

Red LHC

Mesa Redonda LLPs

Jesús Vizán, Santiago Folgueras, Vasiliki Mitsou, Emma Torró

LLPs at the LHC

Where are we in LLP searches at LHC? General aspects in Run 2 searches for LLPs

Moving forward: Triggers for Run 3

Fully exploiting the LHC collisions: dedicated LLP experiments at the LHC

LLPs at the LHC

Where are we in LLP searches at LHC? General aspects in Run 2 searches for LLPs **Jesús**

Moving forward: Triggers for Run 3 **Santi**

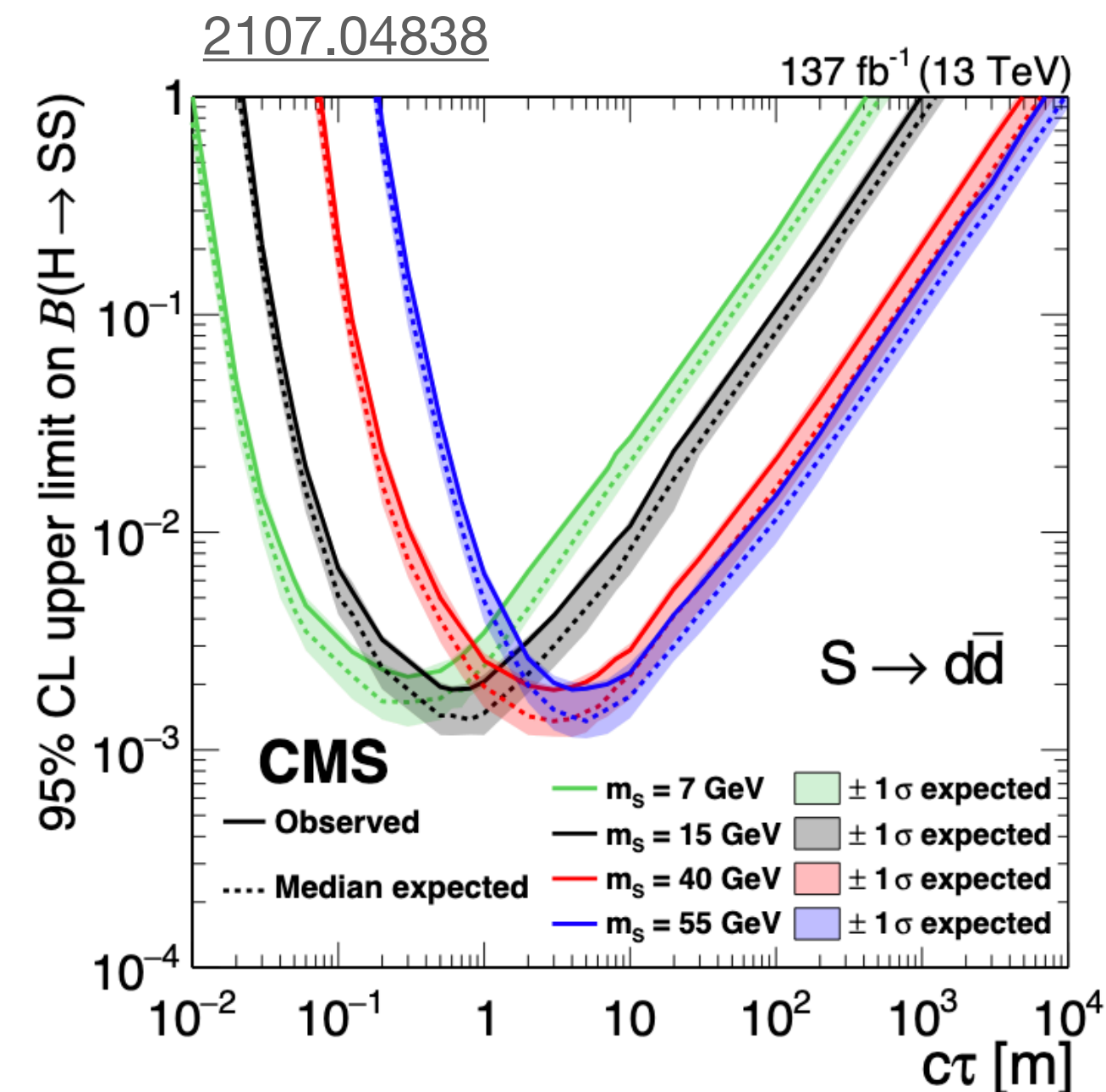
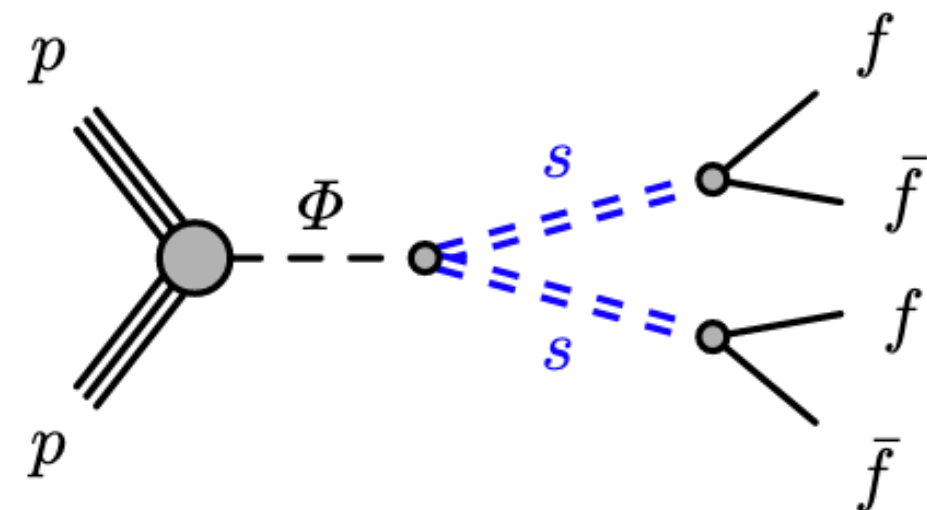
Fully exploiting the LHC collisions: dedicated LLP experiments at the LHC **Vaso**

