Alaa'd Biweekly Update Oct 26th

- **Found out the MadGraph was running Pythia all this time although it does not show "shower = ON"**

```
/=============================================================================\
| 1. Choose the shower/hadronization program      shower = OFF                |
| 2. Choose the detector simulation program     detector = Not Avail.         |
| 3. Choose an analysis package (plot/convert) analysis = Not Avail.          |
| 4. Decay onshell particles                     madspin = OFF                |
| 5. Add weights to events for new hypp.        reweight = OFF                |
\=============================================================================/
```

- **Tested the probability weight formula in the simplest case, which is events with only two accepted signal muons**

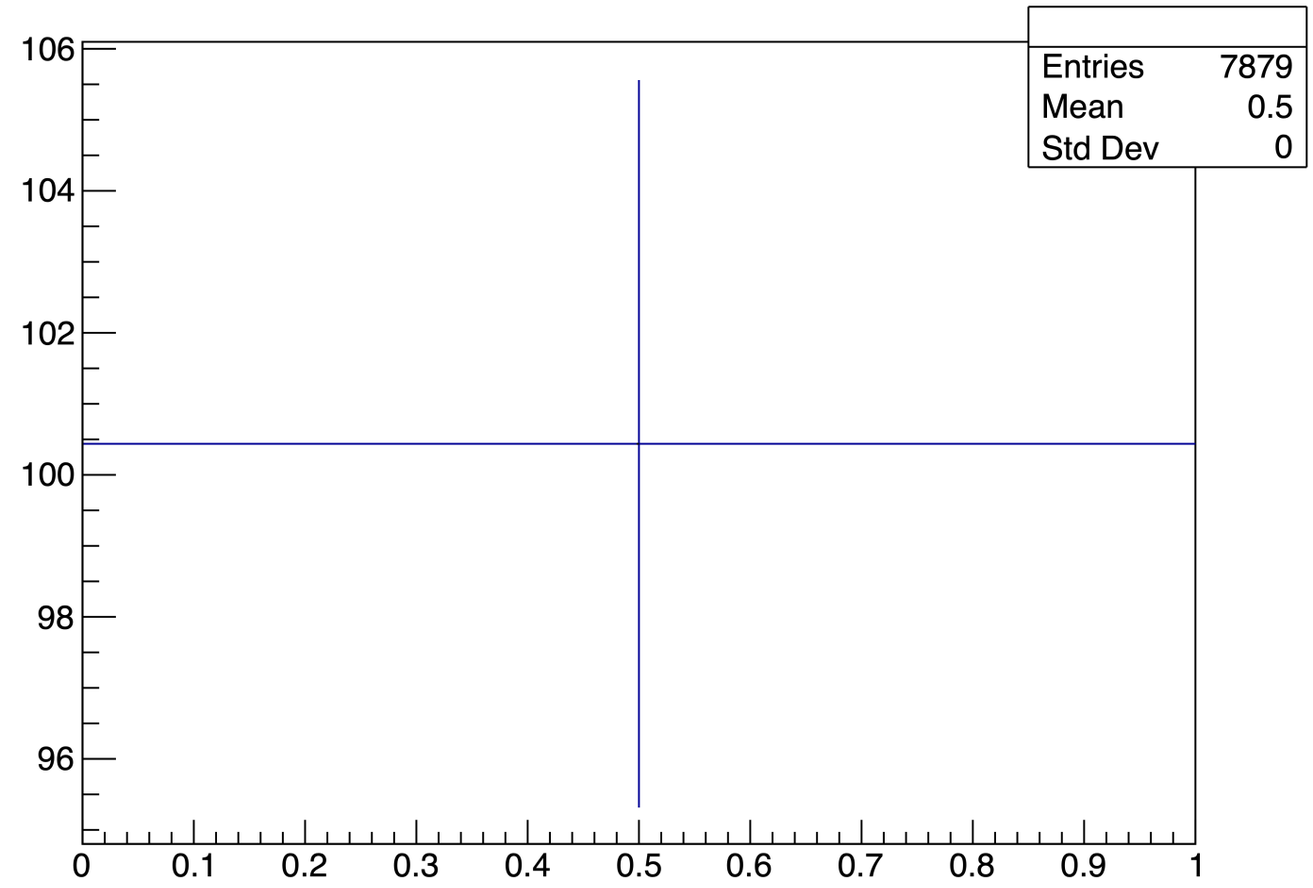
$$P(2\ or\ more\ \mu\ passing) = 1 - \left[\prod_{i=1}^{n}(1-e_i) + \sum_{i=1}^{n}\left(e_i \times \prod_{j\neq i}(1-e_j)\right)\right]$$

