find the corresponding jet to a given particle

previous

- calculate ΔR for every particle- jet combination
- assign the jet with the smallest ΔR to every particle

$\rightarrow$ one jet can be assigned to multiple particles - those events were excluded for the event shape observables
$\rightarrow$ therefore we had low statisics

find the corresponding jet to a given particle

now

- calculate ΔR for every particle- jet combination and save it in vectors
- loop over all possible combination and add ΔR together
- choose the combination where the sum is minimal

$\rightarrow$ takes a bit more computing, since there are many combinations that we loop over, but more statistics
$\rightarrow$ another idea: implement a min p_T cut of the jets, because at the moment we only consider the spatial distribution

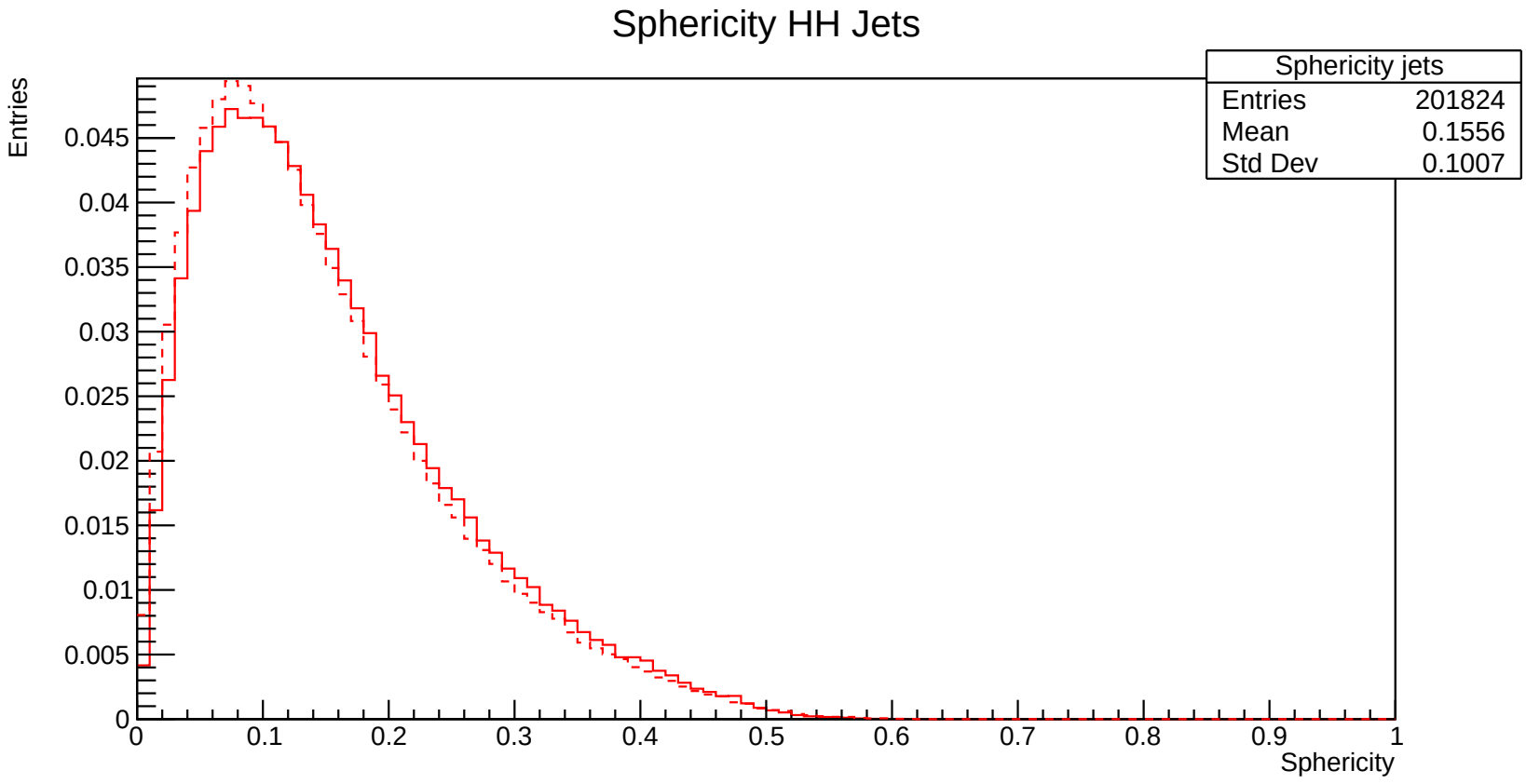


Figure: jets = dashed, particle = solid line

event shape observables - sphericity

$$M = \begin{pmatrix} p_x^2 & p_x p_y & p_x p_z \\ p_x p_y & p_y^2 & p_y p_z \\ p_x p_z & p_y p_z & p_z^2 \end{pmatrix}$$

