

# Z window and DY SFs

- Couldn't find any plots of the inside of the DY window
- However found a presentation from Henriette in February with DY SFs, and so calculated these to do a comparison
- These values were calculated with 2 leptons and  $\geq 2$  jets, passing pt cuts, etc., and  $M_{ll} > 20$  (after step 5 in top analysis)

# DY SF comparison

	My DY SFs	Afiq's thesis (2016)	Henriette's presentation (11/02/20)
LO ee	1.133	1.22	1.07 (2018)
LO emu	1.124	1.203	1.10 (2018)
LO mumu	1.113	1.186	1.12 (2018)
NLO ee	1.006	-	0.98 (2017)
NLO emu	0.978	-	1.01 (2017)
NLO mumu	0.992	-	1.04 (2017)

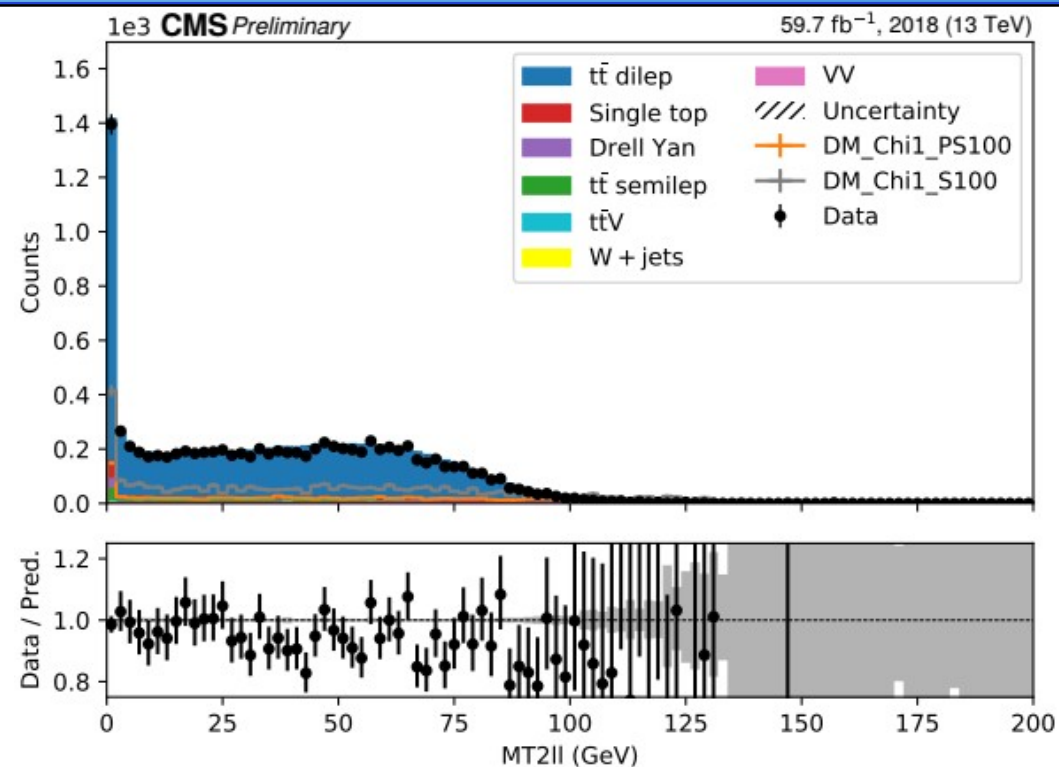
# MT2l

- Tried to implement MT2l, as there was a suggestion to cut on  $MT2l > 40$  GeV so the other region can be used as a semileptonic CR
- This proved a bit trickier than anticipated as the minimisation is difficult: initially tried using scipy, however this is quite slow, and also potentially inaccurate
- Then borrowed some code from Cedric to import the Lester bisection algorithm (which is written in C++), which is faster and more stable

