

# Analysis Meeting

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# Jacobians = Jacobians (ttbar example)

```
jacobians = {'flutter_s13::jacobian', 'flutter_s134::jacobian', 'flutter_s25::jacobian', 'flutter_s256::jacobian'}  
  
if USE_TF then  
  append(jacobians, {'tf_p1::TF_times_jacobian', 'tf_p2::TF_times_jacobian', 'tf_p3::TF_times_jacobian', 'tf_p4::TF_times_jacobian'})  
end  
  
append(jacobians, {'phaseSpaceOut::phase_space', 'looper::jacobian'})
```

```
Iteration 1: 1750000 integrand evaluations so far  
[1] 4.97051e-08 +- 1.04856e-10   chisq 0 (0 df)  
Iteration 2: 4500000 integrand evaluations so far  
[1] 4.97147e-08 +- 2.95704e-11   chisq 0.00902179 (1 df)  
Result:  
4.97147e-08 +- 2.95704e-11  
Integration status: 0  
Hist in pool: 1  
DMEM integral: 9.94207e-08  
Weight computed in 282419ms
```

- jacobians = jacobians
- Time = 5 min
  - Large weight
  - Small error (0.06%)

```
Iteration 1: 1750000 integrand evaluations so far  
[1] 3.98138e-21 +- 4.41587e-23   chisq 0 (0 df)  
Iteration 2: 4500000 integrand evaluations so far  
[1] 4.03956e-21 +- 7.21601e-24   chisq 1.78371 (1 df)  
Result:  
4.03956e-21 +- 7.21601e-24  
Integration status: 0  
Hist in pool: 1  
DMEM integral: 8.02253e-21  
Weight computed in 296185ms
```

- jacobians = jacobians
- Time = 5 min
  - Small weight
  - Small error (0.18%)

```
particles = {  
  inputs = full_inputs,  
  ids = {  
    {  
      pair = {0},  
      pdg_id = {-13},  
      me_index = {1},  
    },  
  
    {  
      pair = {0},  
      pdg_id = {5},  
      me_index = {3},  
    },  
  
    {  
      pair = {0},  
      pdg_id = {13},  
      me_index = {4},  
    },  
  
    {  
      pair = {0},  
      pdg_id = {-5},  
      me_index = {6},  
    },  
  
    {  
      pair = {0},  
      pdg_id = {14},  
      me_index = {2},  
    },  
  
    {  
      pair = {0},  
      pdg_id = {-14},  
      me_index = {5},  
    },  
  }  
},  
  
jacobians = jacobians  
}
```

# Jacobians = Jacobians (Christophs code)

```
jacobiens = {'flatter_s13::jacobian', 'flatter_s25::jacobian', 'flatter_s2513::jacobian', 'flatter_s46::jacobian'}

if USE_TF then
append(jacobiens, {'tf_p1::TF_times_jacobian', 'tf_p2::TF_times_jacobian', 'tf_p3::TF_times_jacobian', 'tf_p4::TF_times_jacobian', 'tf_p5::TF_times_jacobian', 'tf_p6::TF_times_jacobian'})
end

append(jacobiens, {'phaseSpaceOut::phase_space', 'looper::jacobian'})
```

```
Iteration 1: 175000000 integrand evaluations so far
[1] 8.43959e-28 +- 5.84806e-28 chisq 0 (0 df)
Iteration 2: 351000000 integrand evaluations so far
[1] 1.34023e-35 +- 3.91379e-36 chisq 2.08267 (1 df)
Iteration 3: 528000000 integrand evaluations so far
[1] 1.49399e-35 +- 3.87787e-36 chisq 10.5294 (2 df)
Iteration 4: 706000000 integrand evaluations so far
[1] 1.49406e-35 +- 3.87787e-36 chisq 11.6124 (3 df)
Iteration 5: 885000000 integrand evaluations so far
[1] 1.49413e-35 +- 3.87787e-36 chisq 14.5714 (4 df)
Iteration 6: 1065000000 integrand evaluations so far
[1] 1.49414e-35 +- 3.87787e-36 chisq 16.0668 (5 df)
Result:
1.49414e-35 +- 3.87787e-36
Integration status: 1
Hist in pool: 1
DMEM integral: 0
Weight computed in 1706994ms
```

- jacobiens = jacobians
- Time = 28 min
- Large weight
- Small error (26%)

```
Iteration 1: 175000000 integrand evaluations so far
[1] 4.43066e-51 +- 4.42322e-51 chisq 0 (0 df)
Iteration 2: 351000000 integrand evaluations so far
[1] 2.29922e-55 +- 1.79027e-55 chisq 1.00326 (1 df)
Iteration 3: 528000000 integrand evaluations so far
[1] 3.22742e-56 +- 1.79392e-56 chisq 2.23446 (2 df)
Iteration 4: 706000000 integrand evaluations so far
[1] 3.22776e-56 +- 1.79392e-56 chisq 5.31854 (3 df)
Iteration 5: 885000000 integrand evaluations so far
[1] 3.22793e-56 +- 1.79392e-56 chisq 10.8374 (4 df)
Iteration 6: 1065000000 integrand evaluations so far
[1] 3.22795e-56 +- 1.79392e-56 chisq 17.5013 (5 df)
Result:
3.22795e-56 +- 1.79392e-56
Integration status: 1
Hist in pool: 1
DMEM integral: 0
Weight computed in 1872738ms
```

