
    output = np.ndarray((len(temp)),dtype=int)
    for i in range(len(temp)):
        output[i] = int(temp[i])
    return output

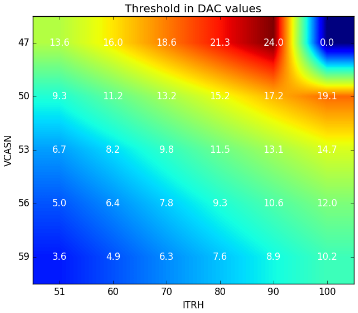
VCASN_0 = getValues(VCASN)
ITHR_0 = getValues(ITHR)

##### Implement sorting algorithm #####
Threshold = np.ndarray((len(VCASN_0),len(ITHR_0)))
for i in range(len(VCASN_0)):
    for j in range(len(ITHR_0)):
        Threshold[i,j] = TRSH[(VCASN == VCASN_0[i]) & (ITHR == ITHR_0[j])]
#######################################
```

Results for 0 V Back Bias



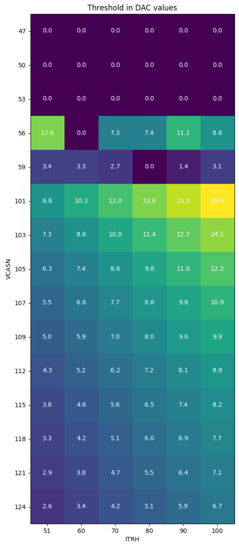
VCASN \ ITRH	51	60	70	80	90	100
47	13.6	16.0	18.6	21.3	24.0	0.0
50	9.3	11.2	13.2	15.2	17.2	19.1
53	6.7	8.2	9.8	11.5	13.1	14.7
56	5.0	6.4	7.8	9.3	10.6	12.0
59	3.6	4.9	6.3	7.6	8.9	10.2

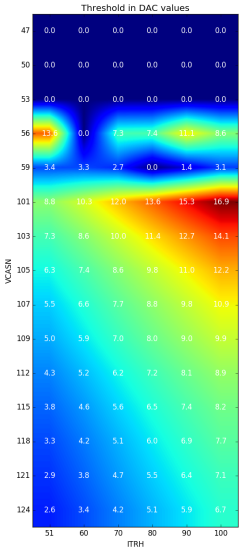


Notes

- Value for VCASN = 47 and ITHR = 100 is faulty, due to a premature stop of the measurement after about 7% of the injections. Threshold calculation fails there.
- The smooth heatmap (on the right) is just for visualization! The colors do **NOT** represent accurate values

Results for 3 V Back Bias





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Thank you!