Benchmark models

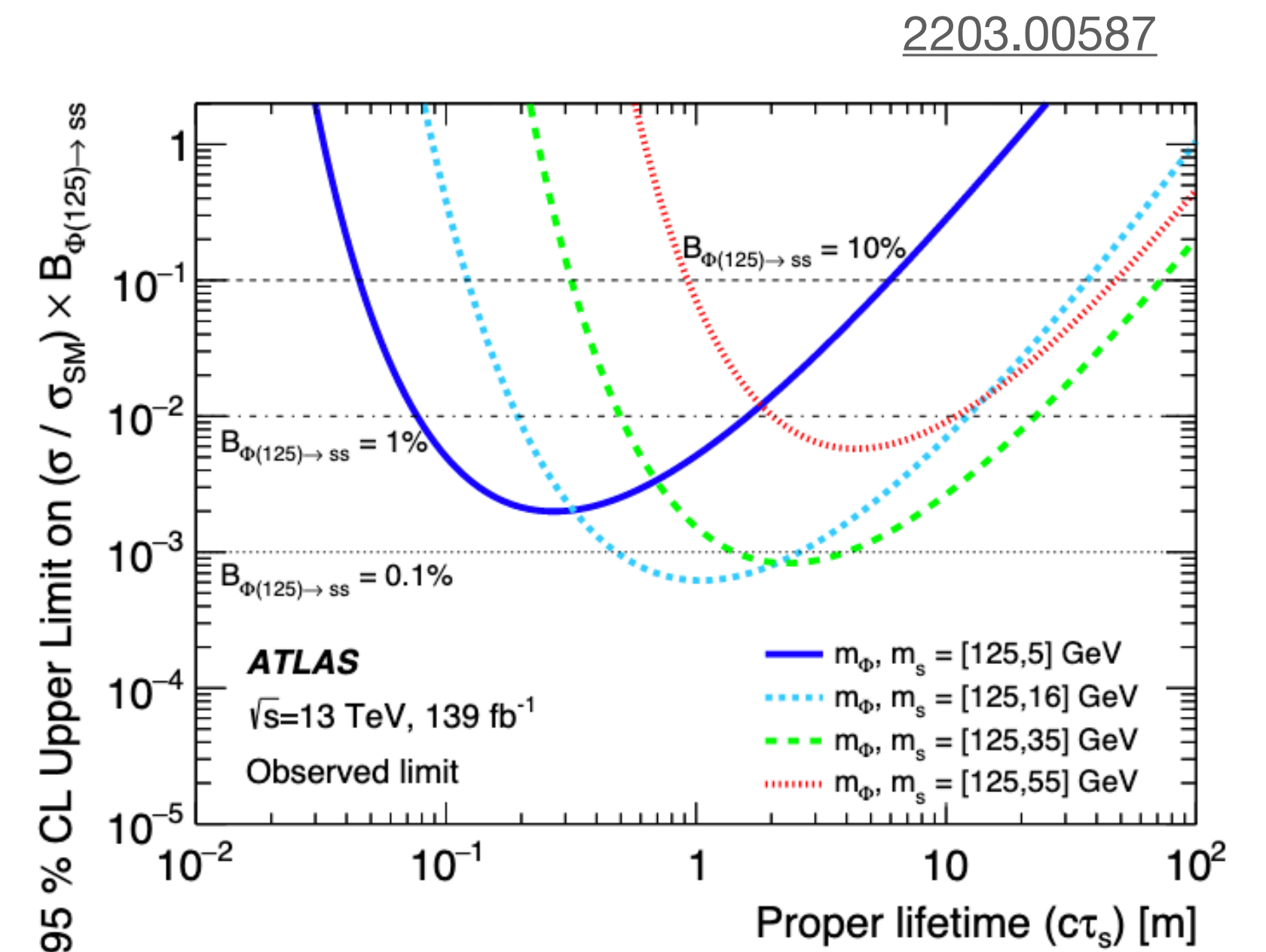
Similar searches in ATLAS and CMS use either different parameters for a given benchmark

