

Status and Updates on Protomodels v2

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Feb – Mar

- Started familiarizing with the the previous version of the code
- Transitioning from smodels v2-> v3
- Included offshell decays

particle	3-body decay channels	relative ratios (if fixed)
$X_Z^{j \neq 1}$	$q\bar{q} X_Z^k, \ell^+ \ell^- X_Z^k, \nu \bar{\nu} X_Z^k$ $q\bar{q}' X_W^i, \ell \nu_\ell X_W^i$	0.7, 0.1, 0.2 0.68, 0.11
X_W^i	$q\bar{q}' X_Z^k, \ell \nu_\ell X_Z^k$	0.68, 0.11
X_W^2	$q\bar{q} X_W^1, \ell^+ \ell^- X_W^1, \nu \bar{\nu} X_W^1$	0.7, 0.1, 0.2

- Running multiple walks , understanding how walks work got initial protomodels with Smodels v3 (software)
- Trying to understand the ideas for test statistic

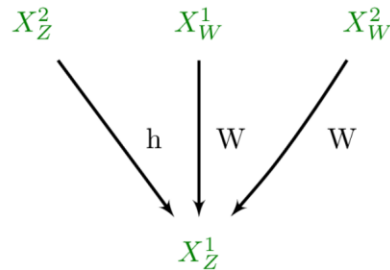
Initial run in Mar, with SModelS v3 (software)

Current best protomodel: $K=7.64$, $Z=3.53$



Walker 871 step 461. llhd plots: [X2Z](#) [X2ZX2Z](#) [X2Z X1W](#) S plots: [X2Z X1W X2W X1Z](#)

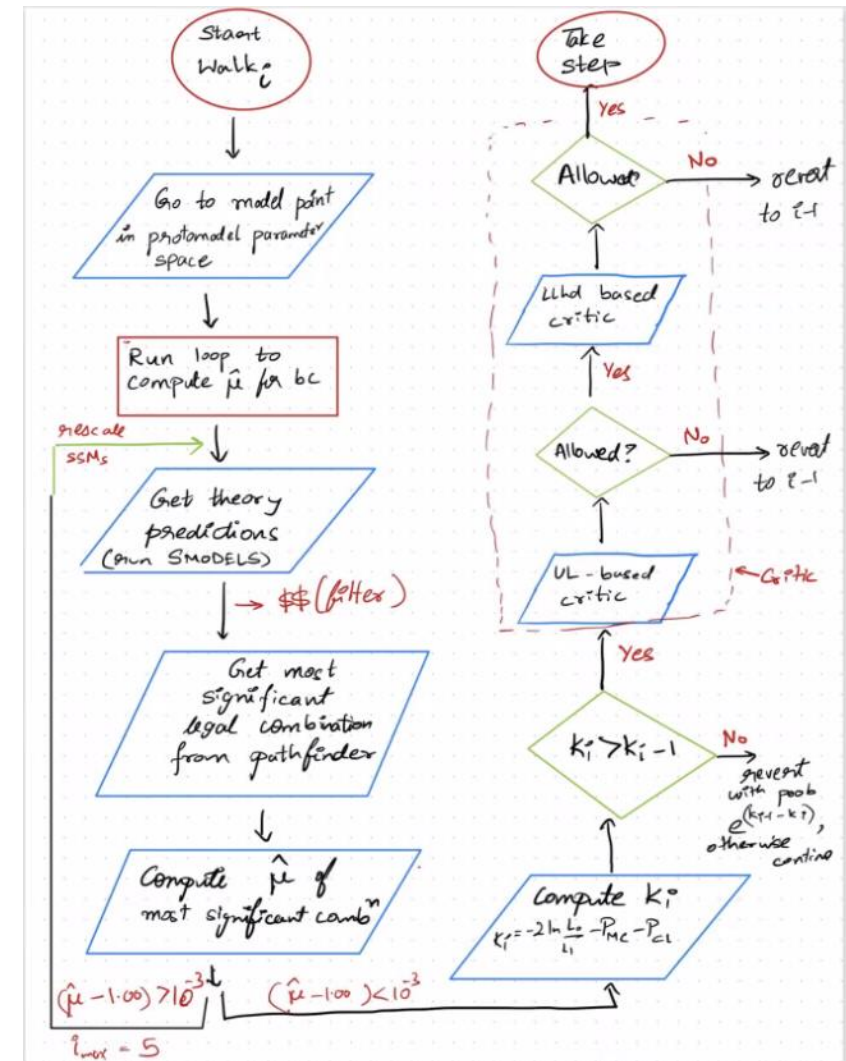
Signal strength multipliers: $(\bar{X}_W^1, X_W^1) = 1.8$; (X_Z^2, X_W^2) , $(\bar{X}_W^2, X_Z^2) = 0.95$; $(\bar{X}_W^2, X_W^2) = 0.21$; $(X_Z^2, X_Z^2) = 0.2$
 Last updated: Mon Mar 18 17:31:13 2024



