

Validation notes for atlas_2003_11956 (search for displaced vertices and muons)

Process: $pp \rightarrow \tilde{t}_1 \tilde{t}_1, \quad \tilde{t}_1 \rightarrow \mu d$
 $m_{\tilde{t}} = 1400 \text{ GeV}$

Events generated with MG5_aMC 2.7.2 interfaced to Pythia8 with up to two extra partons.
 1000 MC events weighted to 136/fb.

Selection	$\tau = 0.01 \text{ ns}$		$\tau = 0.1 \text{ ns}$		$\tau = 1 \text{ ns}$	
	ATLAS	CM	ATLAS	CM	ATLAS	CM
All	64.2	64.2	64.2	64.2	64.2	64.2
E_T^{miss} trigger	63.0	63.2	63.0	63.3	62.7	63.2
$E_T^{\text{miss}} > 180 \text{ GeV}$	60.9	61.2	61.0	61.3	60.6	61.0
At least one muon $p_T > 25 \text{ GeV}, \eta < 2.5$	57.8	60.8	58.7	61.0	52.5	60.6
$2 < d_0(\mu) < 300 \text{ mm}$	11.3	12.8	49.1	52.5	49.5	59.2
$ z_0(\mu) < 500 \text{ mm}$	11.3	12.8	49.1	52.5	49.3	58.1
Pass fake/heavy-flavour/cosmic muon veto	9.1	9.9	40.0	42.4	39.4	48.1
At least one DV	8.5	4.4	37.6	29.8	32.6	39.6
DV fiducial volume	8.4	3.7	37.1	29.1	31.2	32.7
Material veto	5.3	2.2	31.0	16.9	22.2	19.0
$n_{\text{tracks}}^{\text{DV}} \geq 3$	3.8	1.8	26.0	15.5	13.7	17.3
$m_{\text{DV}} > 20 \text{ GeV}$	3.4	1.2	22.7	11.9	10.3	14.0

Selection	$\tau = 0.01$ ns		$\tau = 0.1$ ns		$\tau = 1$ ns	
	ATLAS	CM	ATLAS	CM	ATLAS	CM
All	64.2	64.2	64.2	64.2	64.2	64.2
Muon trigger	50.0	58.8	50.6	58.6	46.4	58.4
$E_T^{\text{miss}} < 180$ GeV	2.5	2.6	2.6	2.5	2.5	2.6
At least one muon $p_T > 25$ GeV, $ \eta < 2.5$	2.2	2.6	2.0	2.5	1.8	2.6
Muon trigger match	2.1	2.6	1.9	2.5	1.7	2.6
$2 < d_0(\mu) < 300$ mm	0.3	0.3	1.4	2.0	1.5	2.5
$ z_0(\mu) < 500$ mm	0.3	0.3	1.4	2.0	1.5	2.4
Pass fake/heavy-flavour/cosmic muon veto	0.2	0.3	1.0	1.5	1.2	1.8
At least one DV	0.2	0.1	1.0	1.1	1.0	1.4
DV fiducial volume	0.2	0.1	1.0	1.1	0.9	1.1
Material veto	0.1	0.04	0.8	0.6	0.7	0.7
$n_{\text{tracks}}^{\text{DV}} \geq 3$	0.1	0.04	0.7	0.6	0.4	0.7
$m_{\text{DV}} > 20$ GeV	0.1	0.03	0.6	0.5	0.3	0.6

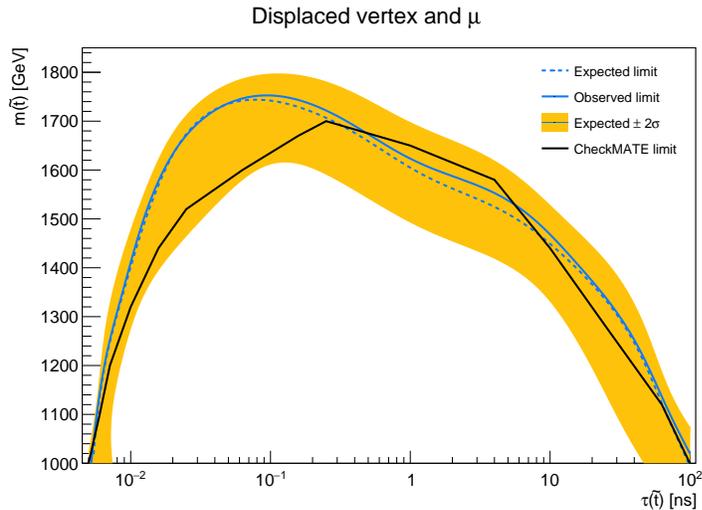


Figure 1: Comparison of exclusion limits in the stop mass and stop lifetime plane, $m_{\tilde{t}}-\tau_{\tilde{t}}$, reported by ATLAS: expected – dashed blue; observed – solid blue and CHECKMATE – black solid. The yellow band shows a 2-sigma range of the ATLAS expected exclusion limit.