# Spring 2020 public meeting of the LHC DM WG

## DM models with $t$-channel mediators
## Introduction & Welcome
## 28/04/2020

**DMWG**: Oleg Brandt, Priscilla Pani, Phil Harris,
Xabier Cid Vidal, Uli Haisch and Tim Tait
Reach us through lhc-dmwg-admin@cern.ch!

# What is the DM WG?

- ✦ <u>LHC DM WG</u> instrumental for:
  - ➡ Defining benchmark models and interpretations for DM searches
  - ➡ Facilitate comparison and collaboration across the LHC experiments and theorists
  - ➡ Develop higher-precision calculations for backgrounds
- ✦ So far focused on simplified DM and 2HDM+a models
- ✦ Past White Papers already Physics of the Dark Universe! See <u>here</u>, <u>here</u>, <u>here</u> and <u>here</u>
- ✦ Current project: t-channel DM models!
- ✦ Already started to think on future projects…

# What is the DM WG?

✦ <u>LHC DM WG</u> instrumental for:

➡ Defining <u>benchmark models and interpretations for DM searches</u>

➡ Facilitate ~~~~~~~~~~~~nts and theo~~~~~~

➡ Develop ~~~~~~

✦ So far foc~~~~~

✦ Past Whit~~~~~~ <u>here</u>, <u>here</u> and ~~~~~~

✦ Current project: t-channel DM models!

✦ Already started to think on future projects...

---

✦ LHC DM WG mailing lists:

➡ General mailing list used for announcements: subscribe <u>here</u>

➡ Contributors mailing list used for discussions among LHC DM WG participants: subscribe <u>here</u>

➡ New mailing list for the t-channel white paper contributors! Subscribe <u>here</u>
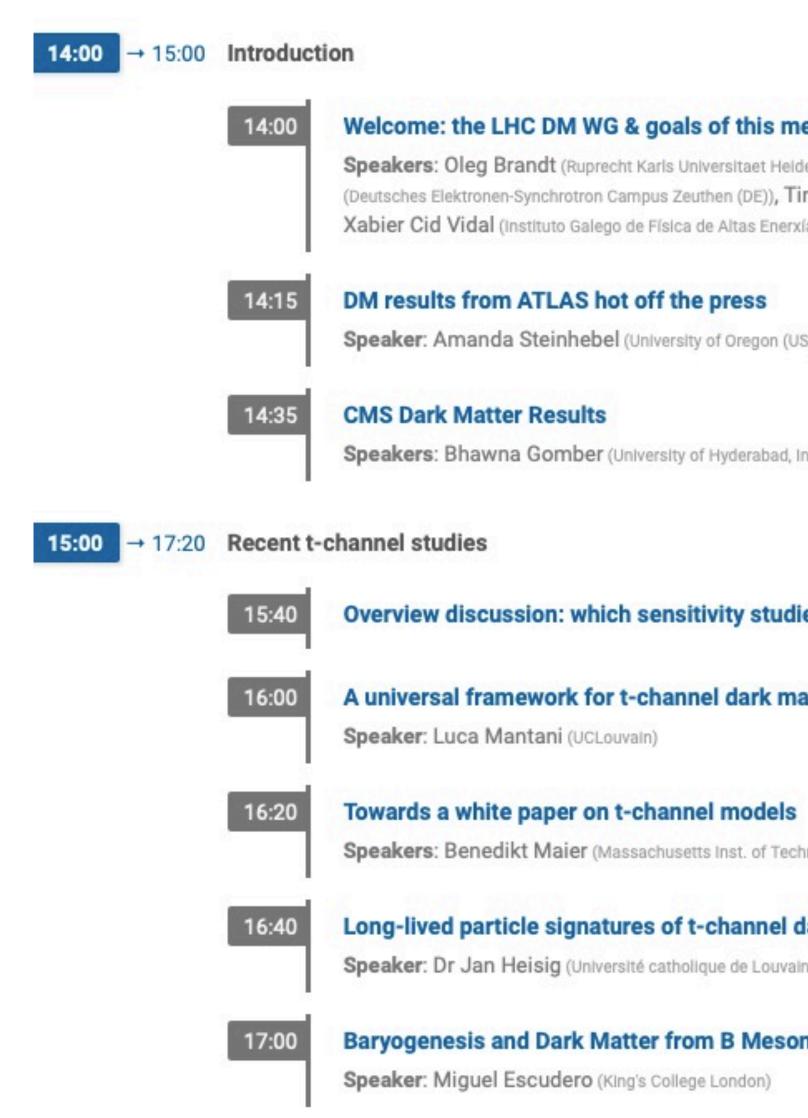
# Goals for today

✦ **Main** goal: <u>consolidate</u> the efforts towards the preparation of the t-channel white paper. Have a first draft for DM@LHC 2020? (June 2020)

  ➡ Describe experimental and theoretical status

  ➡ Improve the communication between the experimental and theoretical counterparts of this effort (already started with the hands-on this morning)

✦ Also, wildcard session

  ➡ General contributions related to the DM WG, even if not directly related to t-channels

  ➡ Future projects: which should be our next project? LLPs, dark photons, dark sectors?

