

# Other LLP Searches

- CalRatio ([ATLAS-EXOT-2019-23](#))

- Dedicated CalRatio trigger:

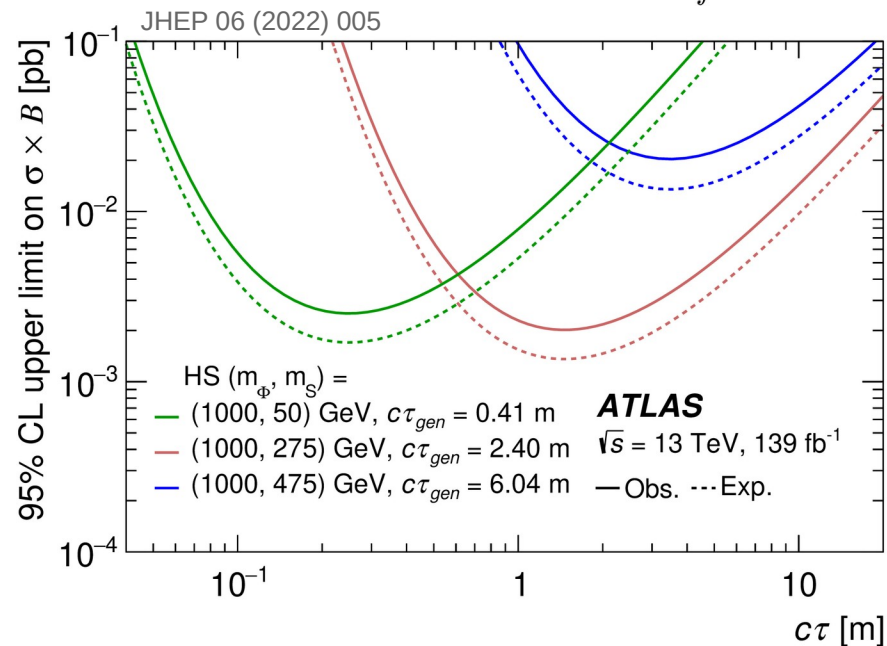
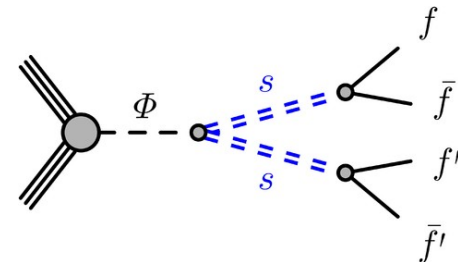
Trigger	Collected integrated luminosity [ $\text{fb}^{-1}$ ]				
	2015	2016	2017	2018	Total
High- $E_T$ CalRatio trigger with $E_T > 60\text{GeV}$	3	33	41	40	117
High- $E_T$ CalRatio trigger with $E_T > 100\text{GeV}$	—	—	44	59	103
Low- $E_T$ CalRatio trigger (2016 version)	—	11	43	—	54
Low- $E_T$ CalRatio trigger (2018 version)	—	—	—	59	59

Low  $E_T$ :  $E_T > 30\text{ GeV}$  (with  $E_T < 3\text{ GeV}$  in ECAL)

- Event Selection:

