EXAMINING N-SUB VARIABLES

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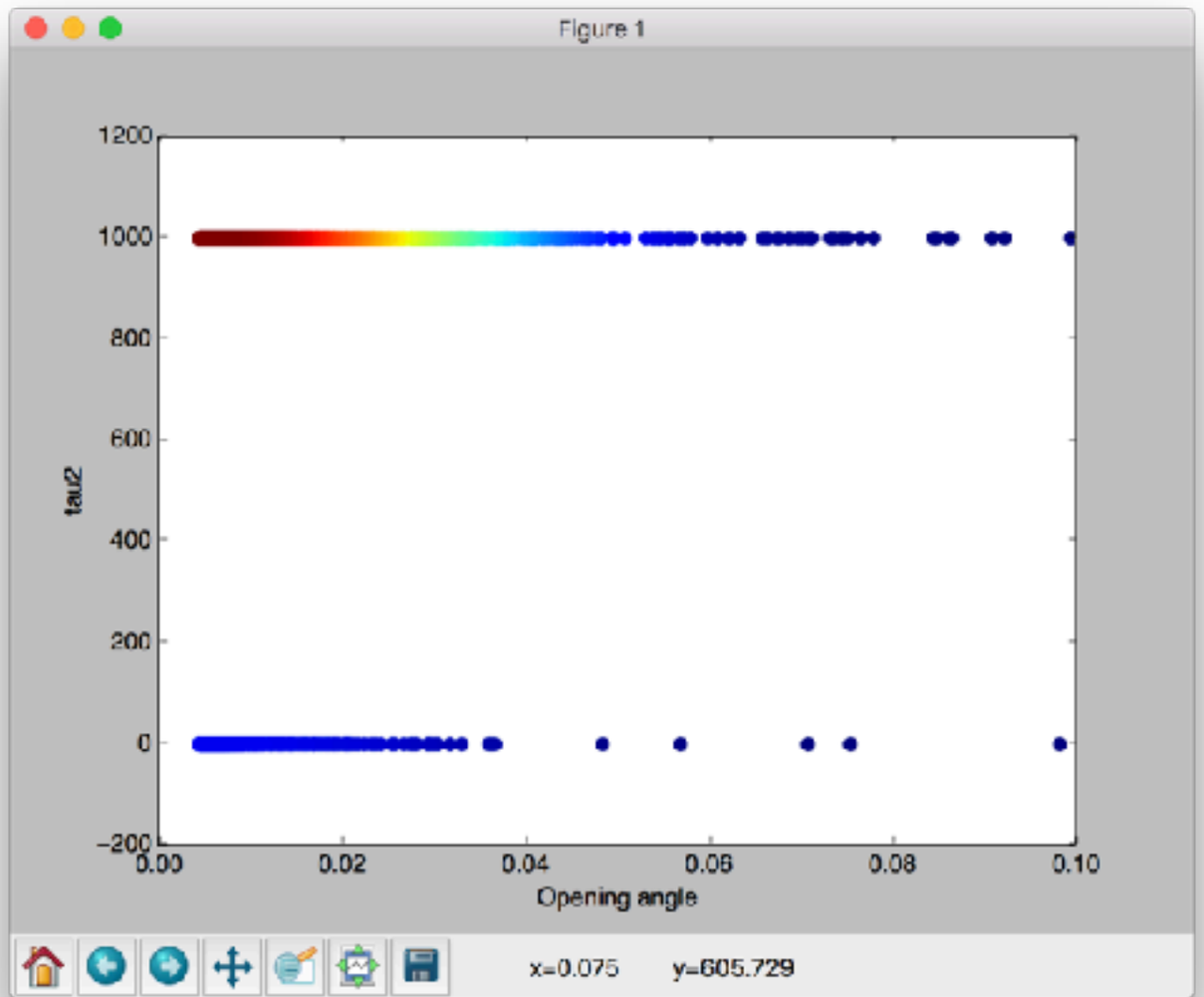
N-Sub in pi0 Files

- Many pi0 events do not get 3 full reconstructed jets. This happens when there are less than 3 hits which pass the threshold.

- Failing events get assigned tauN = 1000.

- 17378 events which do not pass. 1754 events which do pass.