Probability_formula = 0.2219892218480623 6
eff1*eff2 = 0.2219892218480625 2
% error: 7.501871140741 92e-16 %

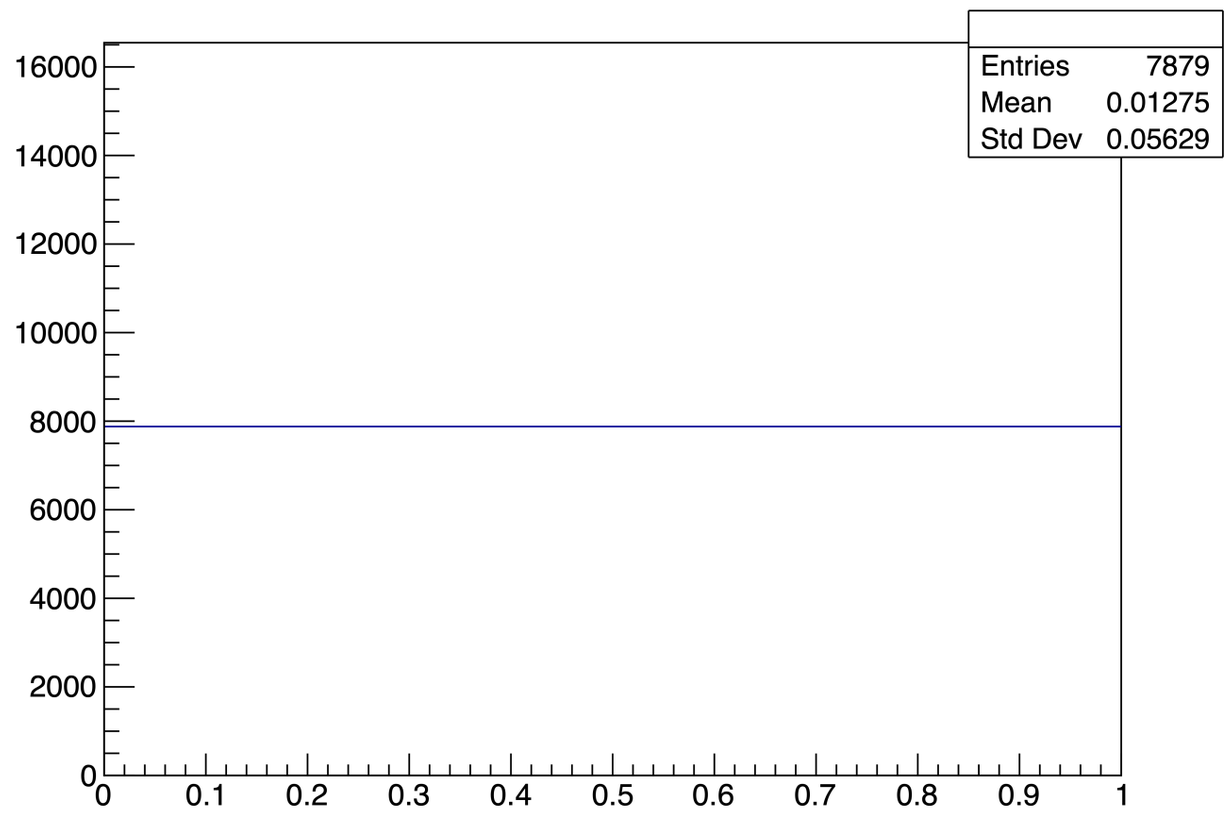
Highest % error is at the order of 10^{-16} %

- **Tried to implement the formula using ROOT TH1 histogram**

Loop over events
histo.Fill(0.5, weight)



Loop over events
histo.Fill (weight)



Integral = histo.GetSumOfWeights()

= 100.43749237060547 **= 7879.0**

In the paper, the fraction of surviving events for the 0.1 ns 400-GeV smuons is:

`acceptance X efficiency = 0.36 * 0.355 = 0.1278`

In our simulated events, the fraction of surviving events is `2275 out of 20,000 = 0.11375`

Next steps:

- **Fix the weights histogram issue to get the expected events in the SR**
- **Compare it to the previous result obtained by the random number generator and throwing away events**
- **Get the statistical uncertainty using the weights histogram**