

h TopDileptonReconstruction.h 7.59 KiB

```

1  #ifndef TopDileptonReconstruction_h
2  #define TopDileptonReconstruction_h
3  #include <iostream>
4
5  #include "TObject.h"
6  #include "TRandom3.h"
7  #include "TLorentzVector.h"
8  #include <assert.h>
9  #include "Math/VectorUtil.h"
10 #include <Math/Polynomial.h>
11 #include <TMatrix.h>
12 #include <TMatrixD.h>
13 #include <TArrayD.h>
14 #include <TMatrixDEigen.h>
15 #include <TMath.h>
16 #include <TLorentzVector.h>
17 #include <TVector3.h>
18 #include <stdio.h>
19 #include <stdlib.h>
20 #include <TVector3.h>
21
22 //namespace top{
23
24 class TopDileptonReconstruction {
25     //ClassDef(top::TopDileptonReconstruction, 1);
26 private:
27
28     std::vector<TLorentzVector> m_NW_tops;
29     std::vector<TLorentzVector> m_EM_tops;
30     std::vector<TLorentzVector> m_SN_tops;
31     std::vector<TLorentzVector> m_NW_tbars;
32     std::vector<TLorentzVector> m_EM_tbars;
33     std::vector<TLorentzVector> m_SN_tbars;
34     std::vector<TLorentzVector> m_NW_nus;
35     std::vector<TLorentzVector> m_EM_nus;
36     std::vector<TLorentzVector> m_SN_nus;
37     std::vector<TLorentzVector> m_NW_nubars;
38     std::vector<TLorentzVector> m_EM_nubars;
39     std::vector<TLorentzVector> m_SN_nubars;
40     std::vector<TLorentzVector> m_NW_mpos;
41     std::vector<TLorentzVector> m_EM_mpos;
42     std::vector<TLorentzVector> m_SN_mpos;
43     std::vector<TLorentzVector> m_NW_mnegs;
44     std::vector<TLorentzVector> m_EM_mnegs;
45     std::vector<TLorentzVector> m_SN_mnegs;
46
47     std::vector<double> m_NW_weights;
48
49     TLorentzVector m_NW_highestWeightTop;
50     TLorentzVector m_NW_highestWeightTbar;
51     TLorentzVector m_EM_averageTop;
52     TLorentzVector m_EM_averageTbar;
53     TLorentzVector m_SN_averageTop;
54     TLorentzVector m_SN_averageTbar;
55
56     TLorentzVector m_NW_highestWeightNu;
57     TLorentzVector m_NW_highestWeightNubar;
58     TLorentzVector m_EM_averageNu;
59     TLorentzVector m_EM_averageNubar;
60     TLorentzVector m_SN_averageNu;
61     TLorentzVector m_SN_averageNubar;
62
63     TLorentzVector m_NW_highestWeightWpos;
64     TLorentzVector m_NW_highestWeightWneg;
65     TLorentzVector m_EM_averageWpos;
66     TLorentzVector m_EM_averageWneg;
67     TLorentzVector m_SN_averageWpos;
68     TLorentzVector m_SN_averageWneg;
69
70     TRandom3 m_random;
71     bool doNW;
72     bool doNWfull;
73     bool doEM;
74     bool doSN;
75
76     double NW_highestWeight;
77

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78 public:
79
80     virtual ~TopDileptonReconstruction();
81     TopDileptonReconstruction();
82
83     void Reconstruct(TLorentzVector lepton_pos,
84                     TLorentzVector lepton_neg,
85                     TLorentzVector b,
86                     TLorentzVector bbar,
87                     double met_ex,
88                     double met_ey,
89                     double mtop,
90                     double mtbar,
91                     double mWpos,
92                     double mWneg);
93
94     void ReconstructNW(TLorentzVector lepton_pos,
95                        TLorentzVector lepton_neg,
96                        TLorentzVector b,
97                        TLorentzVector bbar,
98                        double met_ex,
99                        double met_ey,
100                        double mtop,
101                        double mtbar,
102                        double mWpos,
103                        double mWneg);
104
105     void ReconstructEM(TLorentzVector lepton_pos,
106                        TLorentzVector lepton_neg,
107                        TLorentzVector b,
108                        TLorentzVector bbar,
109                        double met_ex,
110                        double met_ey,
111                        double mtop,
112                        double mtbar,
113                        double mWpos,
114                        double mWneg);
115
116     void ReconstructSN(TLorentzVector lepton_pos,
117                        TLorentzVector lepton_neg,
118                        TLorentzVector b,
119                        TLorentzVector bbar,
120                        double met_ex,
121                        double met_ey,
122                        double mtop,