Analysis Name	Type	Dataset	Topos	Observed	Expected	Approx σ	Particles
CMS-SUS-20-004	comb -		TChiHH	0.2 fb	0.1 fb	2.3 σ	X^1_Z, X^2_Z
CMS-SUS-13-012	em	6NJet8_500HT800 ...	TChiWW	9	0.80 +/- 3.30	1.8 σ	X^2_W, X^1_Z
ATLAS-SUSY-2019-08	em	SR_MM_Med_MCT	TChiWH	7	2.60 +/- 1.30	1.8 σ	X^2_W, X^1_Z, X^2_Z
ATLAS-SUSY-2019-02	comb -		TChiWW	2 fb	0.9 fb	1.3 σ	X^1_W, X^1_Z
ATLAS-SUSY-2013-11	em	mT2-120-DF	TChiWW	5	3.60 +/- 1.20	0.7 σ	X^1_W, X^2_W, X^1_Z
ATLAS-SUSY-2018-41	em	SR-2B2Q-Vh	TChiHH	1	2.49 +/- 0.78	-0.8 σ	X^1_Z, X^2_Z
Not in Best Combo	Type	Dataset	Topos	Observed	Expected	Approx σ	Particles
ATLAS-SUSY-2018-32	comb -		TChiWW	0.3 fb	0.3 fb	0.1 σ	X^2_W, X^1_Z
CMS-SUS-21-002	comb -		TChiWH, TChiWW	0.2 fb	0.3 fb	-1.9 σ	X^2_W, X^1_Z, X^2_Z

