STEALTH physics at LHCb: unleashing the full power of LHCb to probe new physics

Report of Contributions

https://indico.cern.ch/e/LHCb_stealth_physics

Contribution ID: **2** Type: **not specified**

Novel B-decay signatures of light scalars at high energy facilities

In this talk, we will discuss the phenomenology of light scalars of masses m_1 and m_2 coupling to heavy flavour-violating vector bosons of mass $m_V \sim$ TeV. This scenario is particularly motivated, as the scalar-vector coupling arises naturally in non-minimal composite Higgs models and the vector boson is a prime candidate to solve the apparent anomalies observed in tests of lepton flavour universality.

For $m_{1,2} \sim$ few GeV, the model triggers rare B-meson decays such as $B_s^0 \to 3\mu^+3\mu^-$, $B^0 \to 3\mu^+3\mu^-$, $B^+ \to K^+3\mu^+3\mu^-$ and $B_s^0 \to K^{0*}3\mu^+3\mu^-$. None of these signals has been studied experimentally. Therefore, we will discuss dedicated analyses to test these channels at the LHCb, obtaining current and future limits on the corresponding branching ratios.

For $m_{1,2} \gg \mathcal{O}(1)$ GeV, the scalars arise instead in the decay of the vector mediator, which can be produced in pp collisions at the LHC. In this regime, we will show that modified versions of current multiplepton and multitau searches can probe a wide region of the parameter space of this scenario.

Altogether, the potential of the searches we propose outperform other constraints such as those from meson mixing.

Primary author: RAMOS, Maria (LIP)

Presenter: RAMOS, Maria (LIP)

Contribution ID: **3** Type: **not specified**

Soft displaced objects from dark matter at the LHC

Feebly interacting dark sectors with a compressed spectrum should leave characteristic signatures with soft displaced particles in the LHC detectors. I will discuss how we can directly predict such signatures from co-scattering dark matter in the early universe. At ATLAS and CMS searches for soft displaced objects are underway, but limited by large hadronic background. Can LHCb do better?

Primary author: WESTHOFF, Susanne (Heidelberg University)

Presenter: WESTHOFF, Susanne (Heidelberg University)

Contribution ID: **4** Type: **not specified**

Probing dark sectors with long-lived particles at BELLE II

I will present a new search for light scalar singlets in rare meson decays. For tiny interactions, the scalar is long-lived at detector scales and decays into displaced pairs of leptons or light mesons. I will show that Belle II has a remarkable potential to probe scalars in the GeV range with couplings as small as 10^{-5}. The predicted sensitivity is higher than at the long-baseline experiments FASER and NA62.

Primary authors: FILIMONOVA, Anastasiia; SCHÄFER, Ruth; Prof. WESTHOFF, Susanne

Presenter: SCHÄFER, Ruth

Contribution ID: **5** Type: **not specified**

Collider Consequences of Baryogenesis and Dark Matter from B Mesons

In this talk based on ArXiv:1810.00880, I will detail what are the different approaches by which current collider experiments can test whether Baryogenesis and Dark Matter arise from CP violating B meson oscillations and their subsequent decays in the early Universe. These are:

1) Searches for heavy colored scalars (ATLAS, CMS).
2) Measurements of direct CPV in the B meson system (LHCb, Belle-II, ATLAS, CMS).
3) Searches for indirect CPV in the neutral B meson system (LHCb, Belle-II, ATLAS, CMS).
4) Searches for a new decay mode of B mesons into Missing energy and a visible Baryon (LHCb, Belle-II).
5) Searches for a new decay mode of b-flavored baryons into missing energy and mesons (LHCb).

I will of course focus on those relevant for the LHCb experiment, (2-5).

Primary authors: ESCUDERO, Miguel (IFIC-University of Valencia); ELOR, Gilly

Presenter: ESCUDERO, Miguel (IFIC-University of Valencia)

Contribution ID: **6** Type: **not specified**

Registration

Monday, 17 February 2020 14:30 (30 minutes)

Contribution ID: **7** Type: **not specified**

Welcome and introduction

Monday, 17 February 2020 15:00 (30 minutes)

Presenter: CID VIDAL, Xabier (Instituto Galego de Física de Altas Enerxías)

Contribution ID: **8** Type: **not specified**

LHCb reconstruction and PID

Monday, 17 February 2020 15:30 (30 minutes)

Presenter: SANTANA RANGEL, Murilo (Federal University of of Rio de Janeiro (BR))

Contribution ID: **9** Type: **not specified**

LHCb trigger in Run 3

Monday, 17 February 2020 16:00 (30 minutes)

