

# $D^0 \rightarrow K^- \pi^+ \pi^0$ Dalitz Plot Analysis

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# Event generation

- $D^{*+} \rightarrow D^0(\rightarrow K^- + \pi^+ + \pi^0) + \pi^+$
- DALITZ vs PHSP
- No background decfiles

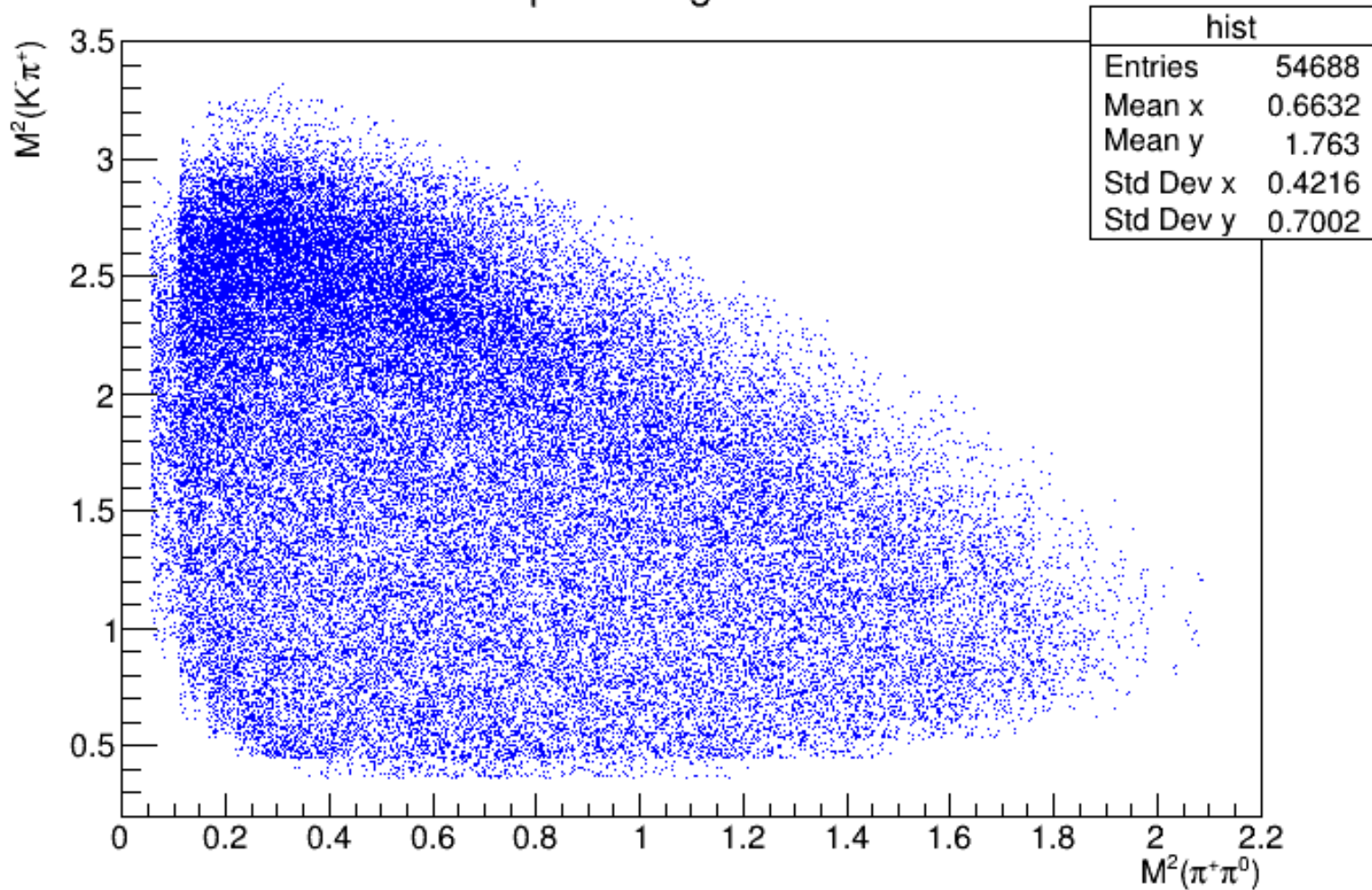
```
50 Decay vpho
51 # Pythia6 definition "32"
52 # (this is automatically
53 1.000 c anti-c PYTHIA 32;
54 Enddecay
55
56 Decay D*+
57 1.0 MyD0 pi+ VSS;
58 Enddecay
59
60 Decay D*-
61 1.0 MyAntiD0 pi- VSS;
62 Enddecay
63
64 Decay MyD0
65 1.0 K- pi+ pi0 PHSP;
66 Enddecay
67 CDecay MyAntiD0
```