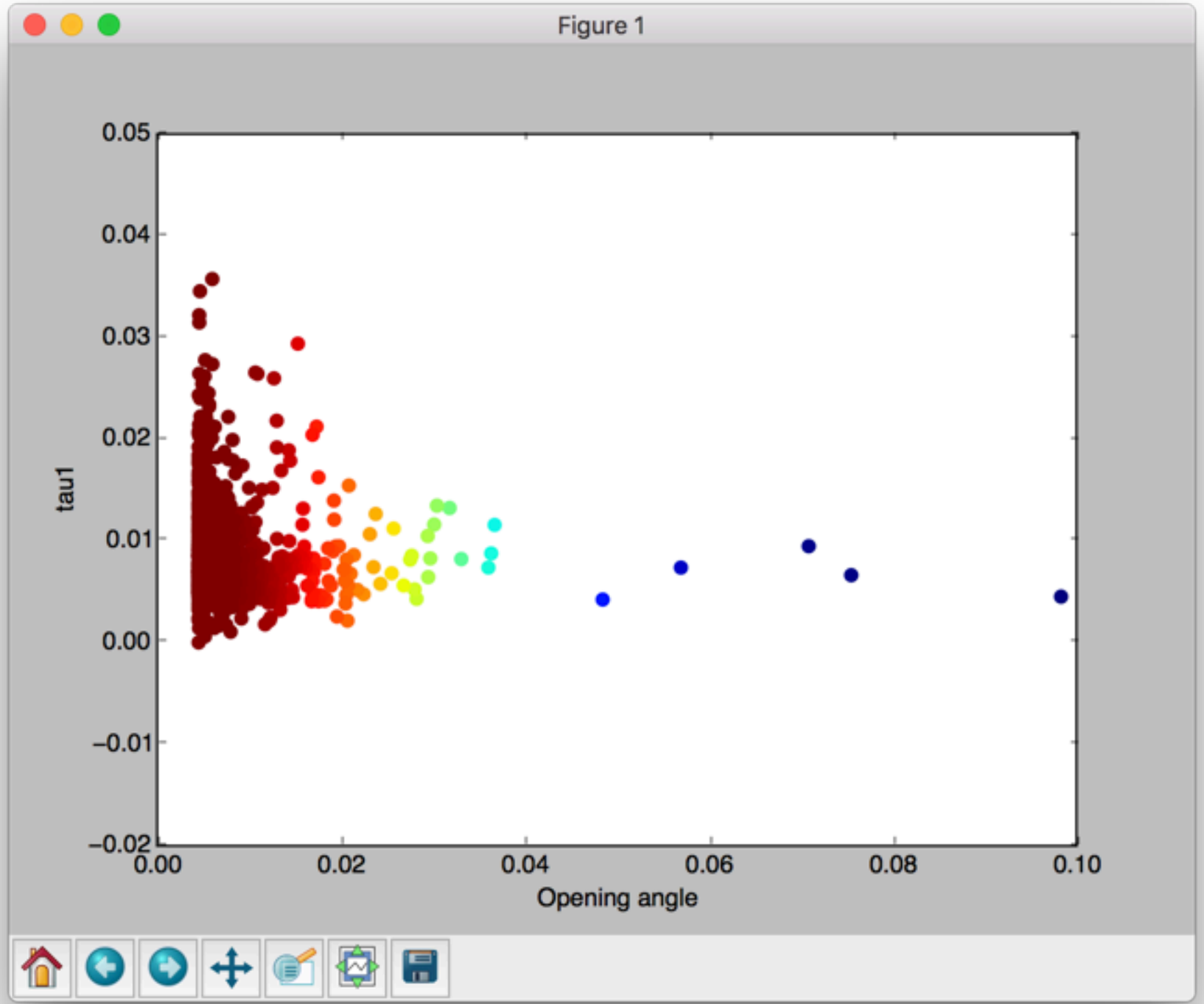


Figure 1
0.05
0.04
0.03
0.02
0.01
0.00
−0.01
−0.02
tau1
0.00
0.02
0.04
0.06
0.08
0.10
Opening angle

