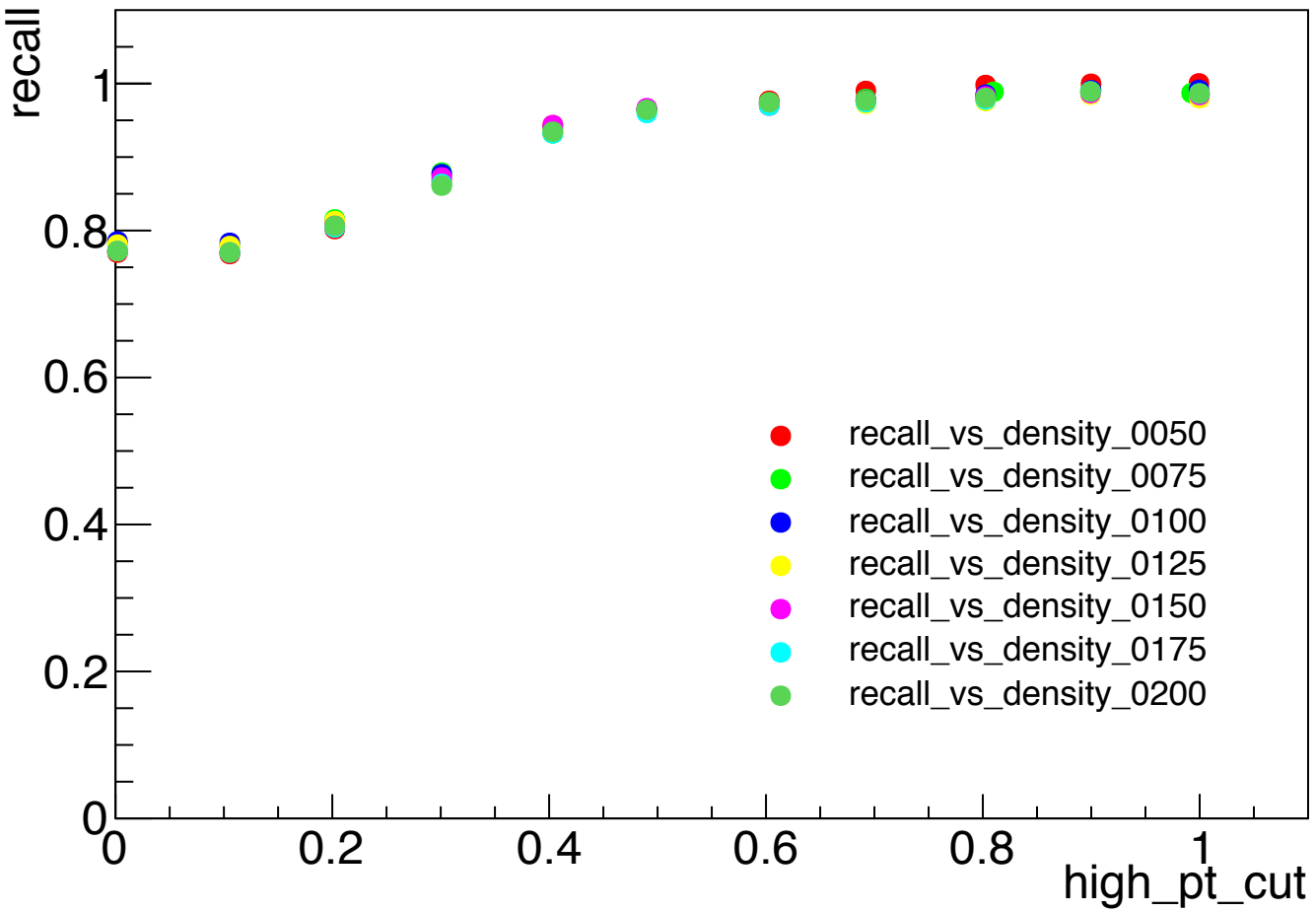
# low pT performance

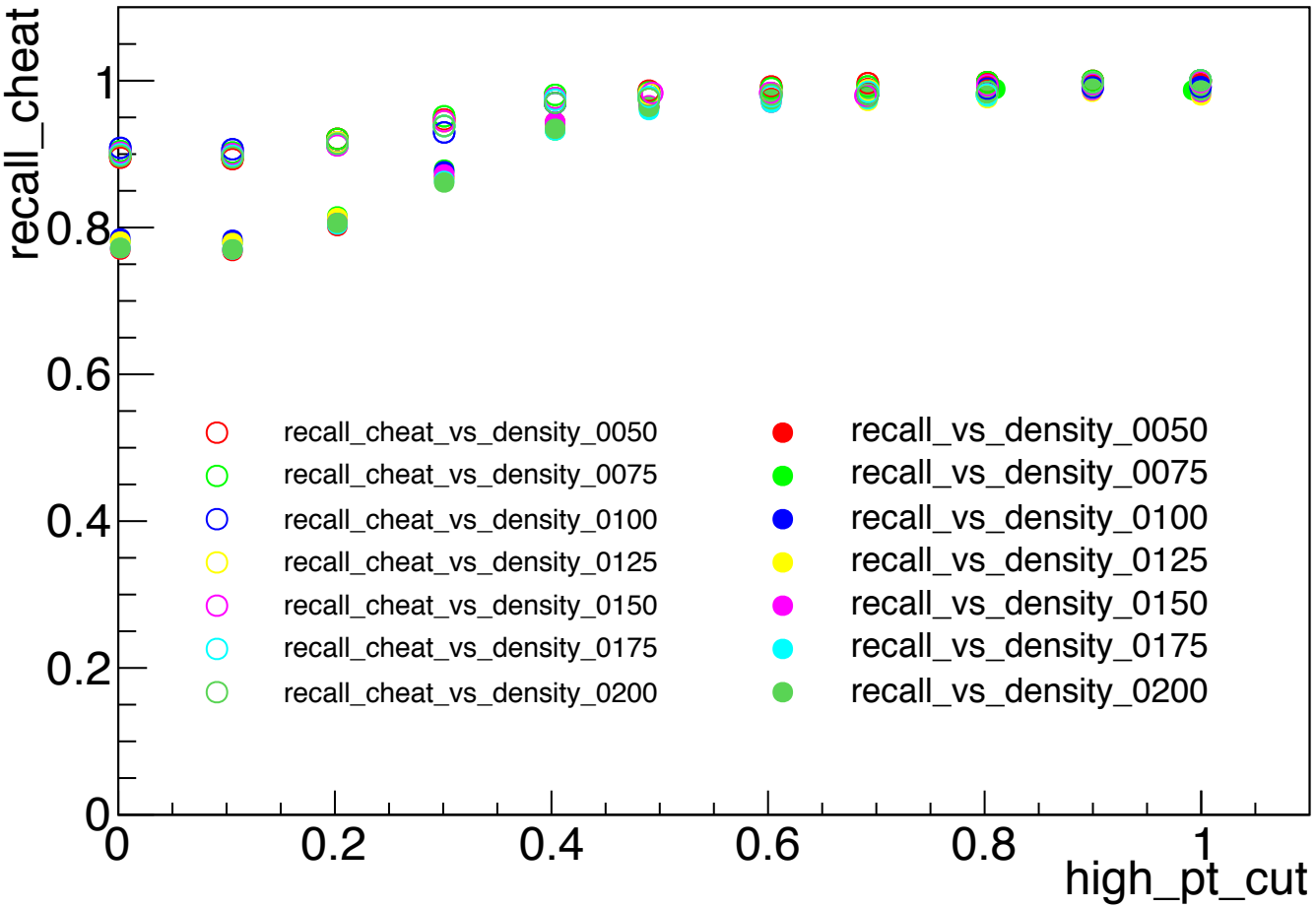
# parameters

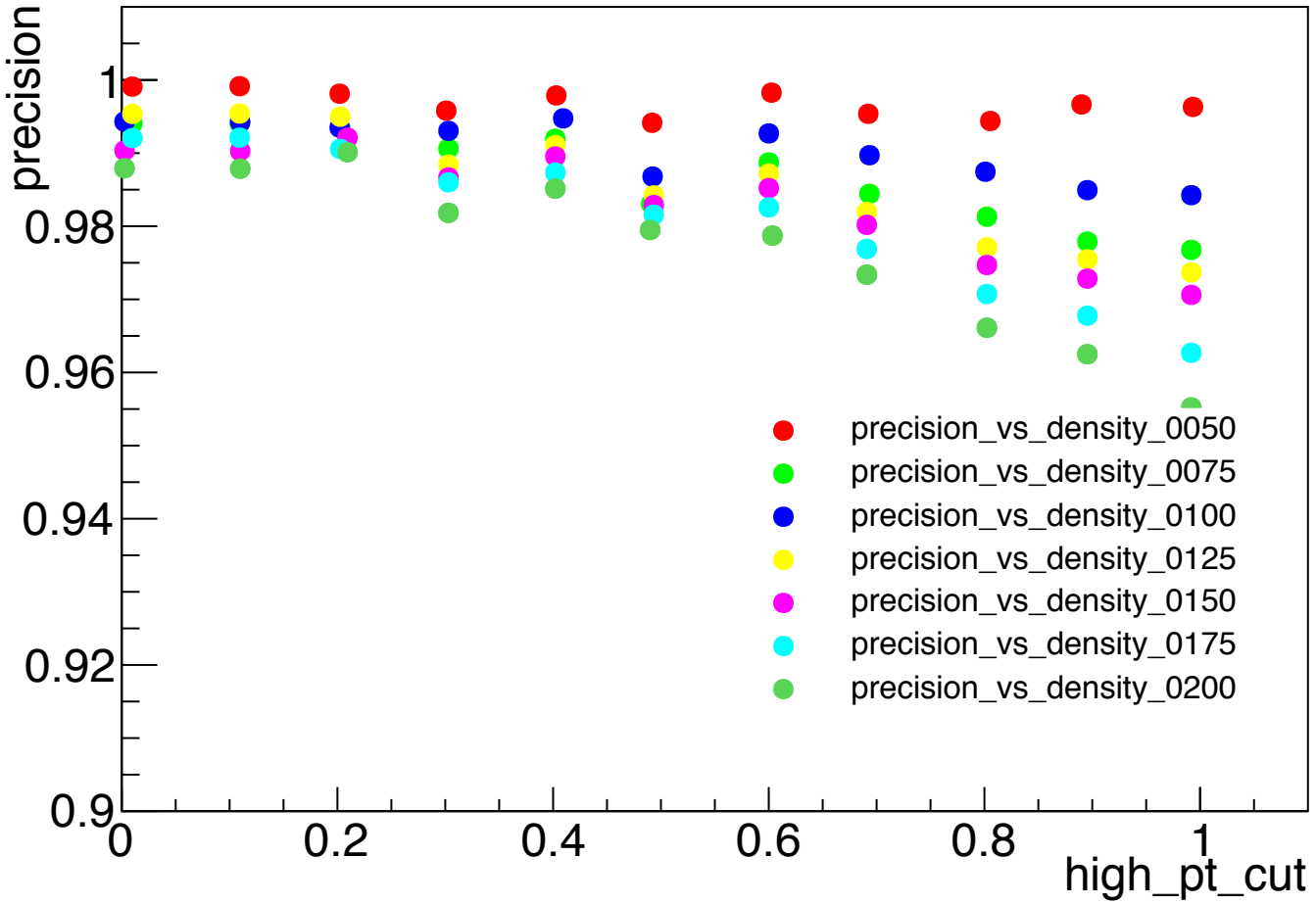
- pT threshold to define “focused” in track ml challenge
  - 1 GeV, 900 MeV, 800 MeV, … 200 MeV, 100 MeV, 0 MeV
  - “high_pt_cut” argument  of “create_dataset”
- Seed for “create_dateset” is fixed to 1
- Density in “create_dataset”
  - (0.050, 0.0750, 0.100, 0.125, 0.150, 0.100)