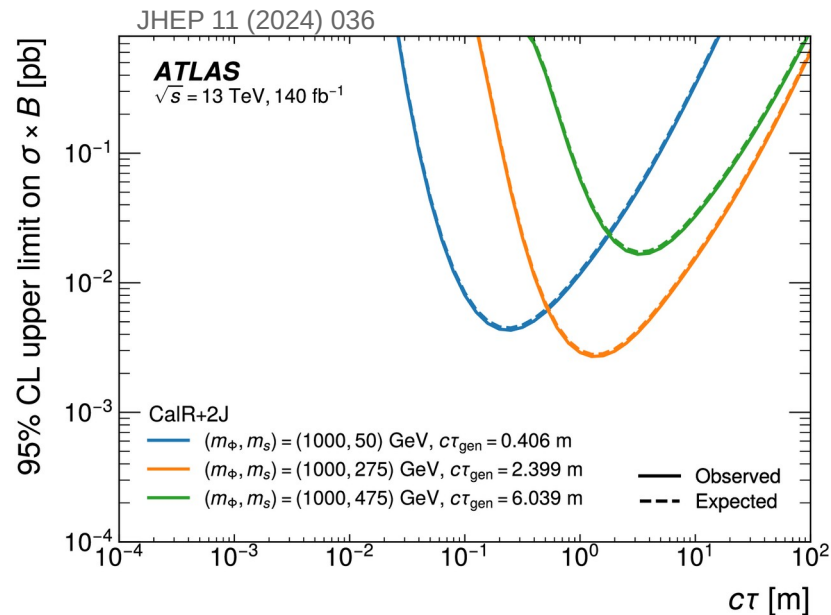
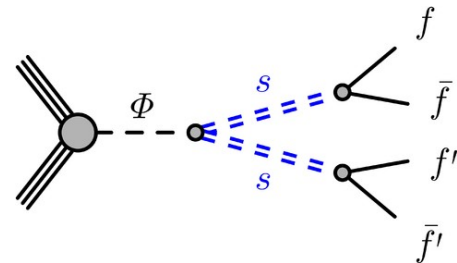
- Trackless jet:  $\sum \Delta R_{\min}(\text{jet}, \text{tracks}) > 0.5$

Low- $E_T$ selection	High- $E_T$ selection
$H_T^{\text{miss}}/H_T < 0.6$	$H_T^{\text{miss}}/H_T < 0.6$
$(\sum_{\text{jet}^{\text{sig}_{1l}}, \text{jet}^{\text{sig}_{2l}}} \log_{10}(E_H/E_{EM})) > 2$	$(\sum_{\text{jet}^{\text{sig}_{1h}}, \text{jet}^{\text{sig}_{2h}}} \log_{10}(E_H/E_{EM})) > 1$
$p_T(\text{jet}^{\text{sig}_{1l}}) > 80\text{GeV}$	$p_T(\text{jet}^{\text{sig}_{1h}}) > 70\text{GeV}$
$p_T(\text{jet}^{\text{sig}_{2l}}) > 80\text{GeV}$	$p_T(\text{jet}^{\text{sig}_{2h}}) > 80\text{GeV}$
low- $E_T$ NN product $> 0.7$	high- $E_T$ NN product $> 0.5$

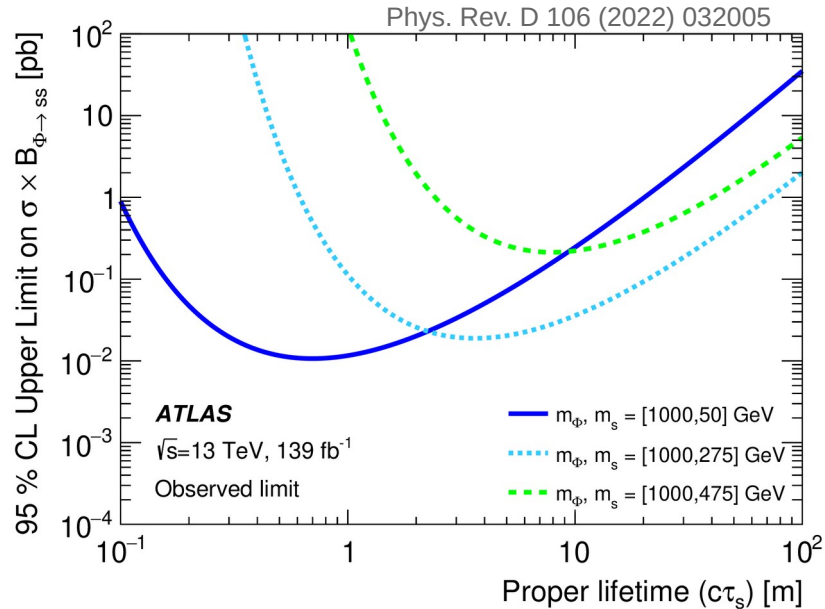
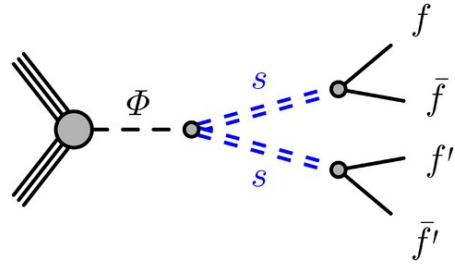