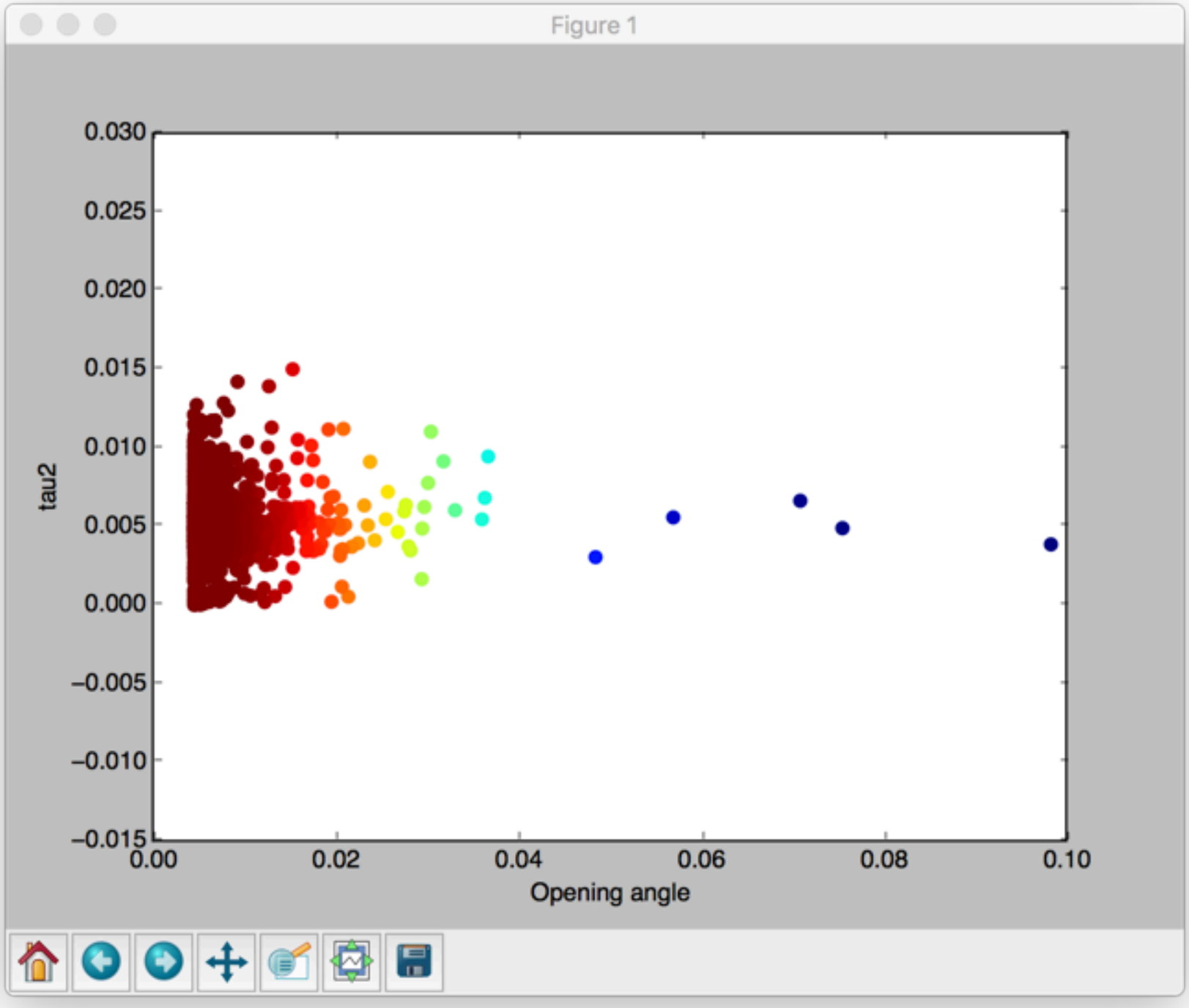


Figure 1
0.030
0.025
0.020
0.015
0.010
0.005
0.000
−0.005
−0.010
−0.015
tau2
0.00
0.02
0.04
0.06
0.08
0.10
Opening angle