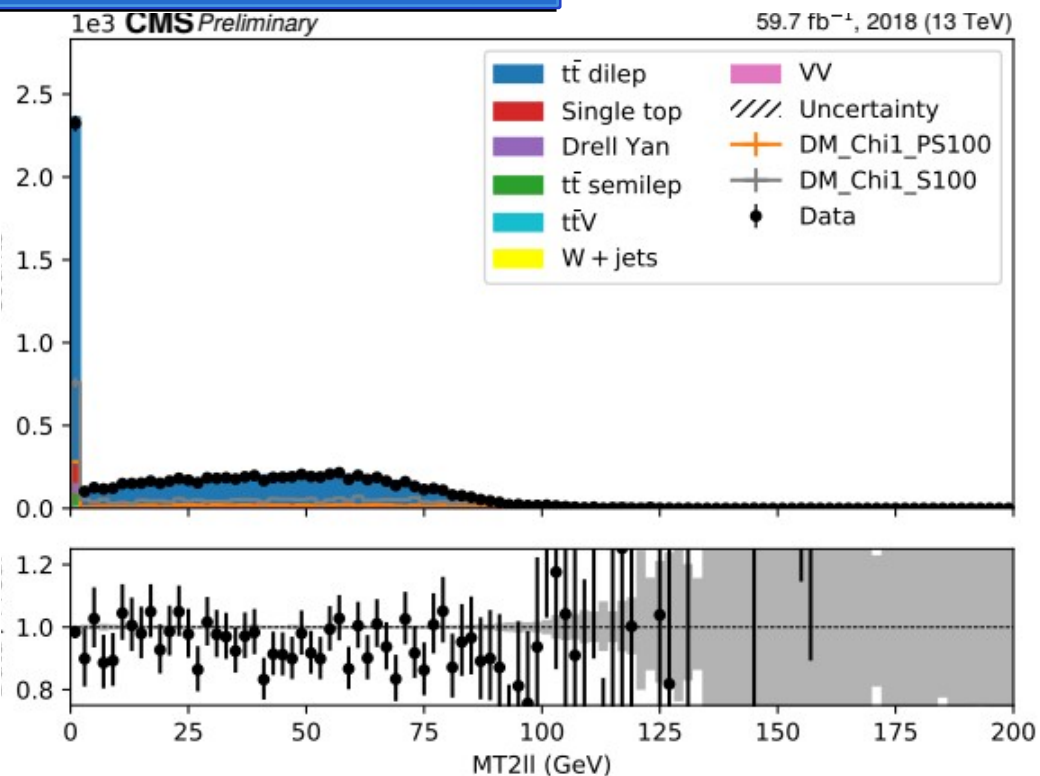
$$m_{T2}^2(\vec{p}_T^{\ell_i}, \vec{p}_T^{\ell_j}, \vec{p}_T^{\text{miss}}) \equiv \min_{\vec{q}_T^1 + \vec{q}_T^2 = \vec{p}_T^{\text{miss}}} \left\{ \max \left[ m_T^2(\vec{p}_T^{\ell_i}, \vec{q}_T^1), m_T^2(\vec{p}_T^{\ell_j}, \vec{q}_T^2) \right] \right\}$$

(Equation from arXiv:1611.09841)