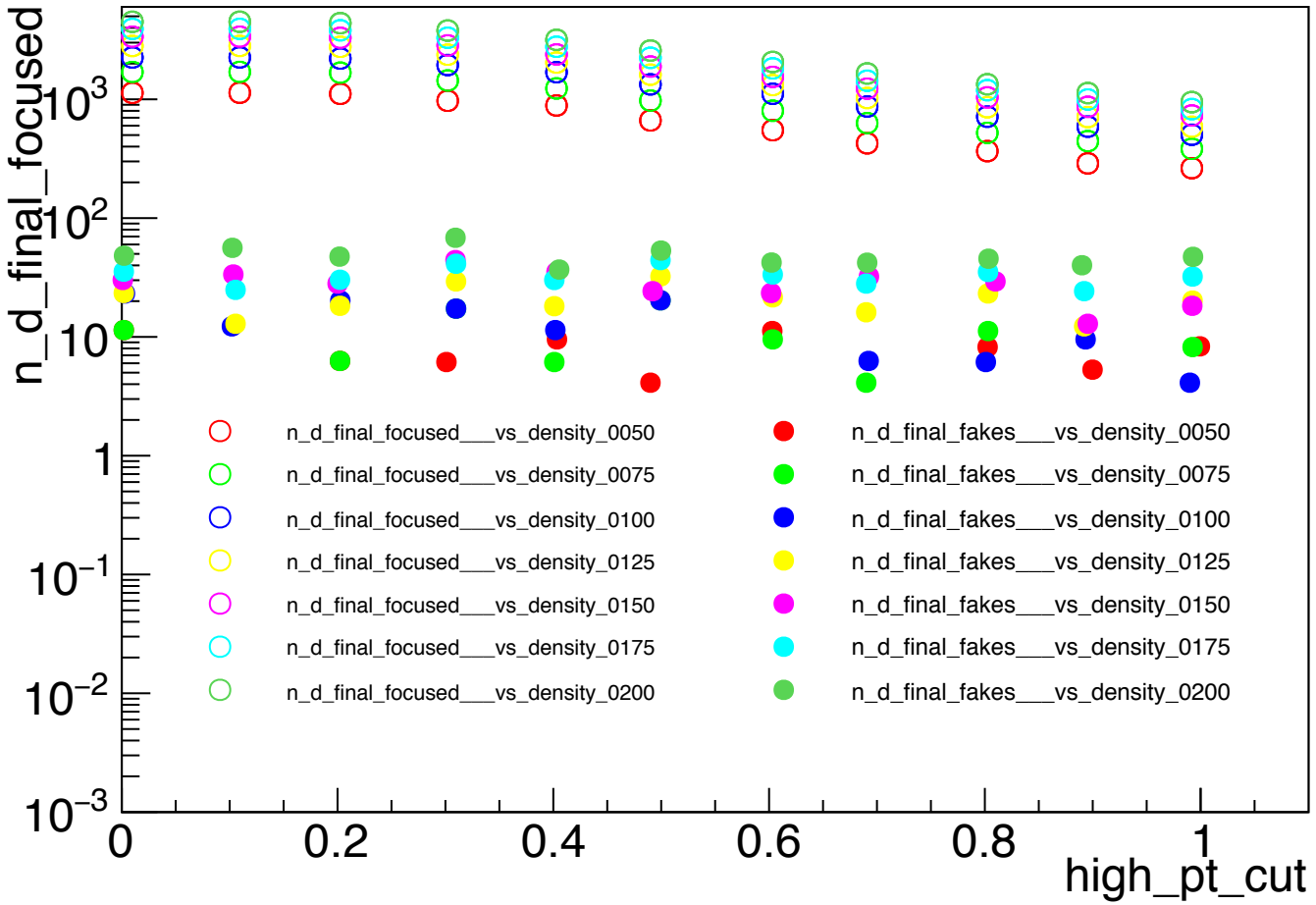
- Initial doublet cuts
  - Fixed with default configuration
    - 350<z0<350 [mm] etc
    - src/hepqpr/qallse/seeding/config.py