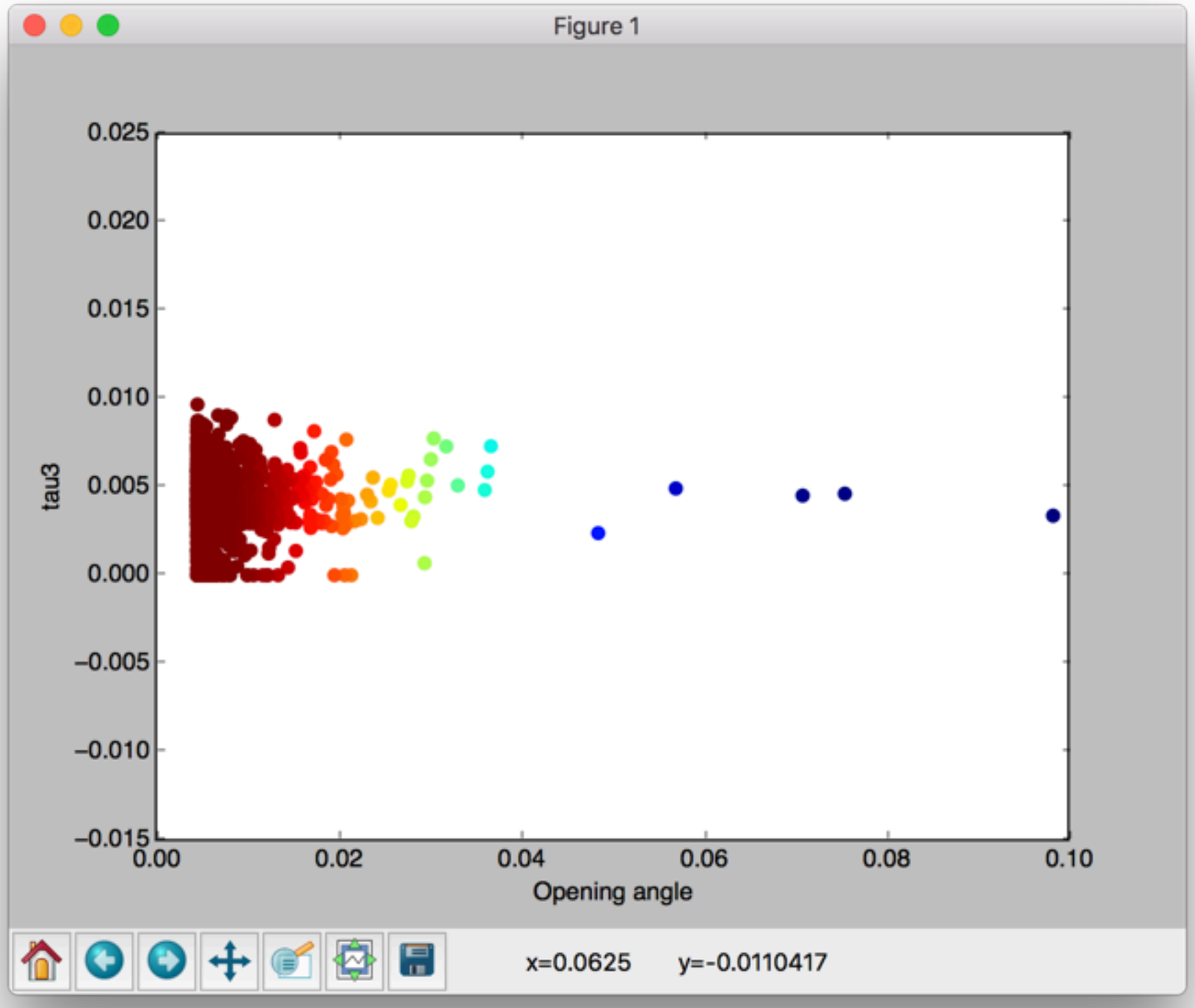


Figure 1
0.025
0.020
0.015
0.010
0.005
0.000
−0.005
−0.010
−0.015
tau3
0.00
0.02
0.04
0.06
0.08
0.10
Opening angle
x=0.0625
y=-0.0110417