# MT2II

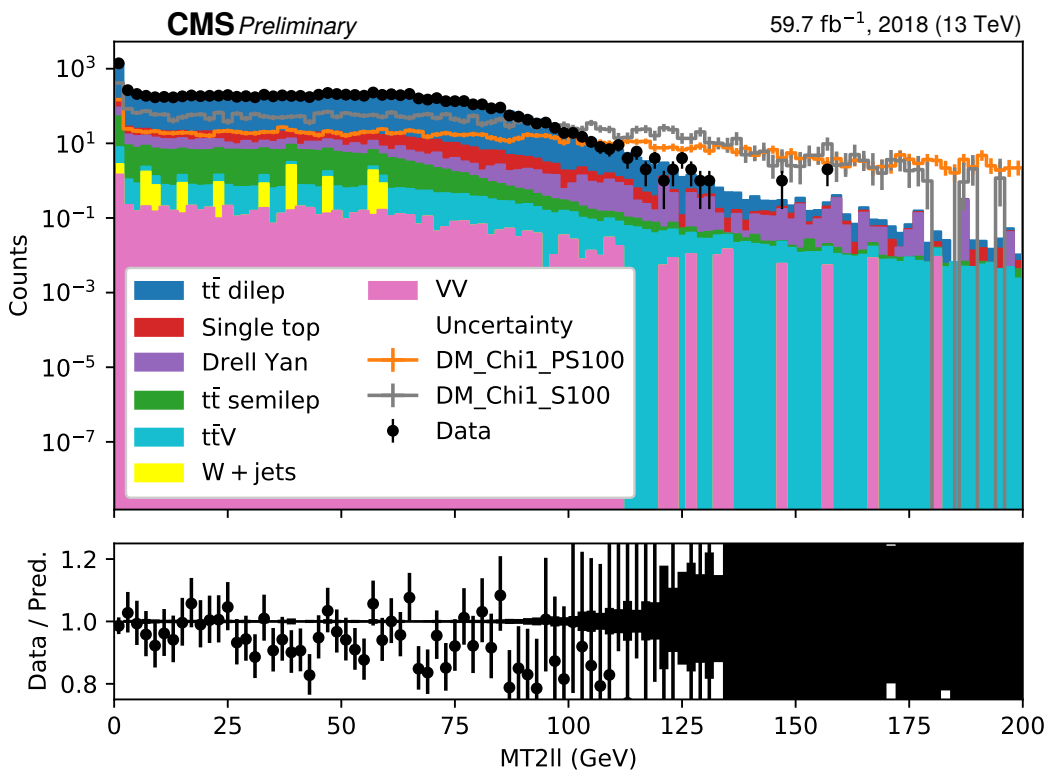


Scipy minimize (BFGS algorithm)

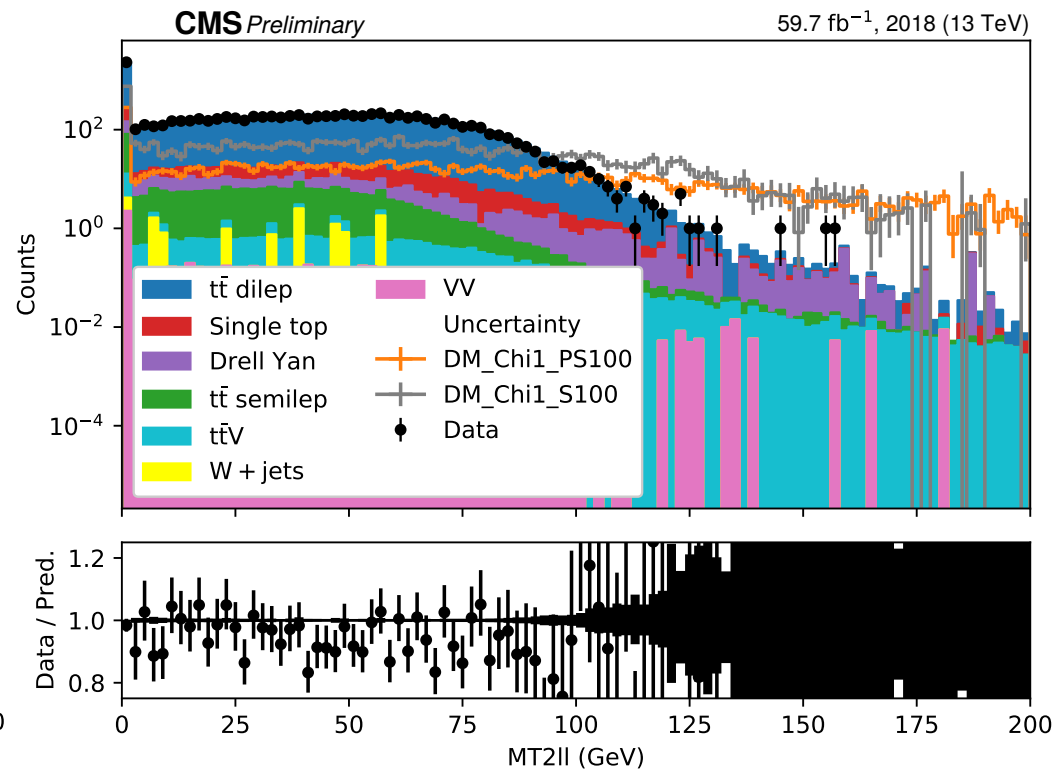


Lester bisection algorithm

# MT2II (log scale)



Scipy minimize (BFGS algorithm)



Lester bisection algorithm