# Event reconstruction

- `ma.reconstructDecay('D0:Kppz -> K-:loose pi+:loose pi0:looseFit', '1.75 < M < 1.95', path=path)`
- `ma.reconstructDecay('D*+:Dpi -> D0:Kppz pi+:all', 'massDifference(0)<0.16', path=path)`
- `ma.vertexTree('D*+:Dpi', -9999., path=path)`
- `ma.matchMCTruth('D*+:Dpi', path=path)`

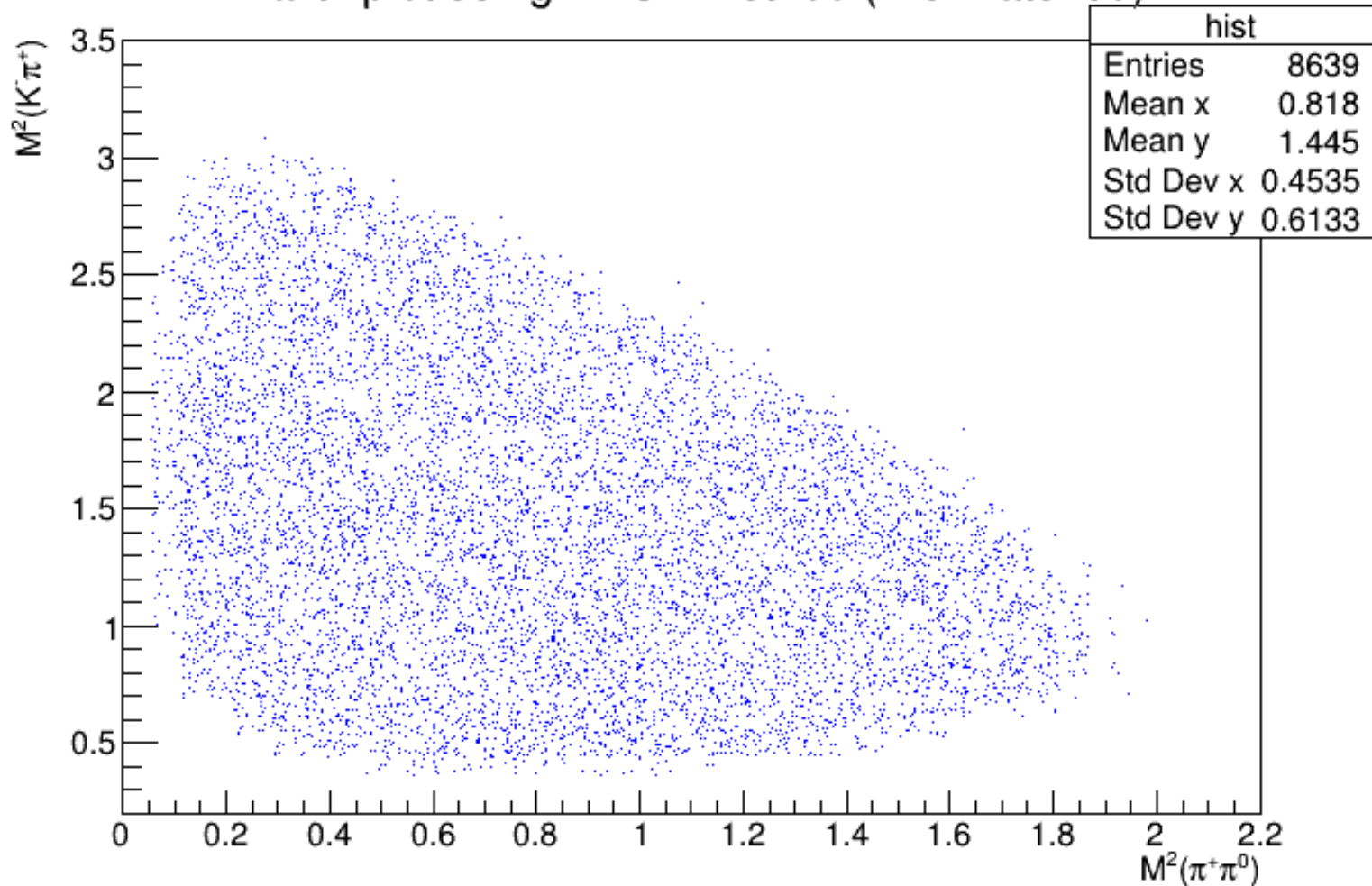
# MC Dalitz plot (PHSP)