- pT threshold (curvature) threshold in definition of triplets
  - “tplet_max_curv” in configuration of Qallse
  - Feed in instantiation of Qallse model
  - Fixed @ curvature for 1/170 MeV (default value)


recall
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
high_pt_cut
recall_vs_density_0050
recall_vs_density_0075
recall_vs_density_0100
recall_vs_density_0125
recall_vs_density_0150
recall_vs_density_0175
recall_vs_density_0200

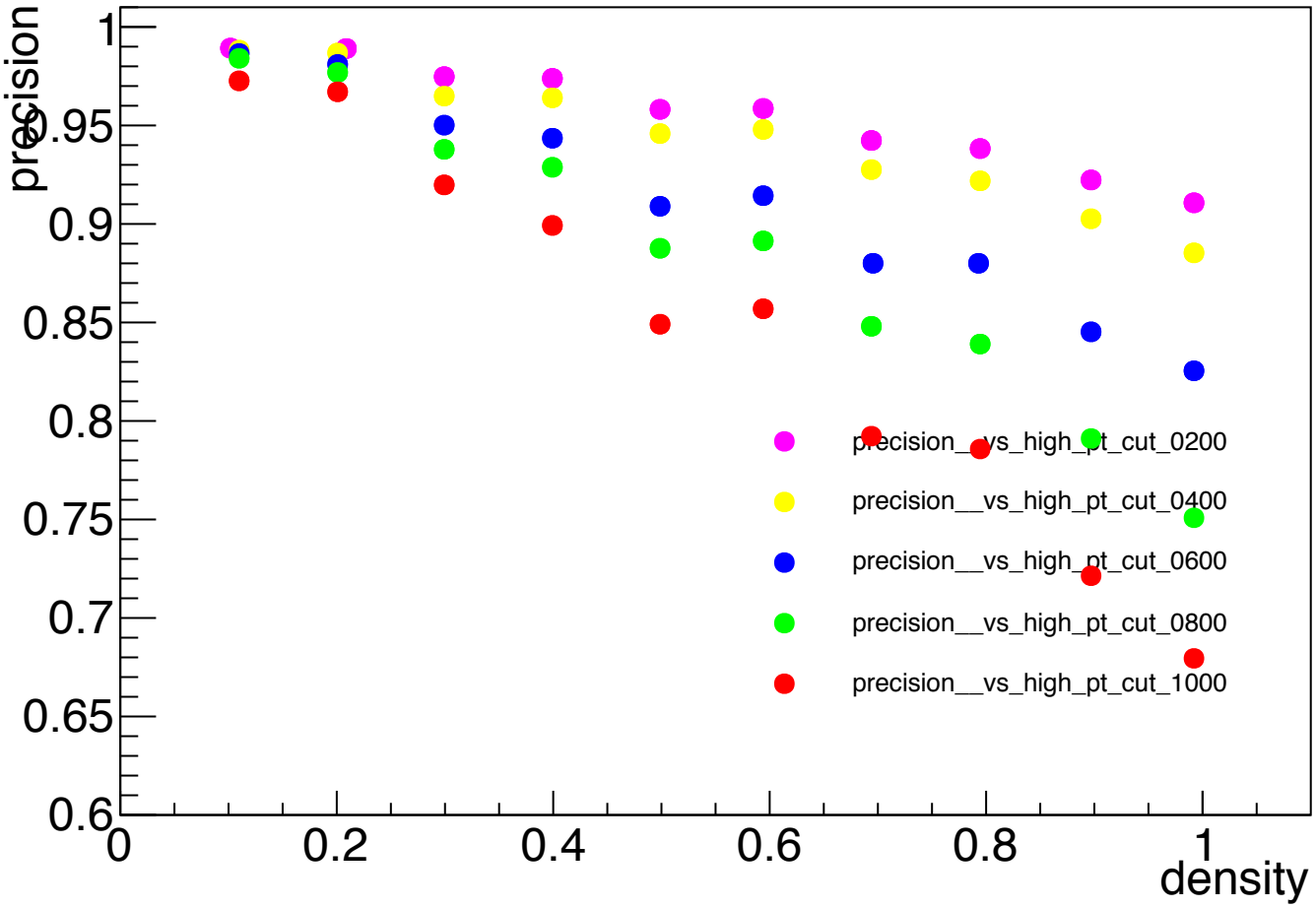

recall_cheat
high_pt_cut
0
0.2
0.4
0.6
0.8
1
recall_cheat_vs_density_0050
recall_cheat_vs_density_0075
recall_cheat_vs_density_0100
recall_cheat_vs_density_0125
recall_cheat_vs_density_0150
recall_cheat_vs_density_0175
recall_cheat_vs_density_0200
recall_vs_density_0050
recall_vs_density_0075
recall_vs_density_0100
recall_vs_density_0125
recall_vs_density_0150
recall_vs_density_0175
recall_vs_density_0200

