

# *Complementarity of different Dark Matter searches*

## **Discussion Session**

**Nazila Mahmoudi (Lyon U. & CERN)**

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# *Complementarity of Dark Matter searches?*

- DM searches at the LHC: monojets, di-jets, ...
  - missing energy markers
- Other searches at the LHC
  - Higgs, exotica, SUSY, extradim, ... searches
  - 750 GeV signal?!?
  - LHCb searches?
- Astro/cosmo related observations
  - relic density, direct detection, indirect detection, large scale structures
- Flavour physics
  - FCNC through dark matter particles? NMFV scenarios?
- Other?
  - axion search experiments, ...

# *Cosmological searches*

- (Thermal) relic density

computation relies on the cosmological assumptions, such as radiation domination, no entropy injection, no non-thermal production,...

- other cosmological scenarios can alter the relic density by several orders of magnitude!

- Dark matter direct detection

relies on the knowledge of the local profile of dark matter in the Solar System

- again, the dark matter density is hardly known and could change the results by a few orders of magnitude

- Dark matter indirect detection

relies on the knowledge of the profile of dark matter in the galaxies, of the propagation, of the background, ...

- possible ways to escape DM interpretations of bumps and excesses...

# *Discussions*

- Should we include cosmological observables when presenting LHC results?
  - difficult to compare the experiments and assumptions
  - very model-dependent results
  - at the same time, theorists like to see several contours in the same parameter plane!
- Should we reinterpret the LHC constraints in the dark matter detection parameter spaces?
  - not the same "cuts"
  - very model-dependent results
  - not fair to the dark matter detection experiments?

## *Discussions (2)*

- Should we present results only in effective or simplified models?
  - Interesting per se...
  - too many models... so many results...
  - not very realistic... hard to find a realistic model which proposes only one mediator for dark matter.
  - useful to emphasise more on the number of signal events vs. number of expected signal events, ...
- How about more realistic scenarios? SUSY, UED,...?
  - yes!
  - very time consuming...
  - how to choose scenarios, benchmarks? pMSSM?

# *Discussions (3)*

- Inverse problem?
  - If LHC unravels DM particles, could we understand better the primordial cosmology?
  - Then the interplay with the cosmological experiments would be of extreme importance!
- What if there is a new resonance at 750 GeV?
  - How can one accommodate DM?
  - What if the signal disappears, and no other hint?
- Other comments?