Apr - July

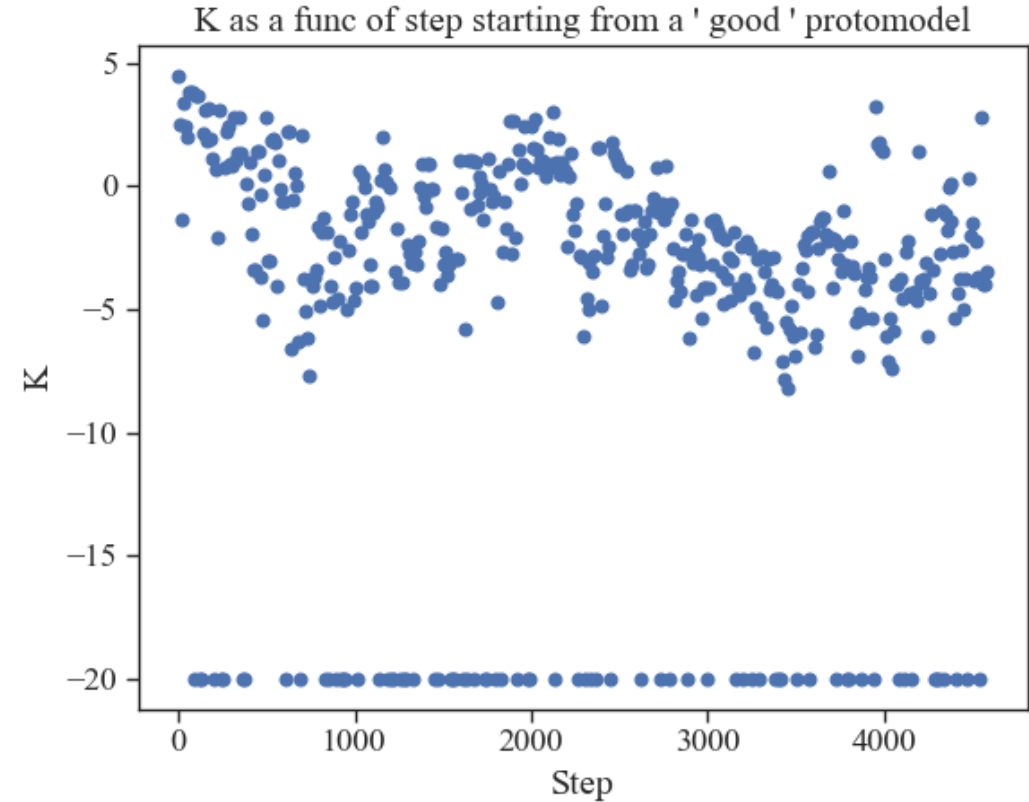
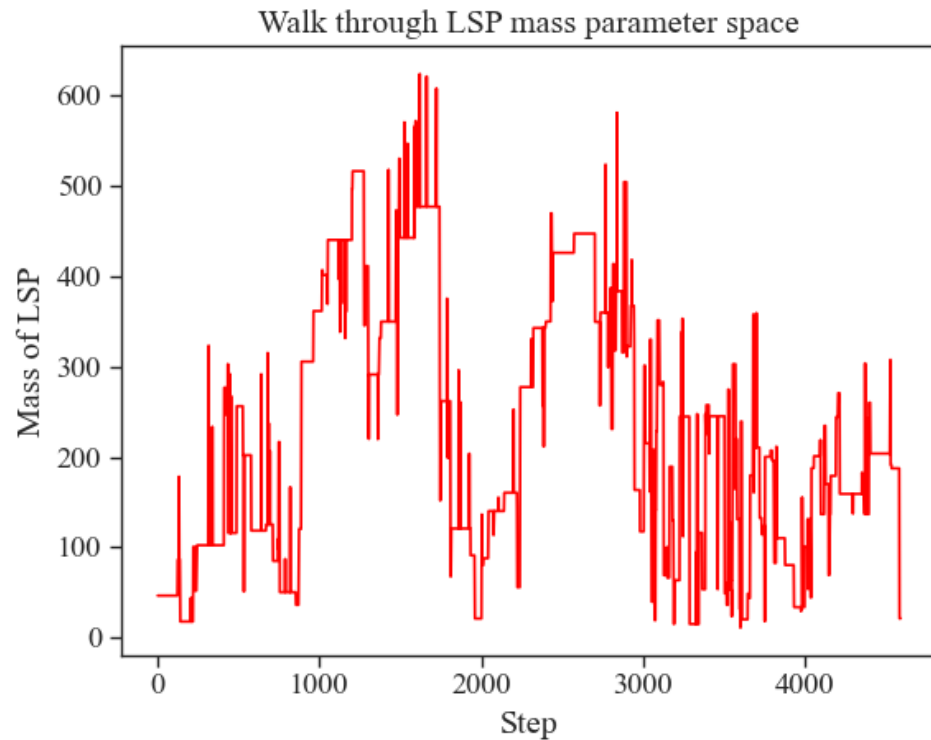
- Jamie & Timothée
 - Discussion on penalizing for combination length
 - Integration of pathfinder in protomodel
- Changed the flow of the decision making process
- With Timothée
 - write and update combination matrix in YAML format Upgrade Critics with Timothee – UL critic decision
 - Upgrading critics -> worked on mostly the UL critic



Sep - Oct

- Discrepancies with old protomodel results from Mar, results were no longer agreeing –
 - updated SModelS database,
 - rewriting of our chains that $\hat{\mu}$ of model is always at 1.0
 - Old TL = $2\log \left(\frac{\prod_{c_i} L(\mu=\hat{\mu}_c)}{\prod_{c_i} L(\mu=0)} \right)_c$; New TL = $2\log \left(\frac{\prod_{c_i} L(\mu=1)}{\prod_{c_i} L(\mu=0)} \right)_c$
- Making sure negative weights do not enter the pathfinder algorithm by setting an offset.
- With Mohammad, started running multiple walks
 - Bug fixes – multiprocessing errors and setup issues on