Presenter: RAMOS PERNAS, Miguel (Universidade de Santiago de Compostela (ES))

Contribution ID: **10** Type: **not specified**

LHCb results in Stealth Physics

Monday, 17 February 2020 17:00 (30 minutes)

Presenter: ILTEN, Philip (University of Birmingham (GB))

Contribution ID: **11** Type: **not specified**

Simulation tools

Monday, 17 February 2020 17:30 (30 minutes)

Presenter: MARTINEZ SANTOS, Diego (Universidade de Santiago de Compostela (ES))

Contribution ID: **12** Type: **not specified**

Discussion (ask an experimentalist)

Monday, 17 February 2020 18:00 (30 minutes)

Presenters: VAZQUEZ SIERRA, Carlos (Nikhef National institute for subatomic physics (NL)); ZURITA, José Francisco (KIT)

Contribution ID: **13** Type: **not specified**

The future of LHCb

Tuesday, 18 February 2020 10:00 (30 minutes)

Presenter: REDI, Federico Leo (EPFL - Ecole Polytechnique Federale Lausanne (CH))

Contribution ID: **14** Type: **not specified**

Codex-b experiment status

Tuesday, 18 February 2020 10:30 (30 minutes)

Presenter: CID VIDAL, Xabier (Instituto Galego de Física de Altas Enerxías)

Contribution ID: **15** Type: **not specified**

Searching for Confining Hidden Valleys at LHCb

Tuesday, 18 February 2020 12:00 (30 minutes)

Presenter: TSAI, Yuhsin (University of Maryland)

Contribution ID: **16** Type: **not specified**

Z portal to a confining hidden sector

Tuesday, 18 February 2020 12:30 (30 minutes)

Presenter: SALVIONI, Ennio (CERN)

Contribution ID: **17** Type: **not specified**

Long Lived Particles Searches in Heavy Ion Collisions at the LHC

Tuesday, 18 February 2020 15:00 (30 minutes)

Presenter: Dr HAJER, Jan (Université catholique de Louvain)

Contribution ID: **18** Type: **not specified**

Search for the true muonium at LHCb

Presenter: PLEWS, Jonathan (University of Birmingham (GB))

Contribution ID: **19** Type: **not specified**

Dark photons theory

Tuesday, 18 February 2020 15:30 (30 minutes)

Presenter: FOLDENAUER, Patrick

Contribution ID: **20** Type: **not specified**

LHC probes of co-scattering dark matter

Tuesday, 18 February 2020 16:00 (30 minutes)

Presenter: WESTHOFF, Susanne (Heidelberg University)

Contribution ID: **21** Type: **not specified**

Baryogenesis and Dark Matter from Mesons

Tuesday, 18 February 2020 17:00 (30 minutes)

Presenter: ELOR, Gilly

Contribution ID: **22** Type: **not specified**

Collider Implications of Baryogenesis and Dark Matter from B Mesons

Tuesday, 18 February 2020 17:30 (30 minutes)

Presenter: ESCUDERO, Miguel (King's College London)

Contribution ID: **23** Type: **not specified**

Discussion (ask a theorist)

Tuesday, 18 February 2020 18:00 (30 minutes)

Presenters: BORSATO, Martino (Ruprecht Karls Universitaet Heidelberg (DE)); TSAI, Yuhsin (University of Maryland)

Contribution ID: **24** Type: **not specified**

Probing dark sectors with long-lived particles at BELLE II

Wednesday, 19 February 2020 10:30 (30 minutes)

Presenter: SCHÄFER, Ruth (Universität Heidelberg)

Contribution ID: **25** Type: **not specified**

Who are LHCb's main rivals?

Wednesday, 19 February 2020 10:00 (30 minutes)

Presenter: DE ROECK, Albert (CERN)

Contribution ID: **26** Type: **not specified**

Novel ⊠-decay signatures of light scalars at high energy facilities

Wednesday, 19 February 2020 11:00 (30 minutes)

Presenter: RAMOS, Maria (LIP)

Contribution ID: **27** Type: **not specified**

ALPs from composite Higgs models

Wednesday, 19 February 2020 12:00 (30 minutes)

Presenter: BUARQUE FRANZOSI, Diogo (Chalmers University of Technology)

Contribution ID: **28** Type: **not specified**

Identifying Exclusive Displaced Hadronic Signatures at LHCb

Wednesday, 19 February 2020 12:30 (30 minutes)

Presenter: ZURITA, José Francisco (KIT)

Contribution ID: **29** Type: **not specified**

Discussion and work in common

Wednesday, 19 February 2020 15:00 (3 hours)