- hard to compare results
- hard for reproducibility. Even looking for a similar signature, the selections are different
- find a collection of benchmarks and agree in the generation details to be used by all experiments

Search for vertices in the MS



$M_s = 7, 15, 40, 55$ GeV



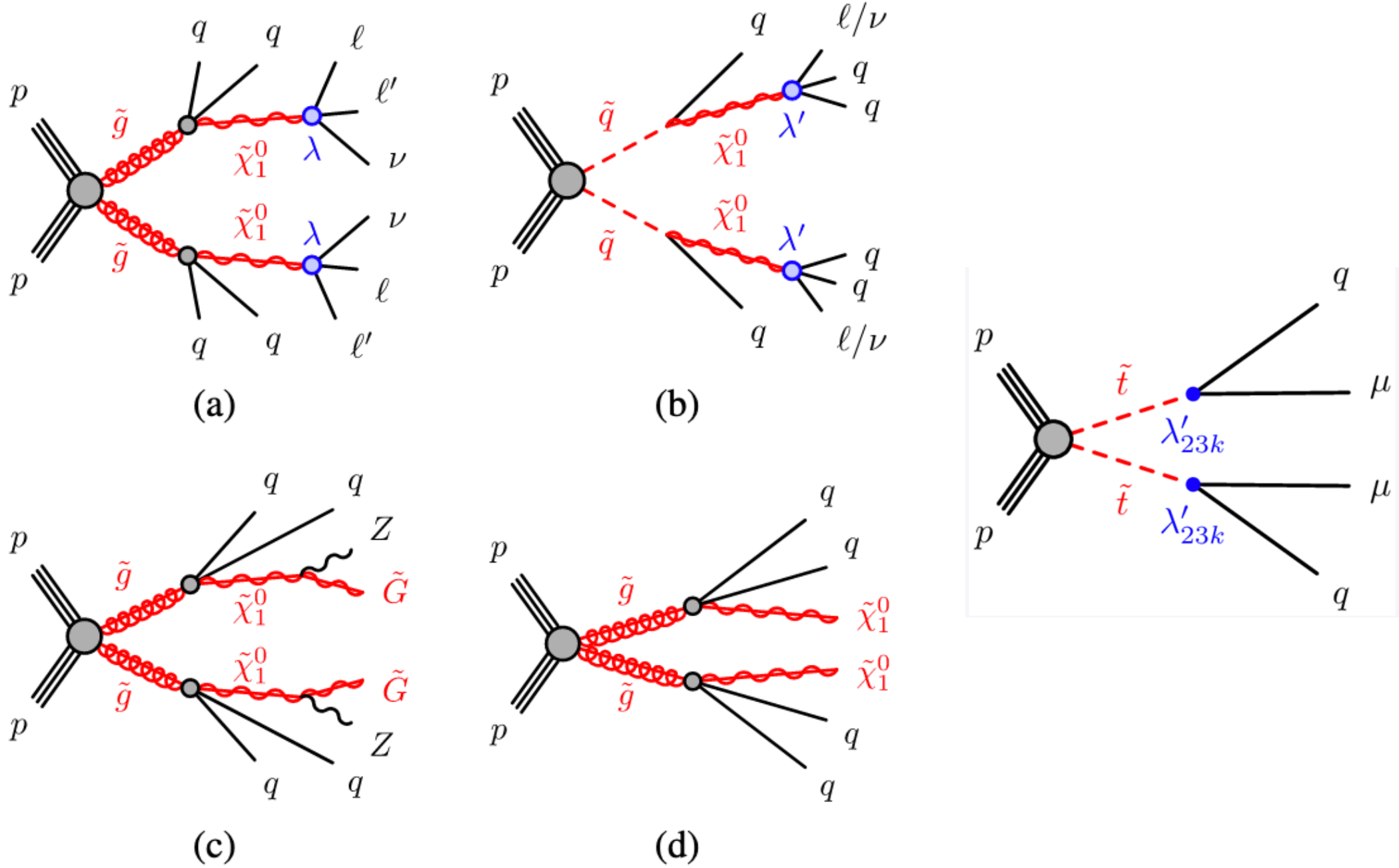
$M_s = 5, 16, 35, 55$ GeV

Benchmark models

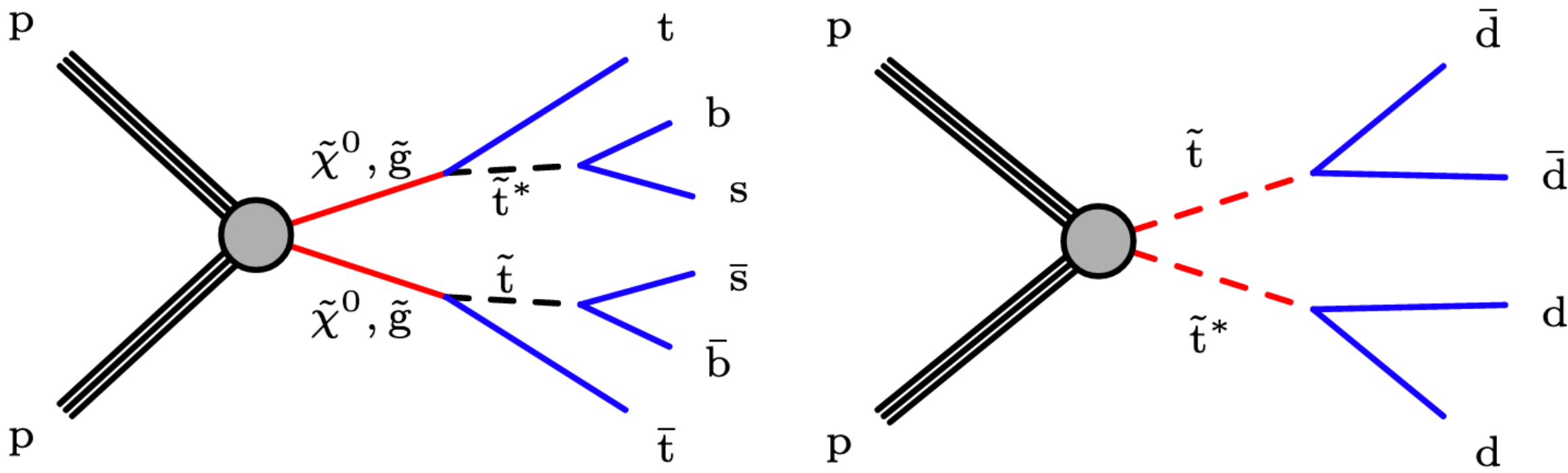
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ATLAS: DV + X in SUSY
 X = muon, e, jets, MET, displ. Muon



