

# Towards a whitepaper for $t$ -channel DM models

## Goals

- Review of the state of the art (collider, cosmology, etc.)
- Benchmark for run 3 and future searches at the LHC

## Timeline and WG activities

- Draft of each contribution by early July
- One WG meeting every 4-5 weeks

## A promising table of contents

- Interplay with cosmology (relic, DD, ID)
- Collider probes (NLO/LO, signal modelling)
- Recasting
- Specific models
  - ➔ Simplified quark-philic models  
(1<sup>st</sup> generation, 2<sup>nd</sup> generation, 3<sup>rd</sup> generation, universal)
  - ➔ Simplified lepto-philic models
  - ➔ Simplified quark-philic models
  - ➔ Non-minimal models

### 3 Interplay with cosmology

### 4 Deciphering first-generation $t$ -channel dark matter signals at hadron colliders

- 4.1 A test case study: dark matter couplings with right-handed up quarks . . . . .
- 4.2 Reinterpretation of the results of the LHC . . . . .
- 4.3 Higher-order correction and their impact on the (full) signal . . . . .

### 5 Flavoured mediators and dark matter

- 5.1 Top-philic dark matter and its connection with flavour physics . . . . .
- 5.2 Boosted top probes of top-philic dark matter . . . . .
- 5.3 Charm-philic dark matter . . . . .
- 5.4 Strange-philic dark matter . . . . .

### 6 Leptophilic dark matter

### 7 Long-lived particle signatures

- 7.1 Freeze-out scenarios (WIMP-like) . . . . .
- 7.2 Freeze-in scenarios (FIMP-like) . . . . .

### 8 Going beyond the minimal setups

- 8.1 Top-philic composite dark matter . . . . .
- 8.2 Frustrated dark matter . . . . .
- 8.3  $B$ -mesogenesis models . . . . .

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## Contact persons

- Generalities: Benjamin Fuks, Benedikt Maier & David Yu
- Cosmology: Chiara Arina
- Colliders  $\oplus$  universal models: Luca Panizzi
- 2<sup>nd</sup>/3<sup>rd</sup> generation: Rute Costa Batalha Pedro
- Lepto-philic models: Michael Baker
- LLPs: Jan Heisig
- Non-minimal models: Alan Cornell

Still room for new contributions  
(contact us!)

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