$$S = \frac{3}{2}(\lambda_2 + \lambda_3)$$

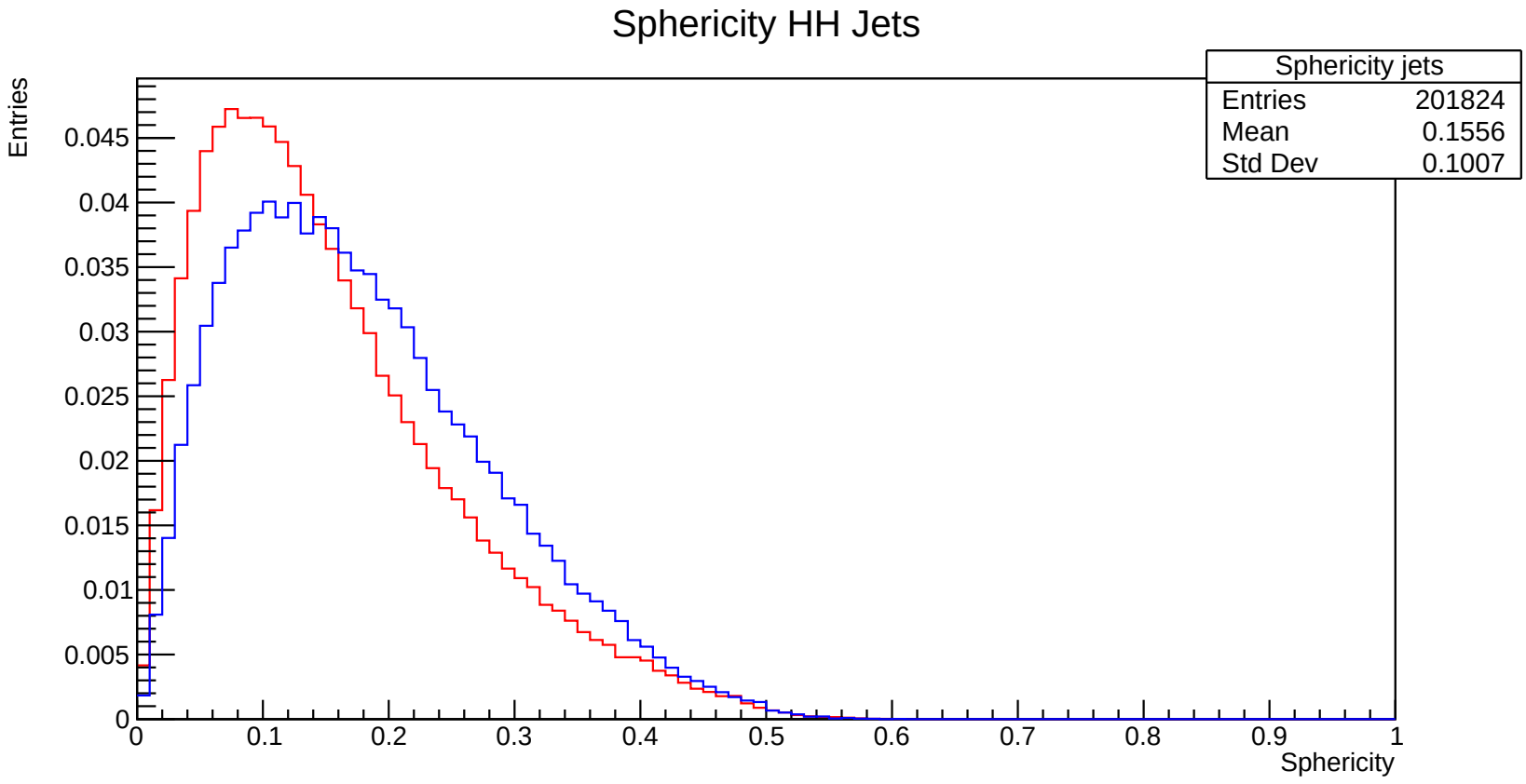


Figure: red= HH, blue= HZ

event shape observables - thrust

$$T_{\perp} = max_{\hat{n}} \frac{\sum_i |\hat{p}_{T,i} \cdot \hat{n}|}{\sum_i |\hat{p}_{T,i}|}$$