CMS: 2DV in SUSY



2104.13474

Coverage in signatures by each experiment

- some analyses done in one experiment but not in others
 - in case of an excess, it takes time for the other to do a similar analysis (dE/dx ATLAS)
 - For new analysis, should we have a common signature strategy?
- Poorly covered regions
 - Low-mass LLPs not passing triggers or offline selections
 - Dark showers giving emerging jets or semivisible jets
 - ~~Displaced taus~~
 - LLP + SM X

Reinterpretation

Number of models involving LLPs is large and increasing: searches designed for a specific signature, then reinterpreted
 A lot of effort lately in including info to:

HEPData

- Information not homogeneous among analyses
- efficiency maps
- Would be good to converge in a minimum set of data

REANA/RECAST

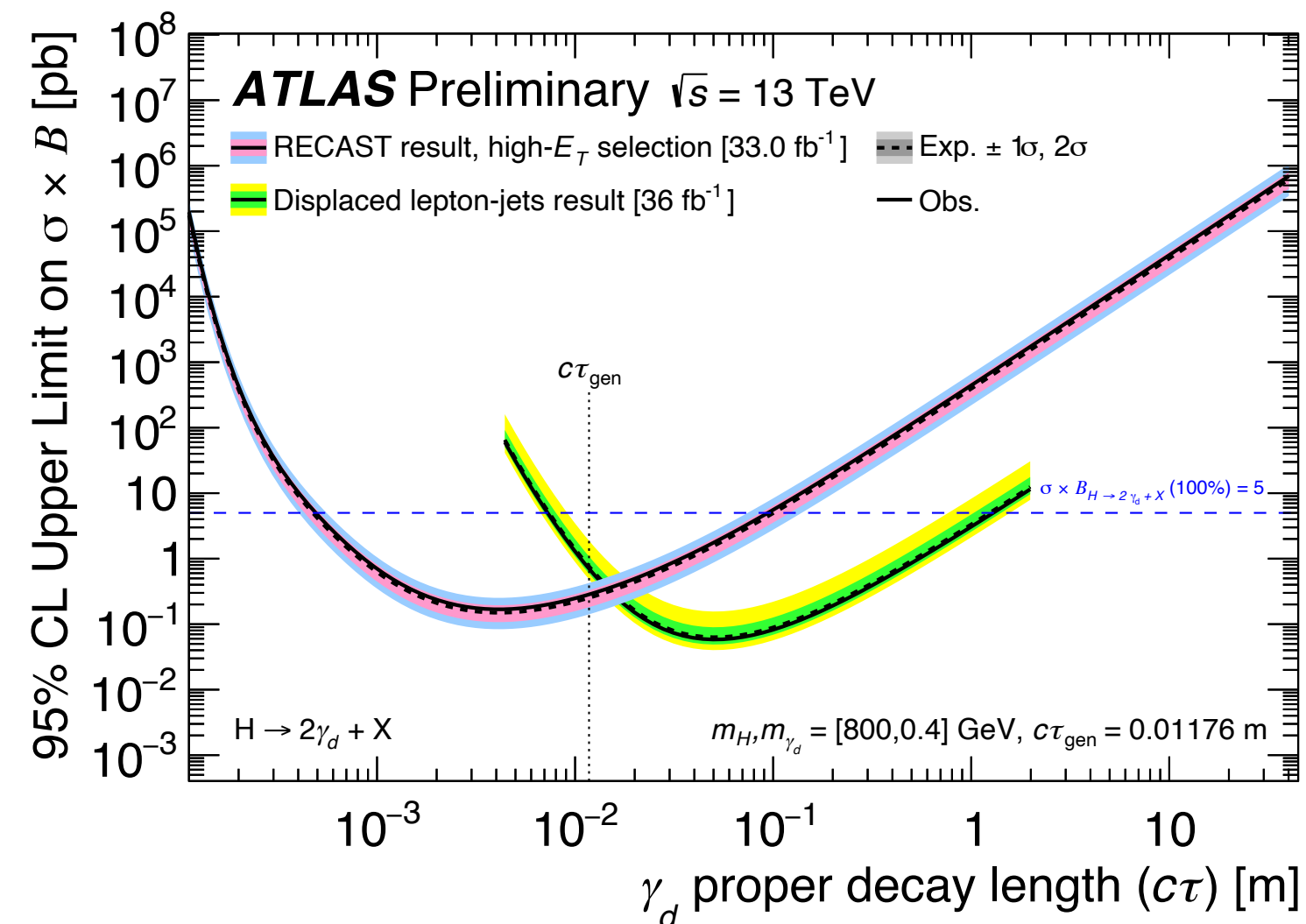
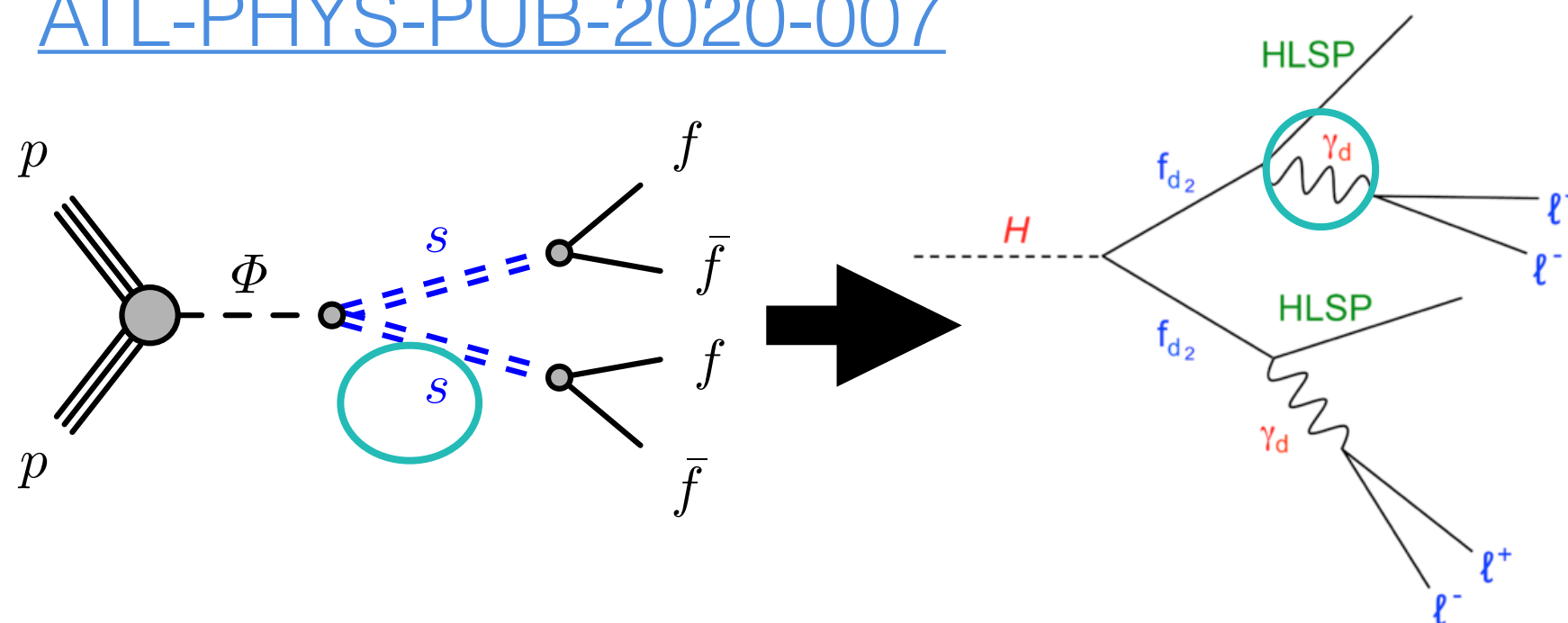
- Running the full analysis over a new signal model.
- How much is this really being used by the theory community?
- Is there a clear procedure for requests?