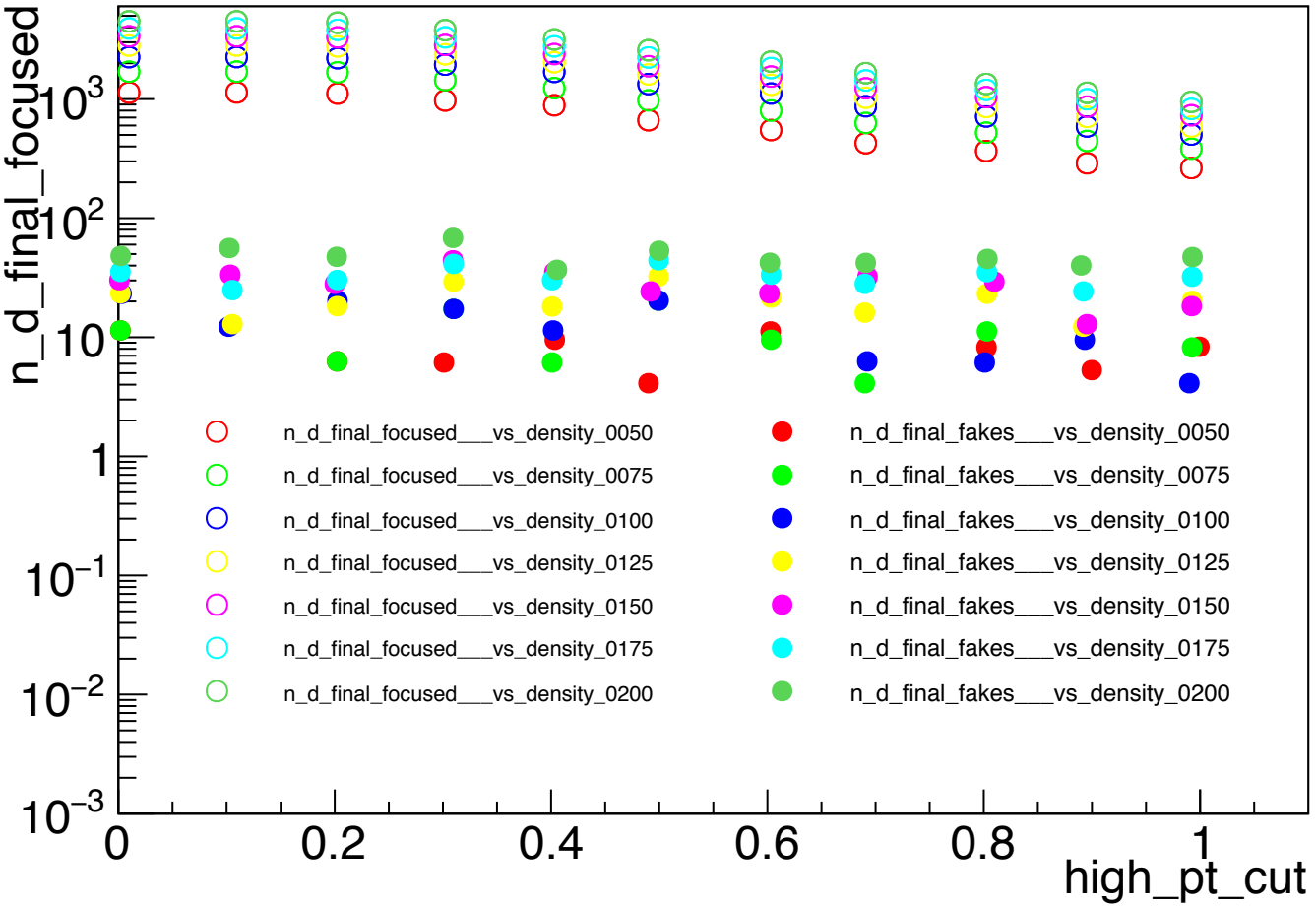

precision
1
0.98
0.96
0.94
0.92
0.9
0
0.2
0.4
0.6
0.8
1
high_pt_cut
precision_vs_density_0050
precision_vs_density_0075
precision_vs_density_0100
precision_vs_density_0125
precision_vs_density_0150
precision_vs_density_0175
precision_vs_density_0200