Dalitz plot using PHSP method



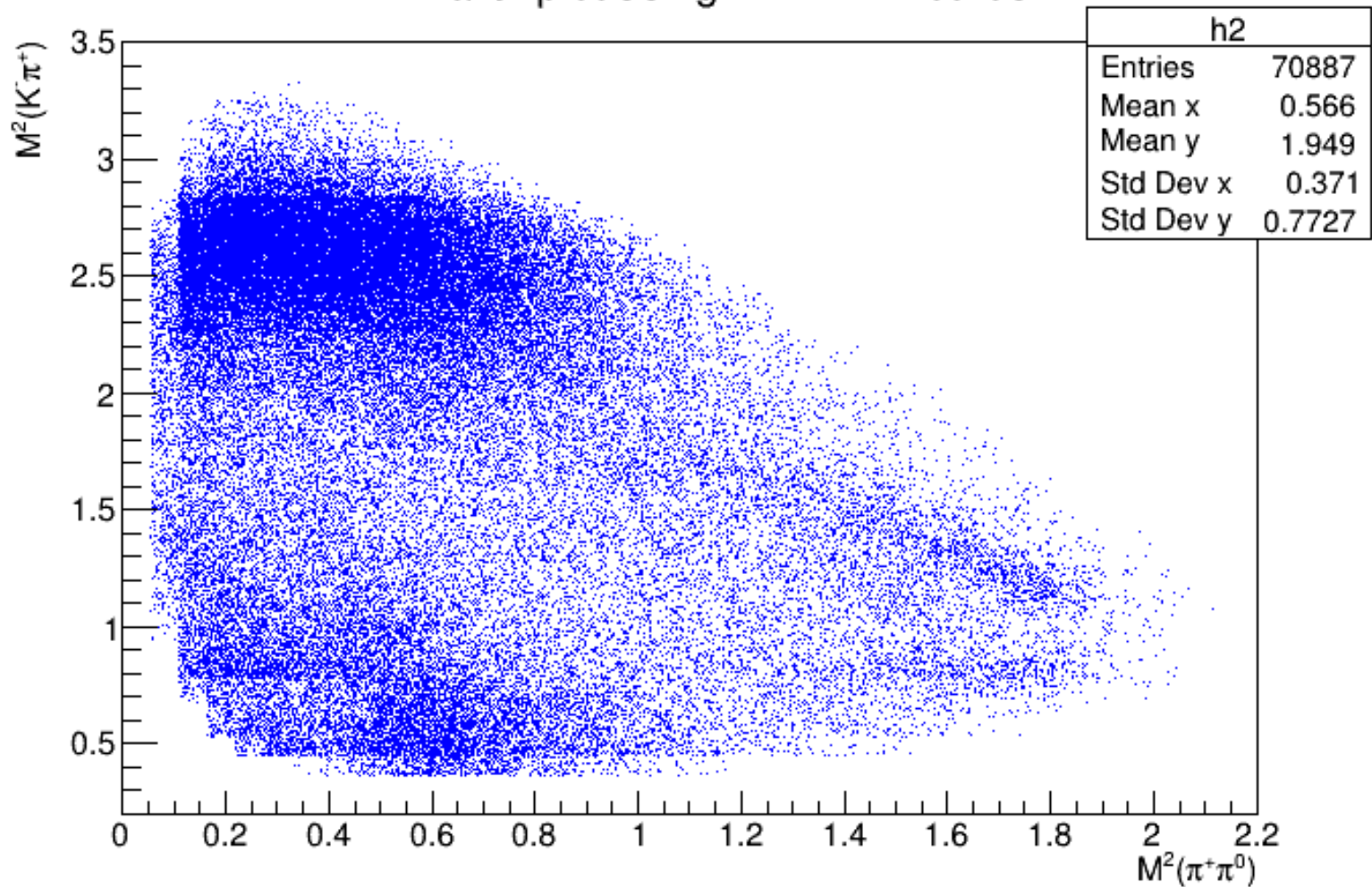
# MC Dalitz plot (PHSP)

Dalitz plot using PHSP method (MC matched)