Problem source: C++ wasn't able to calculate $(j/20) \cdot \pi$ but $(j \cdot \pi)/20$

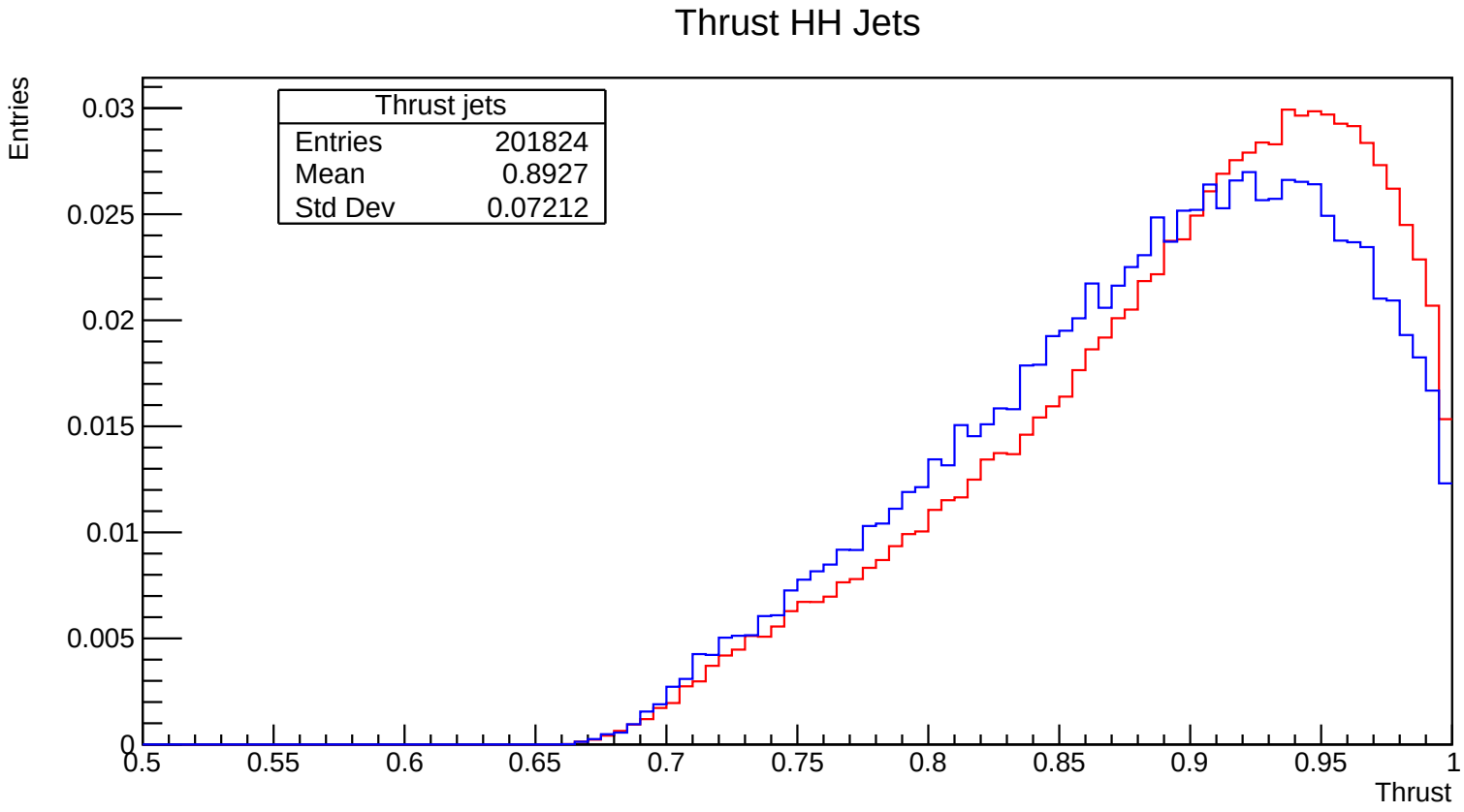
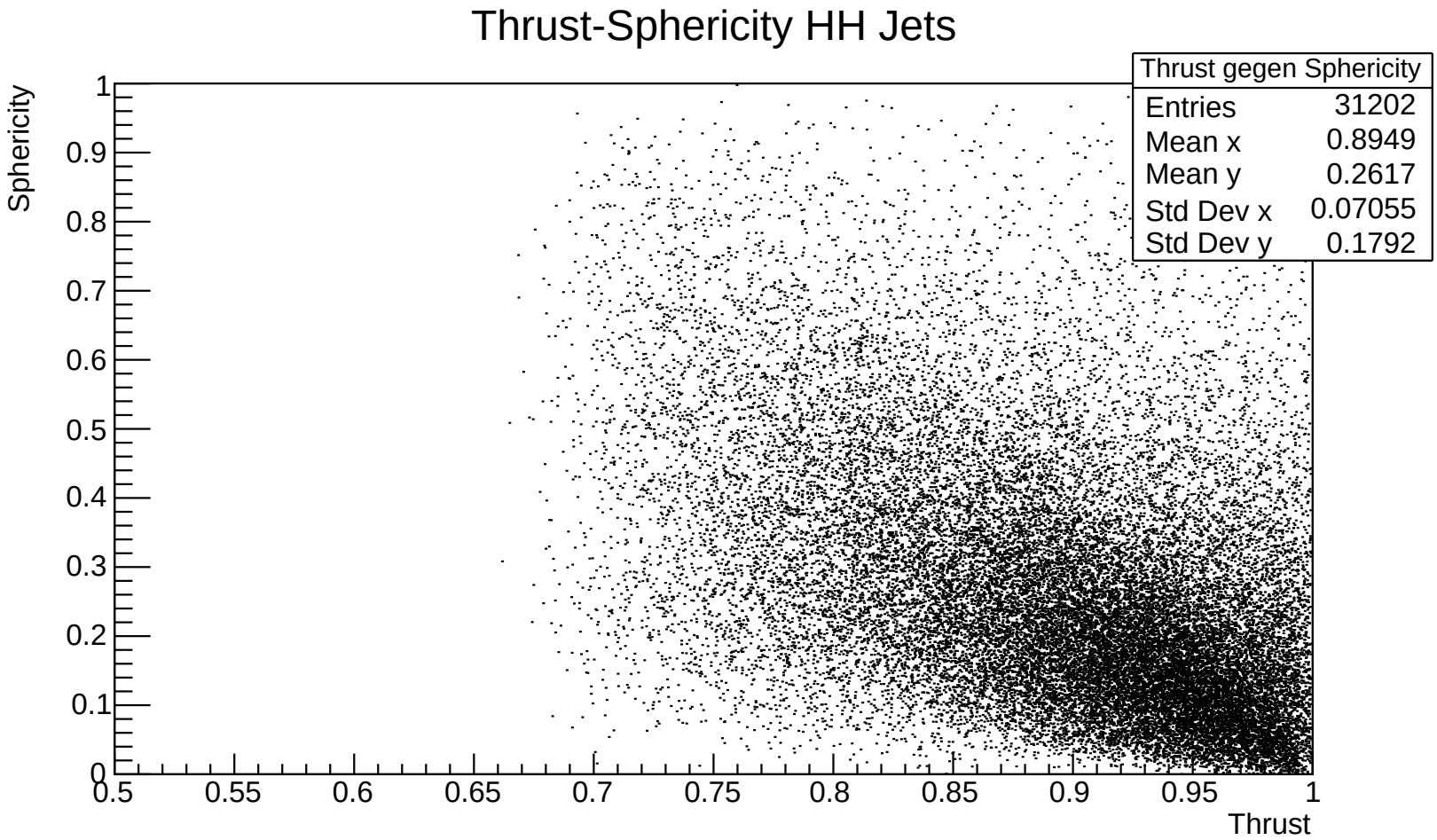