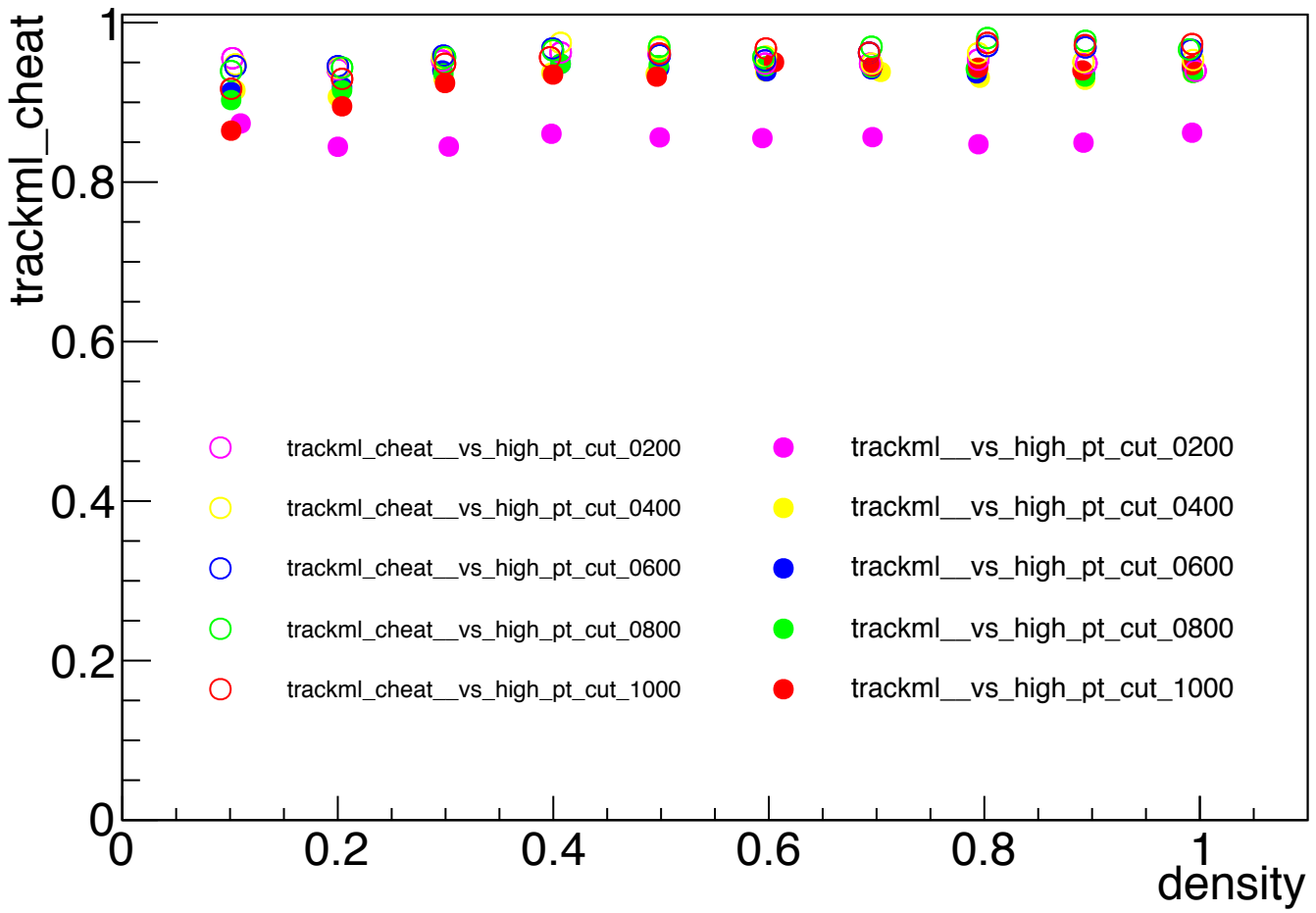

n_d_final_focused
high_pt_cut
10^3
10^2
10
1
10^-1
10^-2
10^-3
0
0.2
0.4
0.6
0.8
1
n_d_final_focused___vs_density_0050
n_d_final_focused___vs_density_0075
n_d_final_focused___vs_density_0100
n_d_final_focused___vs_density_0125
n_d_final_focused___vs_density_0150
n_d_final_focused___vs_density_0175
n_d_final_focused___vs_density_0200
n_d_final_fakes___vs_density_0050
n_d_final_fakes___vs_density_0075
n_d_final_fakes___vs_density_0100
n_d_final_fakes___vs_density_0125
n_d_final_fakes___vs_density_0150
n_d_final_fakes___vs_density_0175
n_d_final_fakes___vs_density_0200

# eta slicing

- Focusing on 0.0<eta<0.15
  - In order to see the performance dependence on the
  - No phi slice
- Density in “create_dataset”
  - (0.1, 0.2, 0.3, … 0.9, 1.0)


precision
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0
0.2
0.4
0.6
0.8
1
density
precision__vs_high_pt_cut_0200
precision__vs_high_pt_cut_0400
precision__vs_high_pt_cut_0600
precision__vs_high_pt_cut_0800
precision__vs_high_pt_cut_1000


n_d_final_focused
high_pt_cut
10^3
10^2
10
1
10^-1
10^-2
10^-3
0
0.2
0.4
0.6
0.8
1
n_d_final_focused___vs_density_0050