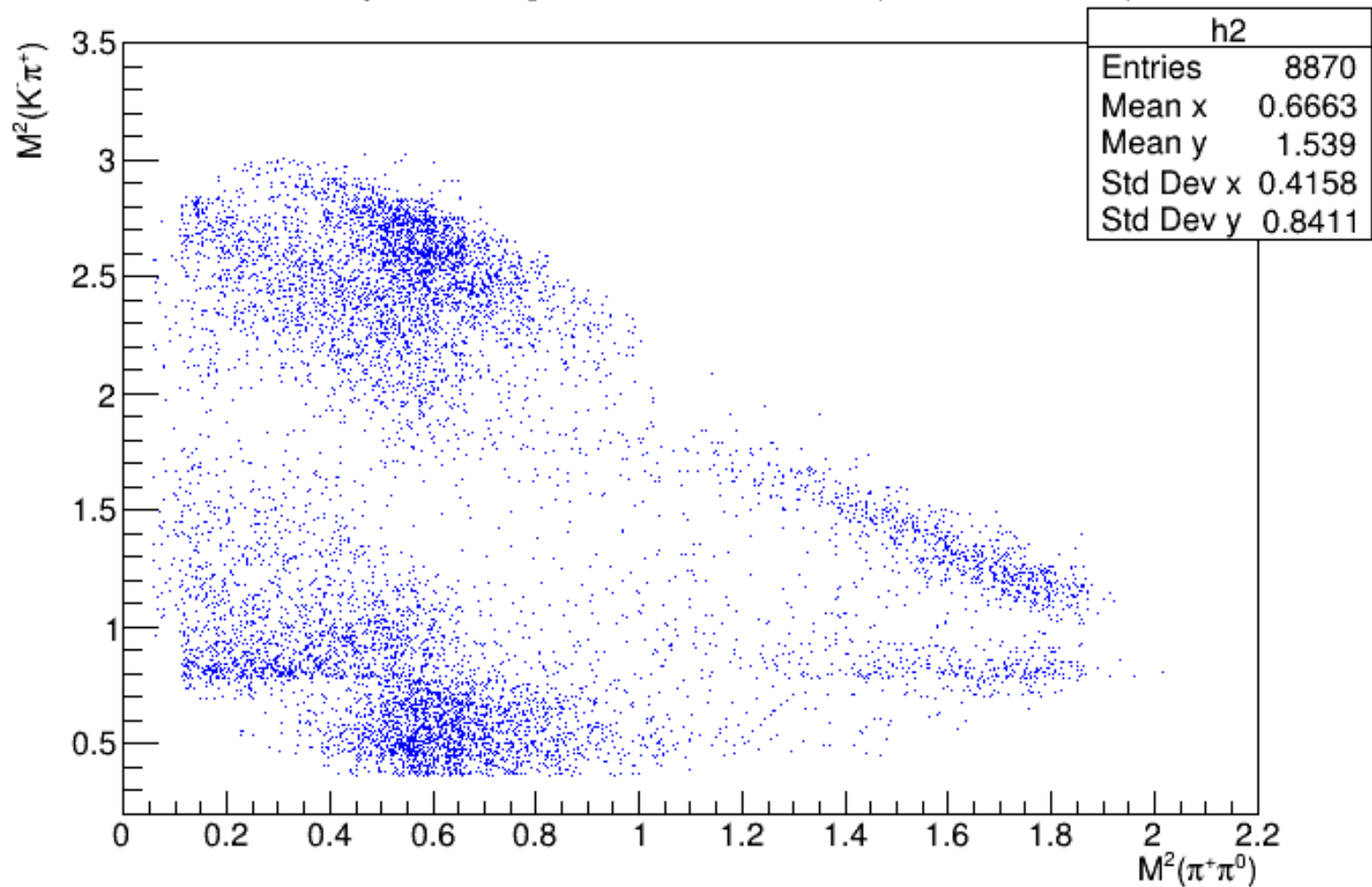
# MC Dalitz plot (DALITZ)

