t-Channel white paper planning

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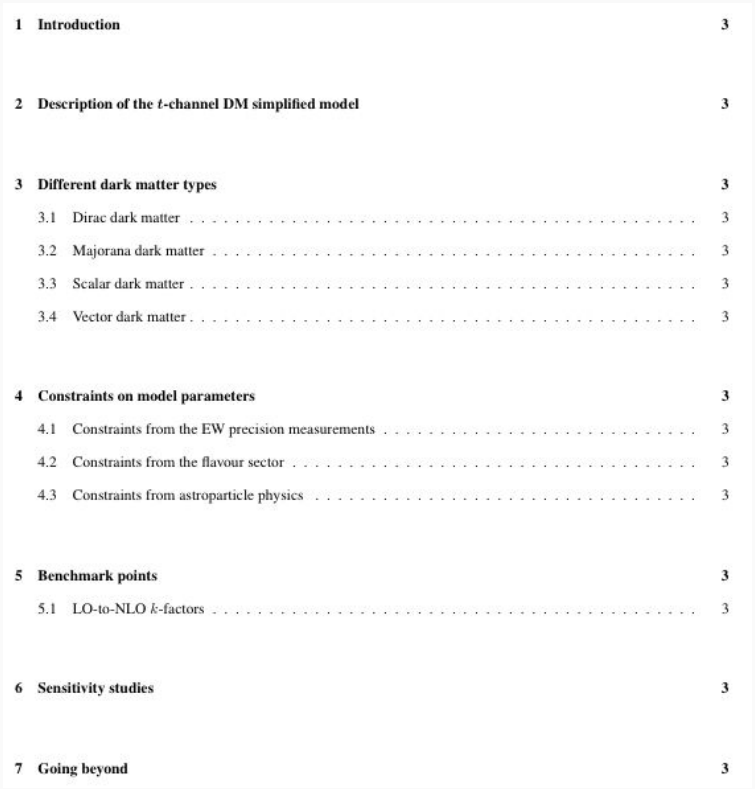
- https://www.overleaf.com/project/5f32eace13c6c30001264129

Getting started



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TBD

Largely from Benj. et al's paper from January

Jakub, Chiara, ...

Input from experiments

Sukanya, Disha, Adil's studies (+Benjamin's group)

TBD

E.g. DM from B decays
LLP - Jan

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Benchmark points

- CMS cards, mass grid uploaded to DMWG-tChannel-code repo (S3D_uR only).
  - Lambda=1, somewhat large.
  - PDF=260000 (somewhat old, chosen for consistency).
- LO/NLO:
  - Plots of xsecs and K factors for representative set of parameters * models * {XX,XY,YY}.
  - Kinematic plots: MET, HT, etc for a smaller grid with diff. K factors:
    - Broken down by {XX, XY, YY-qcd, YY-t, total}.
    - Total-only, for several {MX, MY} values overlaid.
  - Should start assembling results into common plot style. Do we have a DMWG style macro for ROOT and/or matplotlib?
    - Start putting plots or even just data in github.
  - Recommendation for a consistent LO-to-NLO reweighting scheme?

Sensitivity

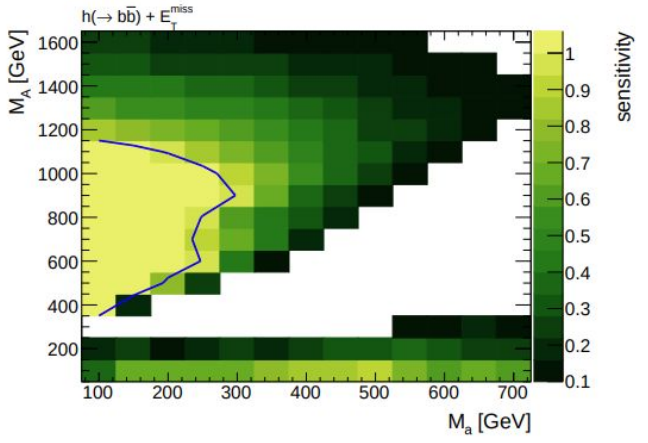
- Reminder from 2HDM+a paper:
- Repeat exercise with ATLAS Run 2 monojet?
  - How to handle A*e?
- Include prescription for model-independent presentation.

$$S_i = \frac{\sigma_i\left(pp \to h + E_T^{\text{miss}}\right)_{\text{2HDM+a}} \cdot \text{BR}\left(h \to b\bar{b}\right)_{\text{SM}} \cdot \left(\mathcal{A} \cdot \varepsilon\right)_i}{\sigma_i\left(pp \to h + E_T^{\text{miss}} \to b\bar{b} + E_T^{\text{miss}}\right)_{\text{obs}}}$$

Table 2: Observed (obs) and expected (exp) upper limits at 95% CL on $\sigma_{\text{vis},h(b\bar{b})+\text{DM}} \equiv \sigma_{h+\text{DM}} \times \mathcal{B}(h \to b\bar{b}) \times \mathcal{A} \times \varepsilon$ of $h(b\bar{b})$ + DM events. Also shown are the acceptance × efficiency ($\mathcal{A} \times \varepsilon$) probabilities to reconstruct and select an event in the same $E_{\text{T}}^{\text{miss}}$ bin as generated.

Range in $E_{\text{T}}^{\text{miss}}$ [GeV]	$\sigma^{\text{obs}}_{\text{vis},h(b\bar{b})+\text{DM}}$ [fb]	$\sigma^{\text{exp}}_{\text{vis},h(b\bar{b})+\text{DM}}$ [fb]	$\mathcal{A} \times \varepsilon$ [%]
[150, 200)	19.1	$18.3^{+7.2}_{-5.1}$	15
[200, 350)	13.1	$10.5^{+4.1}_{-2.9}$	35
[350, 500)	2.4	$1.7^{+0.7}_{-0.5}$	40
[500, ∞)	1.7	$1.8^{+0.7}_{-0.5}$	55

Selection	$\langle\sigma\rangle^{95}_{obs}$ [fb]	S^{95}_{obs}	S^{95}_{exp}
$p_{\text{T}}^{\text{recoil}} > 200$ GeV	861	119653	86000^{+27000}_{-24000}
$p_{\text{T}}^{\text{recoil}} > 250$ GeV	350	48636	35600^{+12700}_{-10000}
$p_{\text{T}}^{\text{recoil}} > 300$ GeV	156	21624	15500^{+6000}_{-4300}
$p_{\text{T}}^{\text{recoil}} > 350$ GeV	87	12066	8200^{+3100}_{-2300}
$p_{\text{T}}^{\text{recoil}} > 400$ GeV	52	7285	4700^{+1800}_{-1300}
$p_{\text{T}}^{\text{recoil}} > 500$ GeV	21	2903	1910^{+720}_{-530}
$p_{\text{T}}^{\text{recoil}} > 600$ GeV	10	1421	930^{+350}_{-260}
$p_{\text{T}}^{\text{recoil}} > 700$ GeV	4.2	578	480^{+180}_{-130}
$p_{\text{T}}^{\text{recoil}} > 800$ GeV	2.1	296	267^{+100}_{-75}
$p_{\text{T}}^{\text{recoil}} > 900$ GeV	1.2	165	161^{+62}_{-45}
$p_{\text{T}}^{\text{recoil}} > 1000$ GeV	1.3	189	113^{+43}_{-31}
$p_{\text{T}}^{\text{recoil}} > 1100$ GeV	0.5	73	71^{+27}_{-20}
$p_{\text{T}}^{\text{recoil}} > 1200$ GeV	0.3	39	47^{+19}_{-13}



Q: why $\Sigma(S_i)>1$?