- jacobians = jacobians
- Time = 31 min
- Small weight
- Large error (56%)

```
particles = {
  inputs = inputs,
  ids = {
    {
      -- quark 1
      pair = {3},
      pdg_id = {2, 4},
      me_index = {3},
    },
    {
      -- neutrino
      pair = {2},
      pdg_id = {-12, -14},
      me_index = {6},
    },
    {
      -- quark2
      pair = {3},
      pdg_id = {-1, -3},
      me_index = {4},
    },
    {
      -- bquark1
      pair = {0},
      pdg_id = {-5},
      me_index = {2},
    },
    {
      -- lepton
      pair = {2},
      pdg_id = {11, 13},
      me_index = {5},
    },
    {
      -- bquark2
      pair = {0},
      pdg_id = {5},
      me_index = {1},
    }
  },
}

-- jacobians = jacobians
}
```

# Jacobians = Jacobians (my code)

```
jacobians = {  
  'flatter_s12::jacobian', 'flatter_s13::jacobian', 'flatter_s24::jacobian',  
  'looperCD::jacobian', 'looper::jacobian', 'phaseSpaceOut::phase_space'  
}  
  
if USE_TF then  
  append(jacobians, 'tf_p41::TF_times_jacobian', 'tf_p21::TF_times_jacobian', 'tf_p42::TF_times_jacobian', 'tf_p3::TF_times_jacobian', 'tf_p22::TF_times_jacobian', 'tf_p1::TF_times_jacobian')  
end
```

```
Iteration 1: 17500000 integrand evaluations so far  
[1] 3.06361e-23 +- 1.98991e-25 chisq 0 (0 df)  
Iteration 2: 35000000 integrand evaluations so far  
[1] 3.06528e-23 +- 5.41705e-26 chisq 0.00759037 (1 df)  
Iteration 3: 52500000 integrand evaluations so far  
[1] 3.06471e-23 +- 3.06364e-26 chisq 0.0241676 (2 df)  
Result:  
3.06471e-23 +- 3.06364e-26  
Integration status: 0  
Hist in pool: 1  
DMEM integral: 9.19347e-23  
Weight computed in 256876ms
```

--jacobians = jacobians

- Time = 4 min
- Large weight
- Small error (0.1%)

```
Iteration 1: 17500000 integrand evaluations so far  
[1] 1.34793e-33 +- 6.89416e-34 chisq 0 (0 df)  
Iteration 2: 35000000 integrand evaluations so far  
[1] 1.37771e-33 +- 6.89126e-34 chisq 2.21582 (1 df)  
Iteration 3: 52500000 integrand evaluations so far  
[1] 1.37783e-33 +- 6.89126e-34 chisq 3.83125 (2 df)  
Iteration 4: 70000000 integrand evaluations so far  
[1] 1.37784e-33 +- 6.89126e-34 chisq 4.85412 (3 df)  
Iteration 5: 87500000 integrand evaluations so far  
[1] 1.37799e-33 +- 6.89126e-34 chisq 7.88074 (4 df)  
Iteration 6: 105000000 integrand evaluations so far  
[1] 1.37799e-33 +- 6.89126e-34 chisq 9.45329 (5 df)  
Result:  
1.37799e-33 +- 6.89126e-34  
Integration status: 1  
Hist in pool: 1  
DMEM integral: 8.69354e-28  
Weight computed in 724885ms
```

jacobians = jacobians

- Time = 12 min
- Small weight
- Large error (50%)

```
particles = {  
  inputs = full_inputs,  
  ids = {  
    {  
      -- lepton  
      pair = {2},--0},  
      pdg_id = {11, 13, -11, -13 ,2, 4, -2, -4},  
      me_index = {5},  
    },  
    {  
      -- quark1  
      pair = {3},--0},  
      pdg_id = {2, 4, -2, -4 ,11, 13},  
      me_index = {3},  
    },  
    {  
      -- neutrino  
      pair = {2},--0},  
      pdg_id = {-12, -14, 12, 14 , -1, -3, 1, 3},  
      me_index = {6},  
    },  
    {  
      -- bquark1  
      pair = {0},  
      pdg_id = {-5},  
      me_index = {2},  
    },  
    {  
      -- quark2  
      pair = {3},--0},  
      pdg_id = {-1, -3, 1, 3 , -12, -14, 12, 14},  
      me_index = {4},  
    },  
    {  
      -- bquark2  
      pair = {0},  
      pdg_id = {5},  
      me_index = {1},  
    },  
  },  
  jacobians = jacobians  
}
```