Dalitz plot using DALITZ method



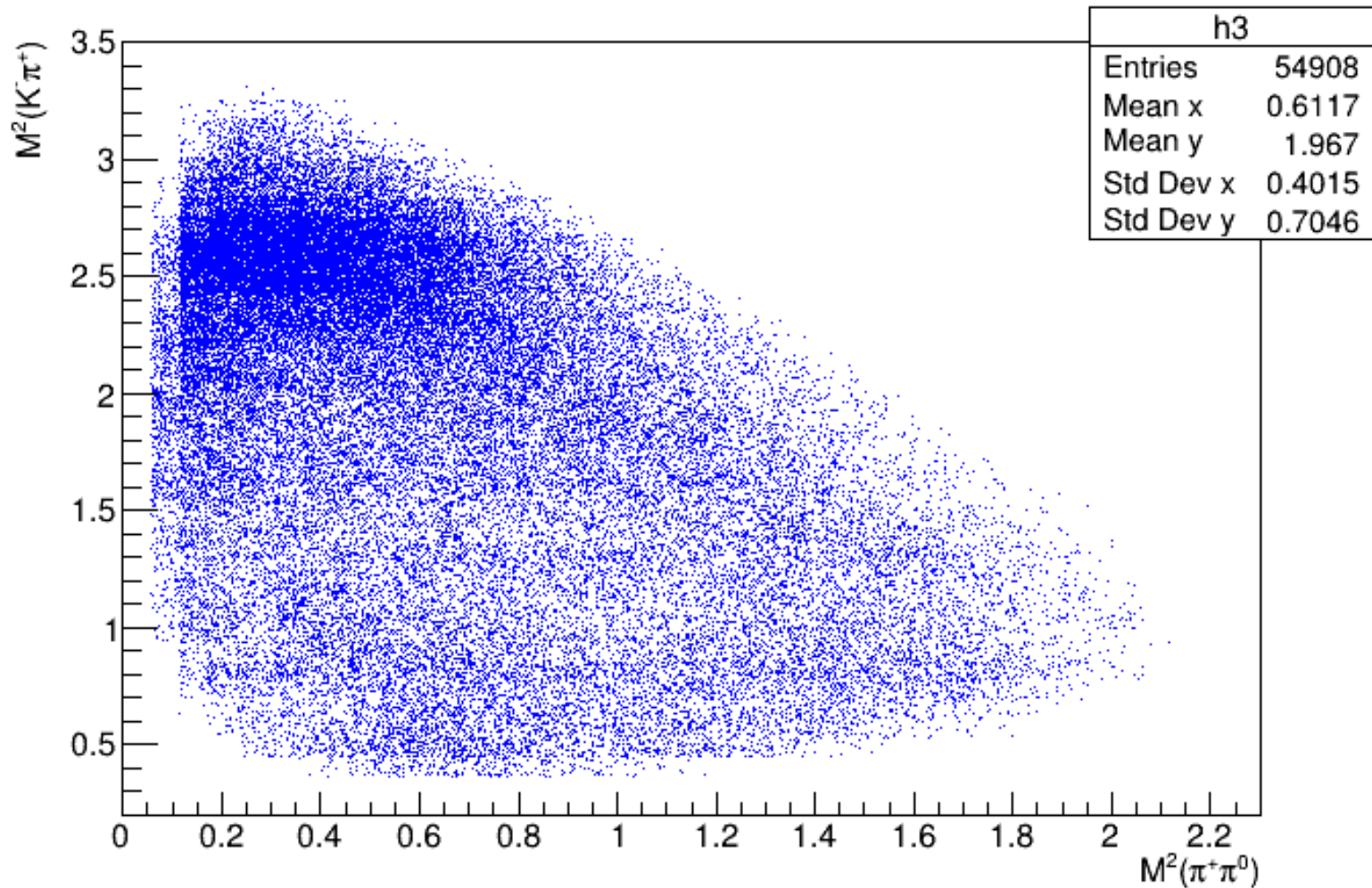
# MC Dalitz plot (DALITZ)

Dalitz plot using DALITZ method (MC matched)



# Dalitz plot of data from exp 8

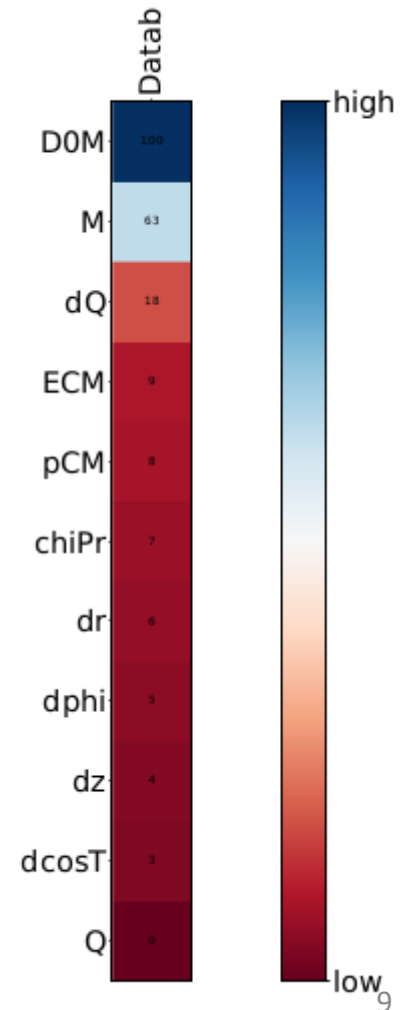
Dalitz plot of data from exp 8





# Background reduction

- FastBDT from MVA package
- Good to know variable selection



# Lesson learnt

- Three body decay event generation with DALITZ/PHSP option
- MC matching
- First experience with Belle II data/MC
- MVA package for selection on cutting variables