- Displaced Jets + Jets or leptons ([ATLAS-EXOT-2022-04](#))

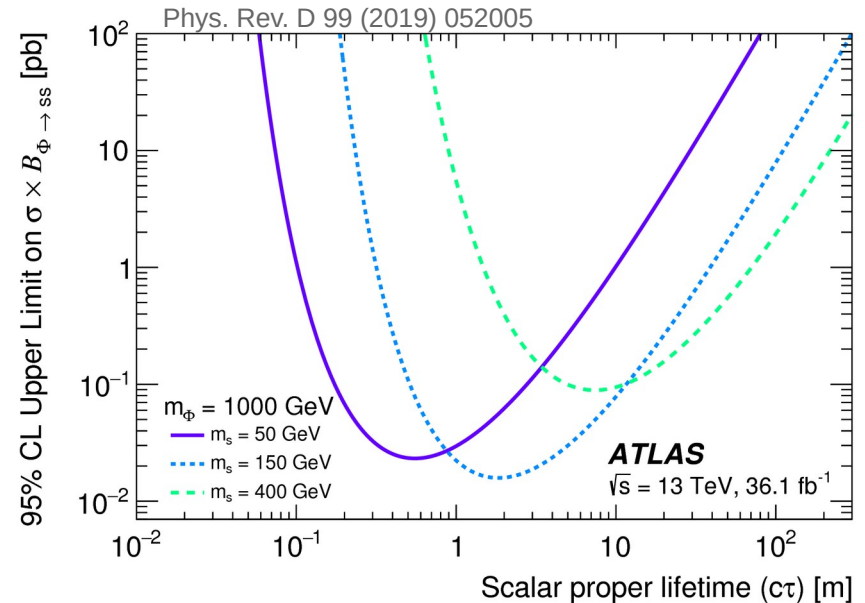
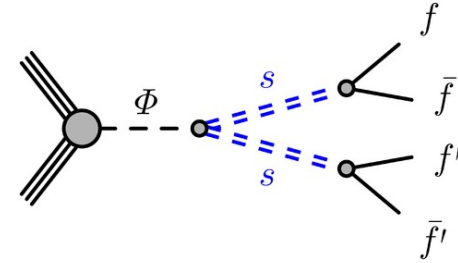
The analysis is split into three channels. The CalRatio + two jets (CalR+2J) channel targets LLPs resulting from gluon–gluon fusion production of the mediator particle in an HS model, leading to two LLPs in the event. One LLP decays in the calorimeter, with its decay products merged into a single displaced jet. The other LLP decays with a short enough decay length and low enough boost to produce two resolved jets from its decay products.



- Displaced Jets in the Muon System  
(ATLAS-EXOT-2019-24)