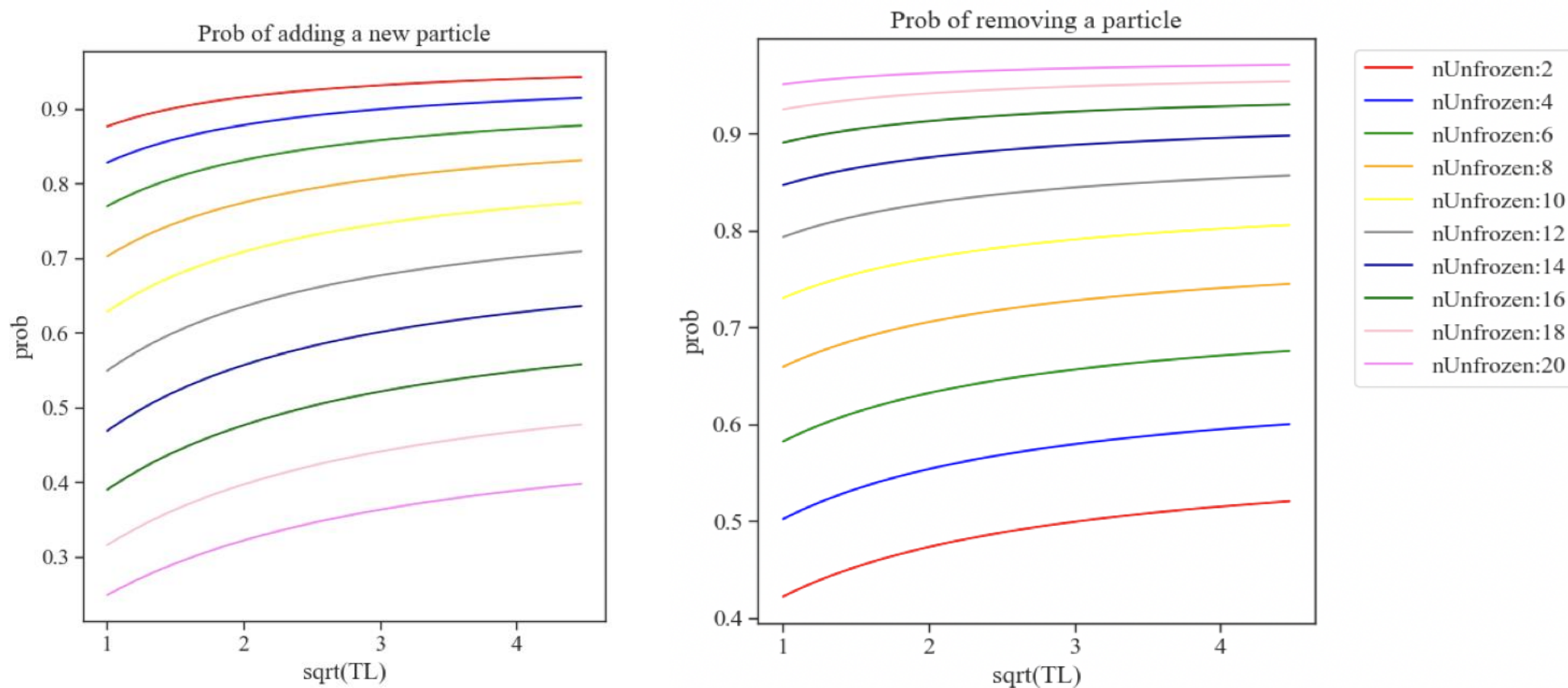
How is it walking?



- With Mohammad – is entire parameter space covered if we don't take into account K and TL?

