

Snowmass 2021:

Dark matter at colliders

Caterina Doglioni (Lund University)
Liantao Wang (University of Chicago)
Energy Frontier Topical Group convenors (EF10)

2020/07/02 - topical meeting on wino/higgsino

Snowmass topics #1: Testing (simple) WIMP Models

1. Electroweak multiplet.

- a. Electroweak multiplet: higgsino/wino(minimal DM). Mediator W/Z/h.
- b. Target: TeV-scale DM masses, motivated by relic density

Questions and points raised during our kick-off meetings [[archived notes](#)]

- Interesting to extend to both minimal and non-minimal models
- Different spins influence complementarity with non-collider experiments

How we/you can proceed

- Everybody can (and encouraged to) submit Lol and contribute white papers, which will be included in the overall volume of Snowmass studies
- We would like to be as inclusive as possible in the working group report. At the same time, there needs to be emphasis.
- What we want to converge on today/soon are **big-picture, high priority benchmarks**
 - Those will be highlighted in the EF10 working group report
 - ...and (hopefully) the report of energy frontier.
 - In addition to the ones highlighted in the briefing book, we are looking for a small number of new ones.
 - Representative of distinct model directions, distinct signal

How we/you can proceed

- Going forward, we are looking forward to many new physics studies.
- In general, studies can be done at the phenomenological study level.
- We will also encourage experimentalists get involved to make more detailed studies of the high priority benchmarks for apples-to-apples comparisons of new proposed facilities.

Coming up next

Current focus: broadly agree on benchmarks to study and why → focused questions

- need input from theory/experiments/other Topical Groups & frontiers

Ongoing goal: offer a discussion platform for ongoing studies

Overall goal: propose and answer focused questions with studies on DM benchmarks

EF 10 **Bi-weekly meetings** with the community will be focusing on **more specific topics**.

Every other Thursday, 12:00 -1 pm (US Eastern time).

Next meeting: July 7th.

Topic: EF02-07-08-09-10 Preparatory meeting for overall EF workshop

For most up to date info, see our [webpage](#) and slack channel

Energy frontier workshop: July 20-22

Joint meeting on LLP and DM interpretations: July 16-17

Join us and give input!

Webpage of EF 10: https://snowmass21.org/energy/dark_matter

Slack channel: #ef10-dark_matter under <https://snowmass2021.slack.com>

Email list: SNOWMASS-EF-10-DARK_MATTER@FNAL.GOV

Instructions on how to join: <https://snowmass21.org/energy/start#communications>

Give your input for our next discussion (same link will work for every meeting):

<https://docs.google.com/document/d/1MWH4W1PAs4xKzWBJVzP3fBU8Z06aEsVvorGa2Friljw/edit#>

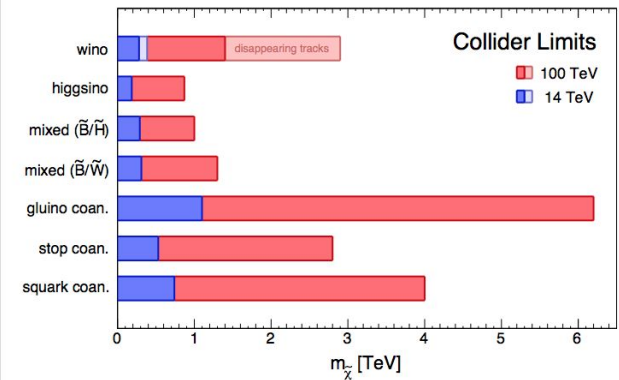
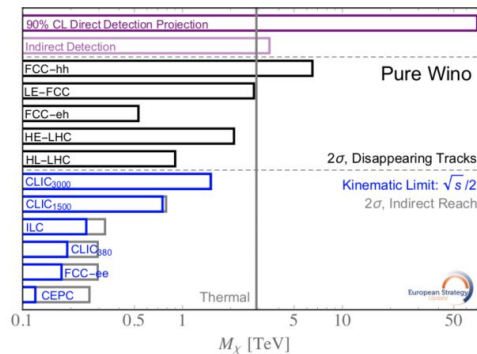
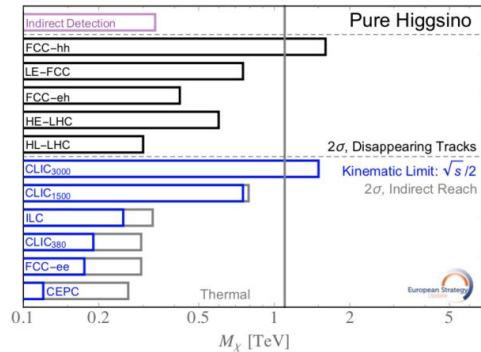
Expression of Interest form:

https://docs.google.com/forms/d/e/1FAIpQLSeFRaT5iUx4GYrypEiM-T6VId1b8y8lsqaruk714Yomw-9mOQ/viewform?usp=sf_link

Lol: <https://snowmass21.org/loi> , deadline: Aug. 31, 2020

Testing Simple WIMP Models: Results

A number of results are available for simple WIMP-like models



Questions:

- Any obvious case missing?
- What kind of refinement of analysis/projections are needed?
- What are the challenges for controlling systematic uncertainties, trigger/detector/machine design?