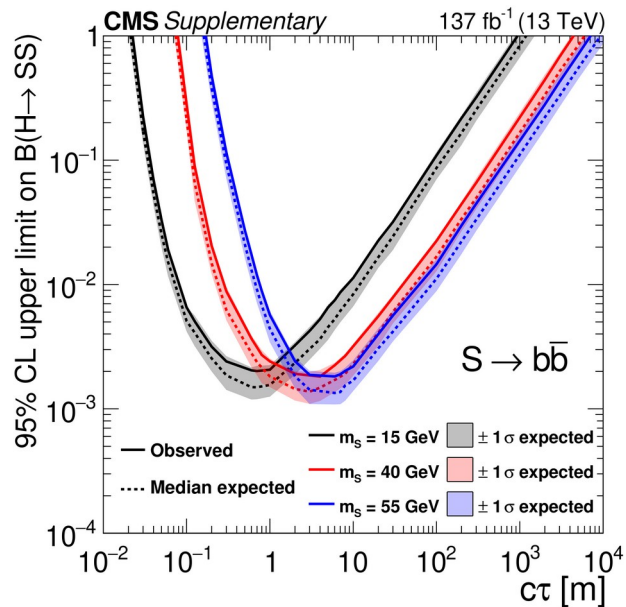
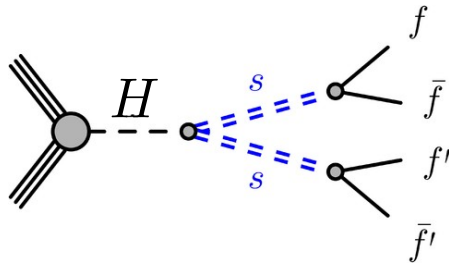


- Displaced Jets in the Muon System  
(ATLAS-EXOT-2017-05)

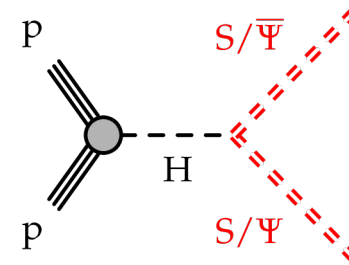


- Displaced Jets in the Muon System  
(CMS-EXO-20-015)

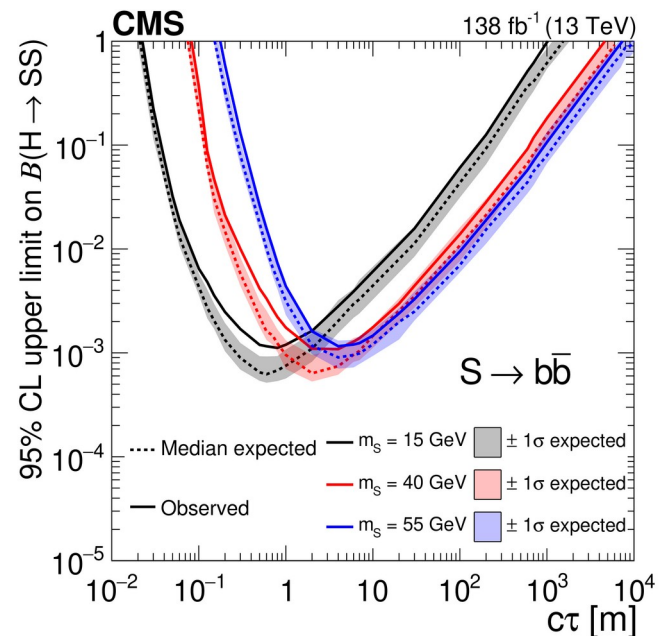
A novel technique is employed to reconstruct decays of LLPs in the endcap muon detectors



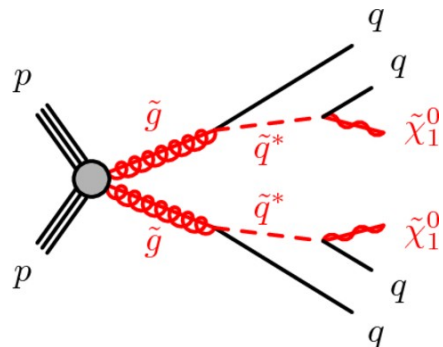
- Displaced Jets in the Muon System  
(CMS-EXO-21-008)



The decays of LLPs are reconstructed as high multiplicity clusters of hits in the muon detectors



- Displaced Jets +MET ([ATLAS-SUSY-2016-08](#))



$$R_{DV} < 30 \text{ cm}$$

- Displaced Jets ([ATLAS-SUSY-2018-13](#))