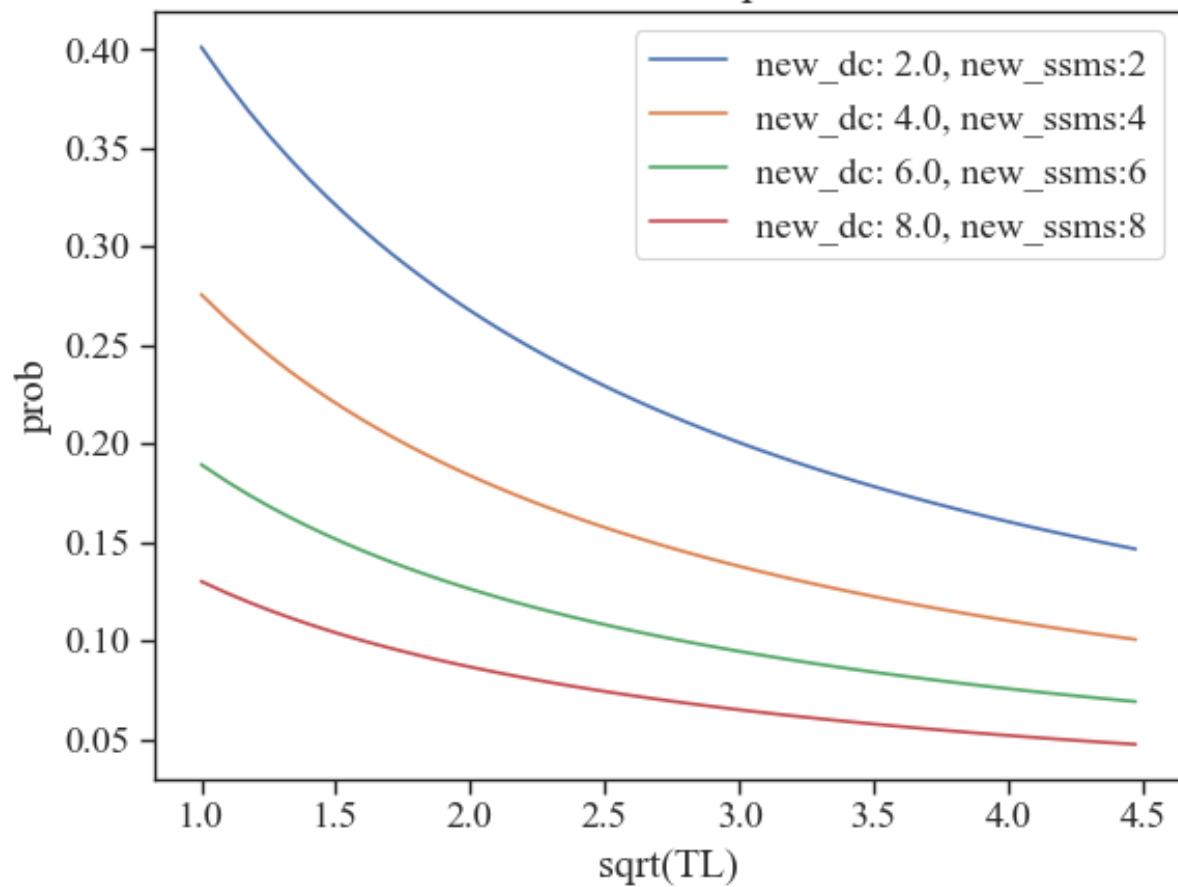
Proposal Density

old

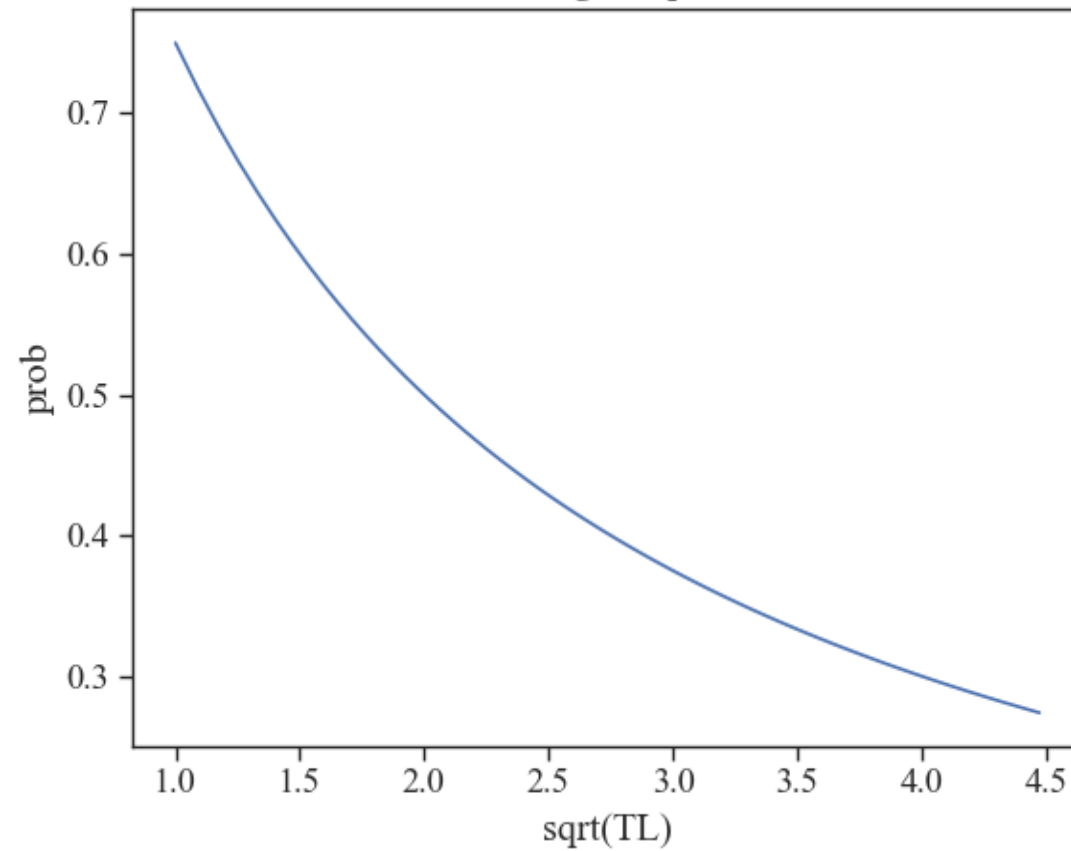