# Agenda

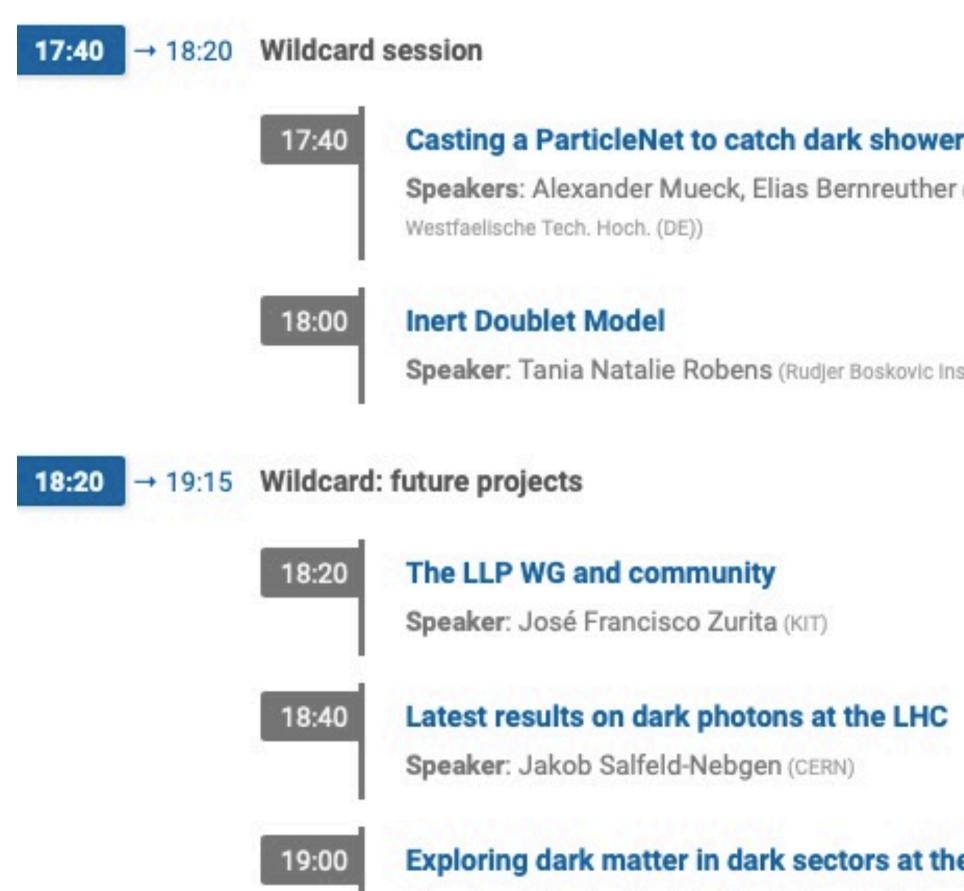**14:00** → 15:00  **Introduction**

**14:00**  **Welcome: the LHC DM WG & goals of this meeting**  ⏱ 10m

Speakers: Oleg Brandt (Ruprecht Karls Universitaet Heidelberg (DE)), Philip Coleman Harris (Massachusetts Inst. of Technology (US)), Priscilla Pani (Deutsches Elektronen-Synchrotron Campus Zeuthen (DE)), Tim M.P. Tait (University of California, Irvine), Ulrich Andreas Haisch (University of Oxford (GB)), Xabier Cid Vidal (Instituto Galego de Física de Altas Enerxías)

**14:15**  **DM results from ATLAS hot off the press**  ⏱ 15m

Speaker: Amanda Steinhebel (University of Oregon (US))

**14:35**  **CMS Dark Matter Results**  ⏱ 15m

Speakers: Bhawna Gomber (University of Hyderabad, India), Deborah Pinna (E), Deborah Pinna (University of Wisconsin Madison (US))

**15:00** → 17:20  **Recent t-channel studies**

**15:40**  **Overview discussion: which sensitivity studies for the White Paper?**  ⏱ 15m

**16:00**  **A universal framework for t-channel dark matter models**  ⏱ 15m

Speaker: Luca Mantani (UCLouvain)

**16:20**  **Towards a white paper on t-channel models**  ⏱ 15m

Speakers: Benedikt Maier (Massachusetts Inst. of Technology (US)), David Yu (Brown University (US))

**16:40**  **Long-lived particle signatures of t-channel dark matter models**  ⏱ 15m

Speaker: Dr Jan Heisig (Université catholique de Louvain (UCL))

**17:00**  **Baryogenesis and Dark Matter from B Mesons**  ⏱ 15m

Speaker: Miguel Escudero (King's College London)

# Agenda

**17:40** → 18:20  **Wildcard session**

**17:40**  **Casting a ParticleNet to catch dark showers**  ⏱ 15m

**Speakers**: Alexander Mueck, Elias Bernreuther (RWTH Aachen University), Felix Kahlhoefer (RWTH Aachen), Michael Kramer (Rheinisch Westfaelische Tech. Hoch. (DE))

**18:00**  **Inert Doublet Model**  ⏱ 15m

**Speaker**: Tania Natalie Robens (Rudjer Boskovic Institute (HR))

**18:20** → 19:15  **Wildcard: future projects**

**18:20**  **The LLP WG and community**  ⏱ 15m

**Speaker**: José Francisco Zurita (KIT)

**18:40**  **Latest results on dark photons at the LHC**  ⏱ 15m

**Speaker**: Jakob Salfeld-Nebgen (CERN)

**19:00**  **Exploring dark matter in dark sectors at the LHC**  ⏱ 15m

**Speaker**: Caterina Doglioni (Lund University (SE))

# Snowmass

✦ <u>Snowmass</u> process: create a community vision for the particle physics community for the US and its international partners

➡ Starting up now, will continue until late 2021.

➡ Input for this process will be letters of interest and contributed papers

✦ Structure with WG and subWG. In particular "**Dark Matter at Colliders**" within "Energy Frontier". Convened by Caterina Doglioni and Lian Tao Wang

➡ Main focus will be building up on the work done for the European Strategy on generic WIMPs.

➡ Expanding in other directions if there is interest, especially if there are synergies with other groups/frontiers and colliders can contribute to the bigger picture.

➡ More info from Caterina…