Figure: red= HH, blue= HZ


Thrust-Sphericity HH Jets
Thrust gegen Sphericity
Entries 31202
Mean x 0.8949
Mean y 0.2617
Std Dev x 0.07055
Std Dev y 0.1792
Sphericity
Thrust
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0.5
0.55
0.6
0.65
0.7
0.75
0.8
0.85
0.9
0.95
1

spin-correlation

$$cos(\theta) = \frac{\vec{H} \cdot \vec{b}}{|\vec{H}| \cdot |\vec{b}|}$$

where $\vec{b}$ is in rest frame of $\vec{H}$

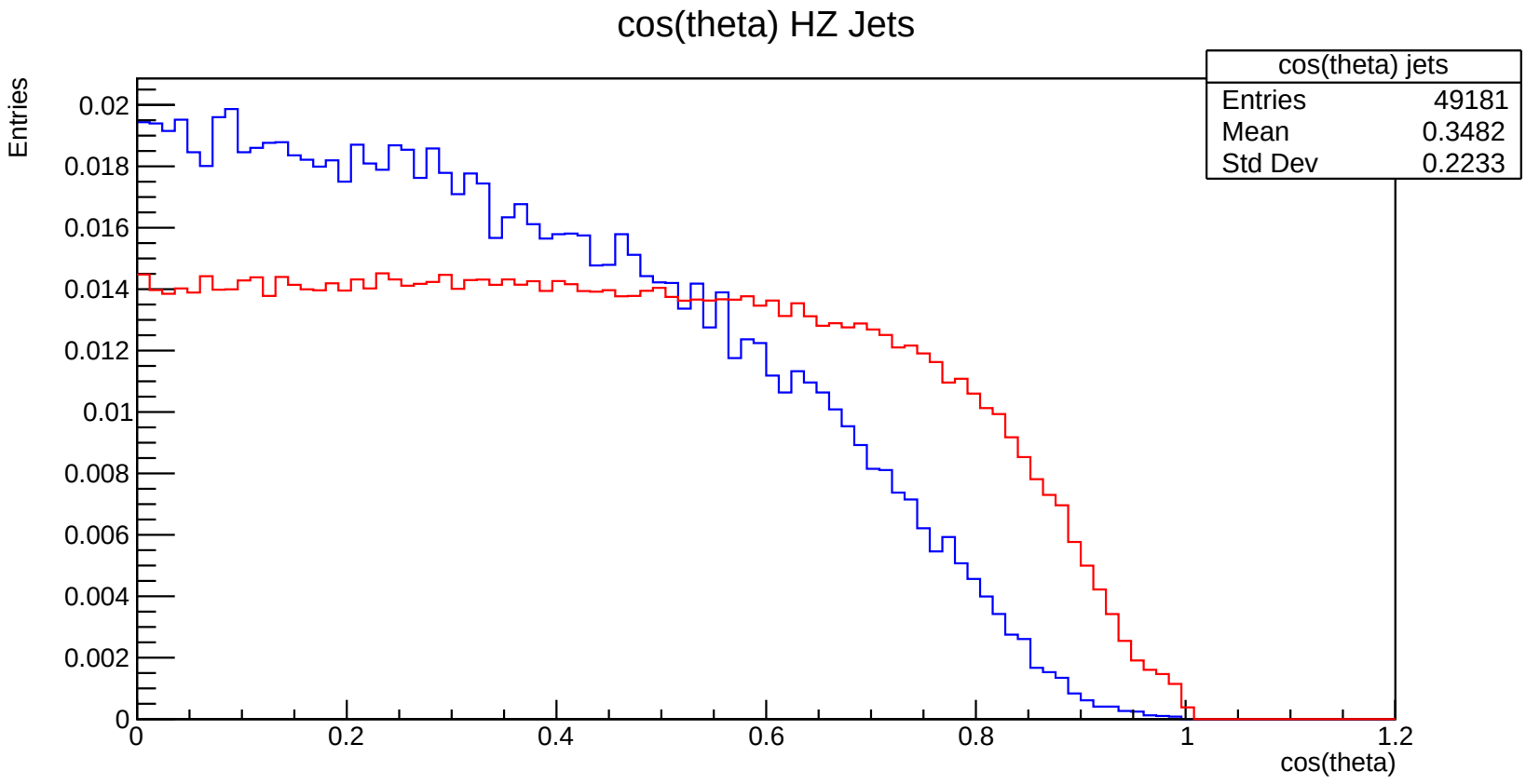


Figure: red= HH, blue= HZ