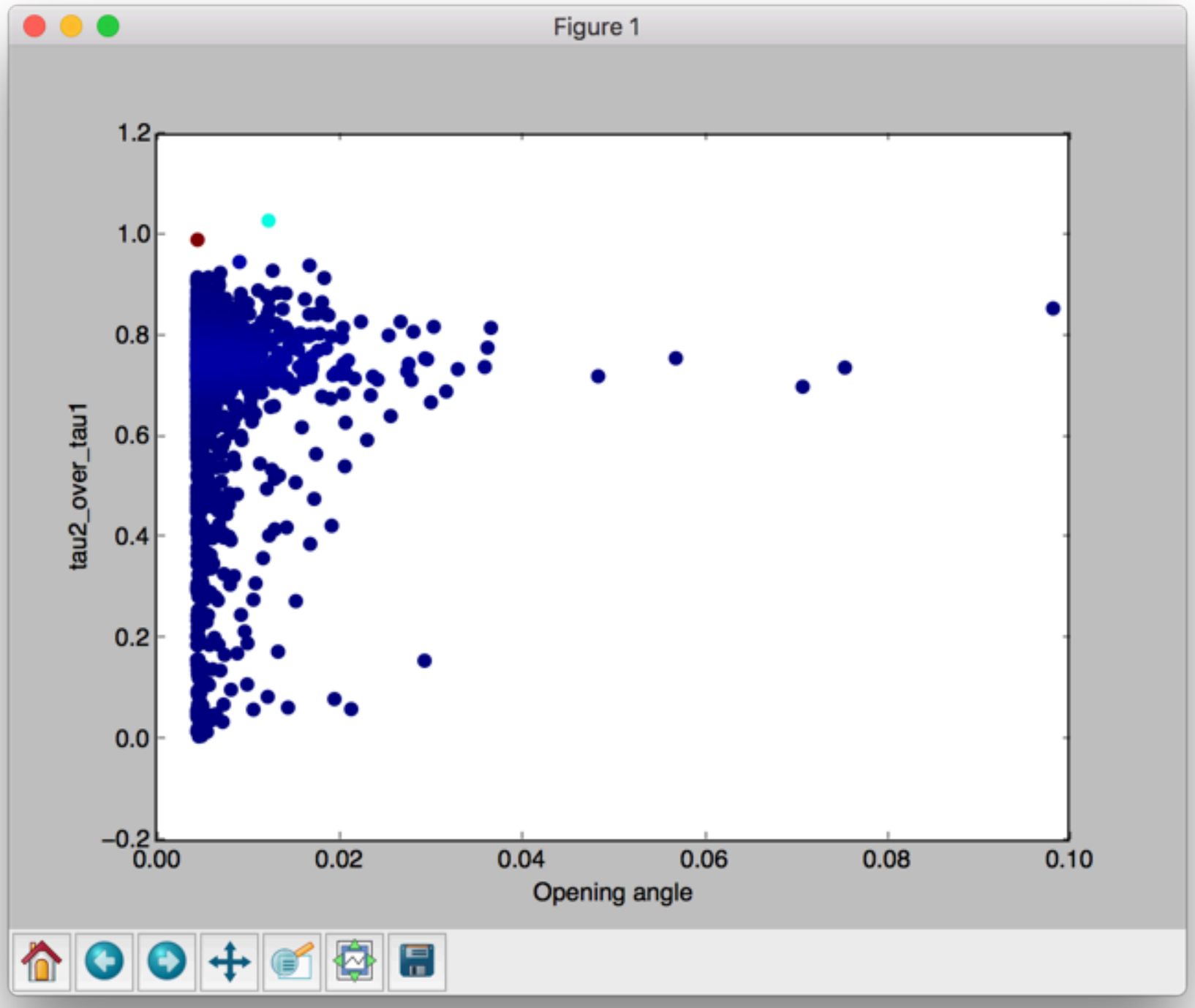


Figure 1
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
tau2_over_tau1
0.00
0.02
0.04
0.06
0.08
0.10
Opening angle