n_d_final_focused___vs_density_0075
n_d_final_focused___vs_density_0100
n_d_final_focused___vs_density_0125
n_d_final_focused___vs_density_0150
n_d_final_focused___vs_density_0175
n_d_final_focused___vs_density_0200
n_d_final_fakes___vs_density_0050
n_d_final_fakes___vs_density_0075
n_d_final_fakes___vs_density_0100
n_d_final_fakes___vs_density_0125
n_d_final_fakes___vs_density_0150
n_d_final_fakes___vs_density_0175
n_d_final_fakes___vs_density_0200


trackml_cheat
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
density
trackml_cheat__vs_high_pt_cut_0200
trackml_cheat__vs_high_pt_cut_0400
trackml_cheat__vs_high_pt_cut_0600
trackml_cheat__vs_high_pt_cut_0800
trackml_cheat__vs_high_pt_cut_1000
trackml__vs_high_pt_cut_0200
trackml__vs_high_pt_cut_0400
trackml__vs_high_pt_cut_0600
trackml__vs_high_pt_cut_0800
trackml__vs_high_pt_cut_1000

# messages

- With the current double selection and Hamiltonian modeling:
  - 20% degradation in efficiency for low pT tracks
    - 10% from doublet selection
      - Saito-kun is checking in details
    - 10% from QUBO sampling
- Degradation seen in the current degradation for Low pT does not depend on density (=pileup)