123                        double mtbar,
124                        double mWpos,
125                        double mWneg);
126
127     double NW_get_weight(TLorentzVector nu1,
128                          TLorentzVector nu2,
129                          double met_ex,
130                          double met_ey);
131
132     std::vector<TLorentzVector> NW_solveForNeutrinoEta(TLorentzVector* lepton,
133                                                         TLorentzVector* bJet,
134                                                         double nu_eta,
135                                                         double mtop,
136                                                         double mW);
137
138     std::vector<TMatrixD> EM_getNeutrinoEllipse(TLorentzVector& bjet,
139                                                  TLorentzVector& lepton,
140                                                  double& mW,
141                                                  double& mNu);
142
143     bool EM_cmp(std::pair<Double_t, TVectorD> kv1,
144                 std::pair<Double_t, TVectorD> kv2);
145
146     std::vector<TVectorD> EM_intersect_ell_ell(TMatrixD A, TMatrixD B);
147     std::vector<TVectorD> EM_intersect_ell_line(TMatrixD E, TVectorD L, std::vector<Double_t> &kv);
148     Double_t EM_cofactor(TMatrixD A, int row, int col);
149     TMatrixD EM_rotationMatrix(int axis, double angle);
150     std::vector<TVectorD> EM_factor_degenerate(TMatrixD G);
151
152
153     std::vector<TLorentzVector> GetNW_tops(){ return m_NW_tops;};
154     std::vector<TLorentzVector> GetNW_tbars(){ return m_NW_tbars;};
155     std::vector<TLorentzVector> GetEM_tops(){ return m_EM_tops;};
156     std::vector<TLorentzVector> GetEM_tbars(){ return m_EM_tbars;};
157

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158 std::vector<TLorentzVector> GetSNTops(){ return m_SN_tops;};
159 std::vector<TLorentzVector> GetSNTbars(){return m_SN_tbars;};
160
161 std::vector<TLorentzVector> GetNMNus(){ return m_NW_nus;};
162 std::vector<TLorentzVector> GetNMNubars(){return m_NW_nubars;};
163 std::vector<TLorentzVector> GetEMNus(){ return m_EM_nus;};
164 std::vector<TLorentzVector> GetEMNubars(){return m_EM_nubars;};
165 std::vector<TLorentzVector> GetSNNus(){ return m_SN_nus;};
166 std::vector<TLorentzVector> GetSNNubars(){return m_SN_nubars;};
167
168 std::vector<TLorentzVector> GetNMWpos(){return m_NW_Wpos;};
169 std::vector<TLorentzVector> GetNMWnegs(){return m_NW_Wnegs;};
170 std::vector<TLorentzVector> GetEMWpos(){return m_EM_Wpos;};
171 std::vector<TLorentzVector> GetEMWnegs(){return m_EM_Wnegs;};
172 std::vector<TLorentzVector> GetSNWpos(){return m_SN_Wpos;};
173 std::vector<TLorentzVector> GetSNWnegs(){return m_SN_Wnegs;};
174
175 std::vector<double> GetNWweights(){return m_NW_weights;};
176 double GetNWweight(){return NWhighestWeight;};
177
178 TLorentzVector GetNWTop(){ return m_NW_highestWeightTop;};
179 TLorentzVector GetNWTbar(){ return m_NW_highestWeightTbar;};
180 TLorentzVector GetEMTop(){ return m_EM_averageTop;};
181 TLorentzVector GetEMTbar(){ return m_EM_averageTbar;};
182 TLorentzVector GetSNTop(){ return m_SN_averageTop;};
183 TLorentzVector GetSNTbar(){ return m_SN_averageTbar;};
184
185 TLorentzVector GetNMNu(){ return m_NW_highestWeightNu;};
186 TLorentzVector GetNMNubar(){ return m_NW_highestWeightNubar;};
187 TLorentzVector GetEMNu(){ return m_EM_averageNu;};
188 TLorentzVector GetEMNubar(){ return m_EM_averageNubar;};
189 TLorentzVector GetSNNu(){ return m_SN_averageNu;};
190 TLorentzVector GetSNNubar(){ return m_SN_averageNubar;};
191
192 TLorentzVector GetNMWpos(){ return m_NW_highestWeightWpos;};
193 TLorentzVector GetNMWneg(){ return m_NW_highestWeightWneg;};
194 TLorentzVector GetEMWpos(){ return m_EM_averageWpos;};
195 TLorentzVector GetEMWneg(){ return m_EM_averageWneg;};
196 TLorentzVector GetSNWpos(){ return m_SN_averageWpos;};
197 TLorentzVector GetSNWneg(){ return m_SN_averageWneg;};
198
199 void RunNW(){doNW = true;};
200 void RunEM(){doEM = true;};
201 void RunSN(){doSN = true;};
202
203 TLorentzVector Average(std::vector<TLorentzVector> vecs);
204
205 //virtual ~NeutrinoWeighter()=0;
206 };
207
208 bool EM_cmp(std::pair<Double_t,TVectorD> kv1, std::pair<Double_t,TVectorD> kv2);
209
210
211 #endif
212
213
214
215

```