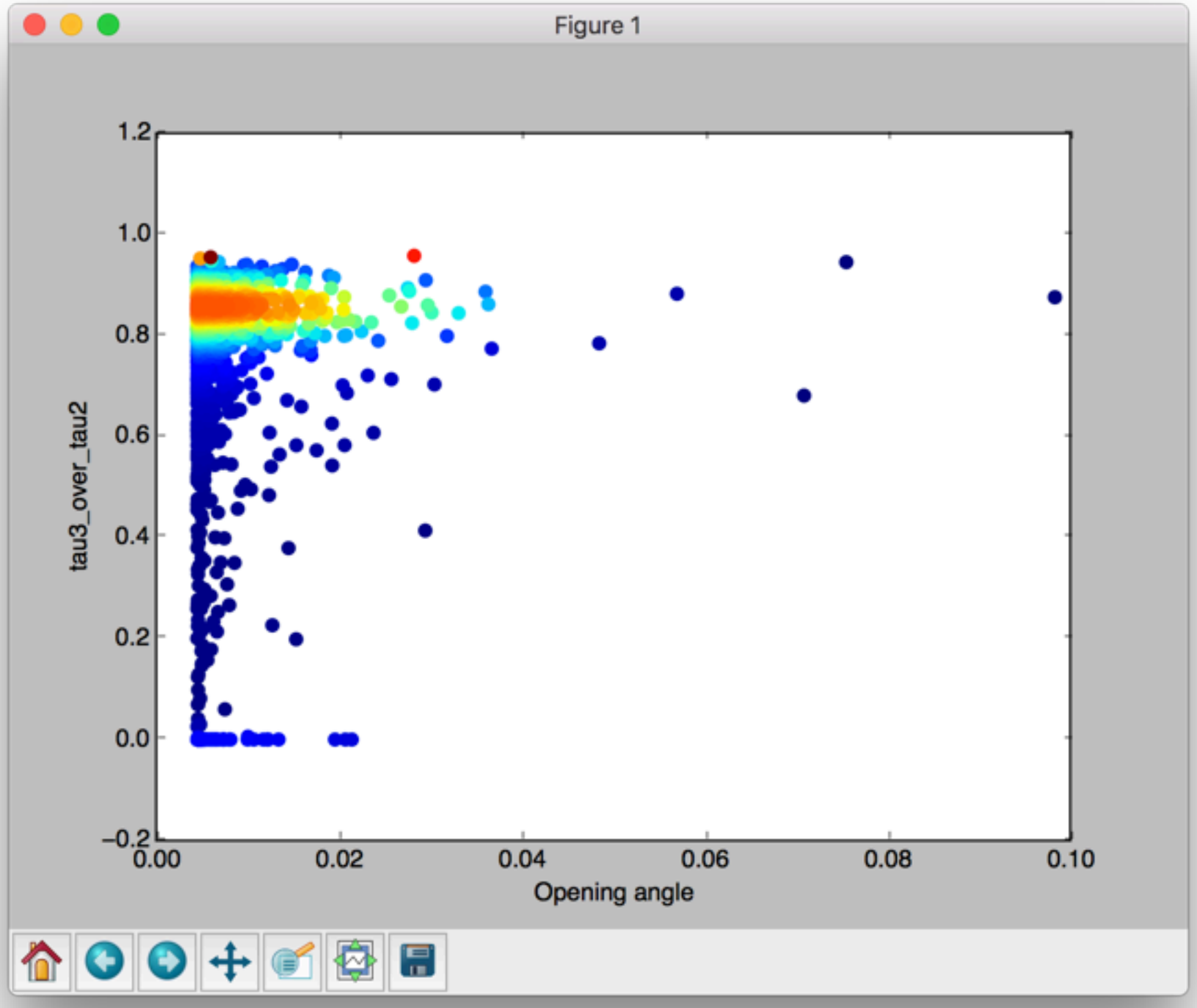


Figure 1
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
tau3_over_tau2
0.00
0.02
0.04
0.06
0.08
0.10
Opening angle

Appendix

Plotting Code

```
import h5py as h5
import matplotlib.pyplot as plt
import numpy as np
from scipy.stats import gaussian_kde

pi0 = {}
for toScatter in ["OpeningAngle", "N_Subjettiness/tau1", "N_Subjettiness/tau2", "N_Subjettiness/tau3", "N_Subjettiness/tau2_over_tau1",
"N_Subjettiness/tau3_over_tau2"]:
    pi0[toScatter] = []
    for i in range(1, 11):
        file = h5.File("pi0_60_GeV_" + str(i) + ".h5")
        pi0[toScatter].extend(file[toScatter][:])

def scatter(toScatter):
    x = np.array(pi0["OpeningAngle"])
    y = np.array(pi0["N_Subjettiness/"+toScatter])
    xy = np.vstack([x, y])
    z = gaussian_kde(xy)(xy)
    goodInd = (np.array(pi0["N_Subjettiness/tau2"]) < 500)
    x, y, z = x[goodInd], y[goodInd], z[goodInd]
    idx = z.argsort()
    x, y, z = x[idx], y[idx], z[idx]
    fig, ax = plt.subplots()
    ax.scatter(x, y, c=z, s=50, edgecolor='')
    plt.xlim(0,0.1)
    plt.xlabel("Opening angle")
    plt.ylabel(toScatter)
    plt.show()

scatter("tau2")
```