Re-interpreting prompt analysis in LLP scenarios

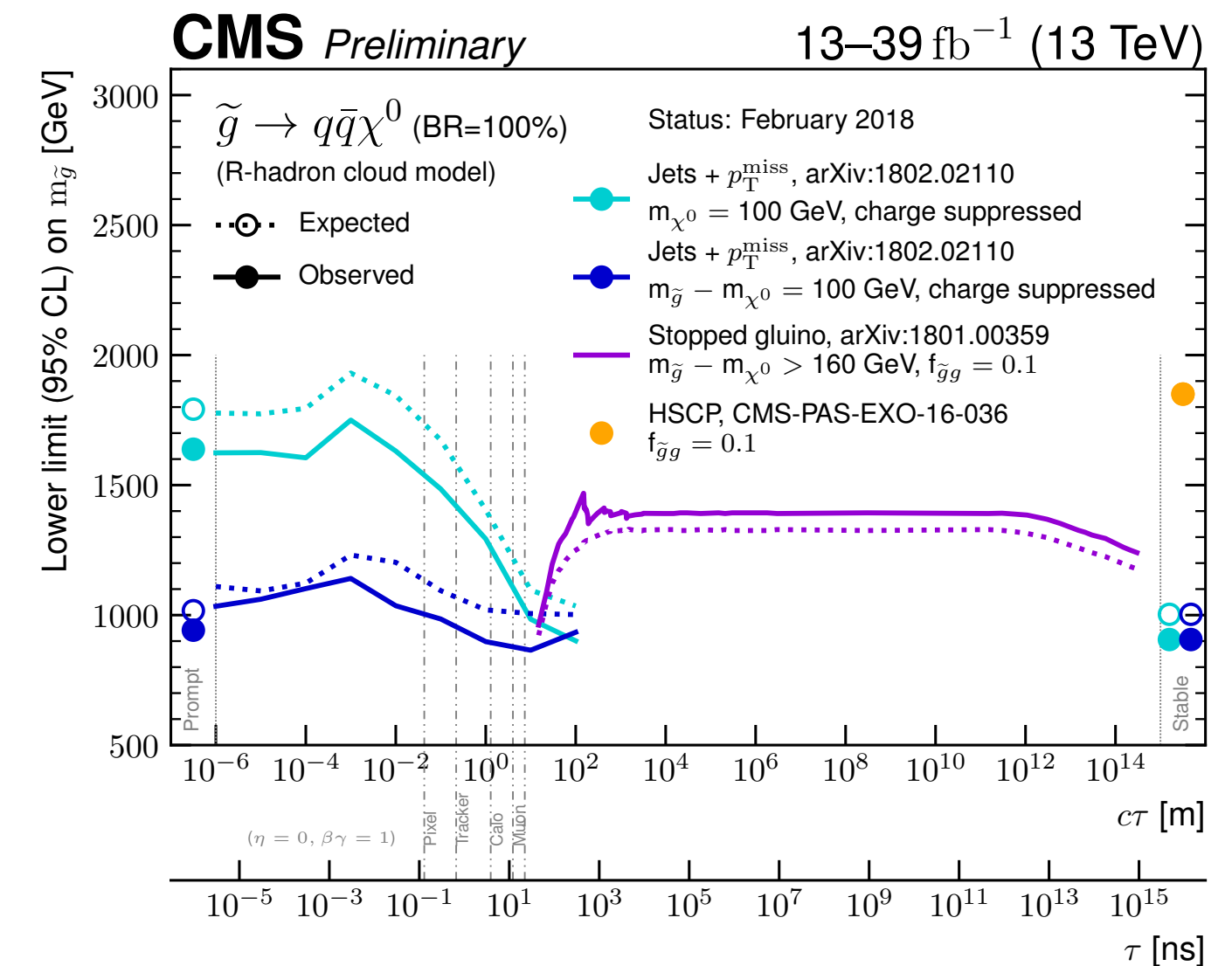
- Additional coverage at relatively short lifetimes
- Should be done systematically whenever possible

From HS displaced jet search to dark photon FRVZ model

[ATL-PHYS-PUB-2020-007](https://arxiv.org/abs/2007.007)



[SUS-16-038](https://arxiv.org/abs/1603.038)



Use of ML techniques for displaced objects identification

Getting extended to more and more analyses

- Good improvement in cases where they have been applied**
- What's the impact in terms of reinterpretation?**