Current

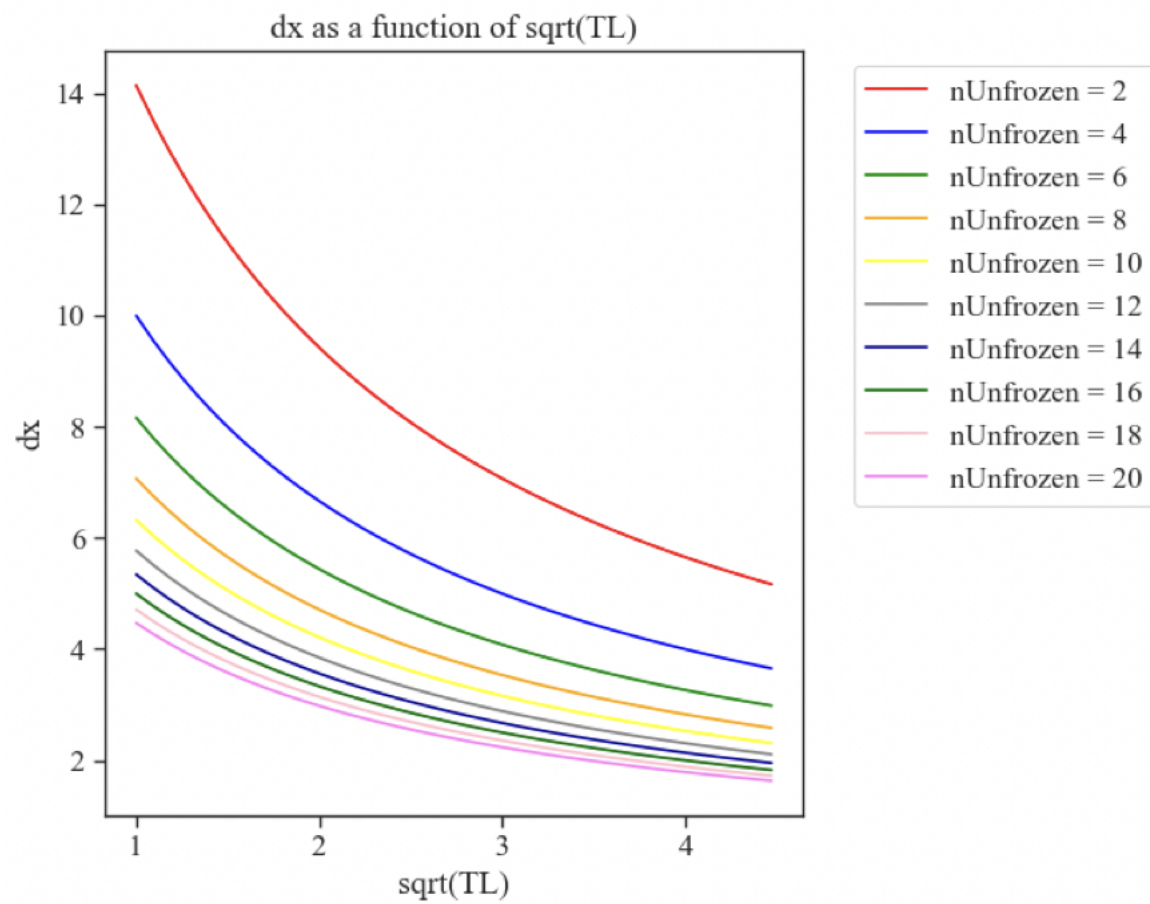
Addition of one particle



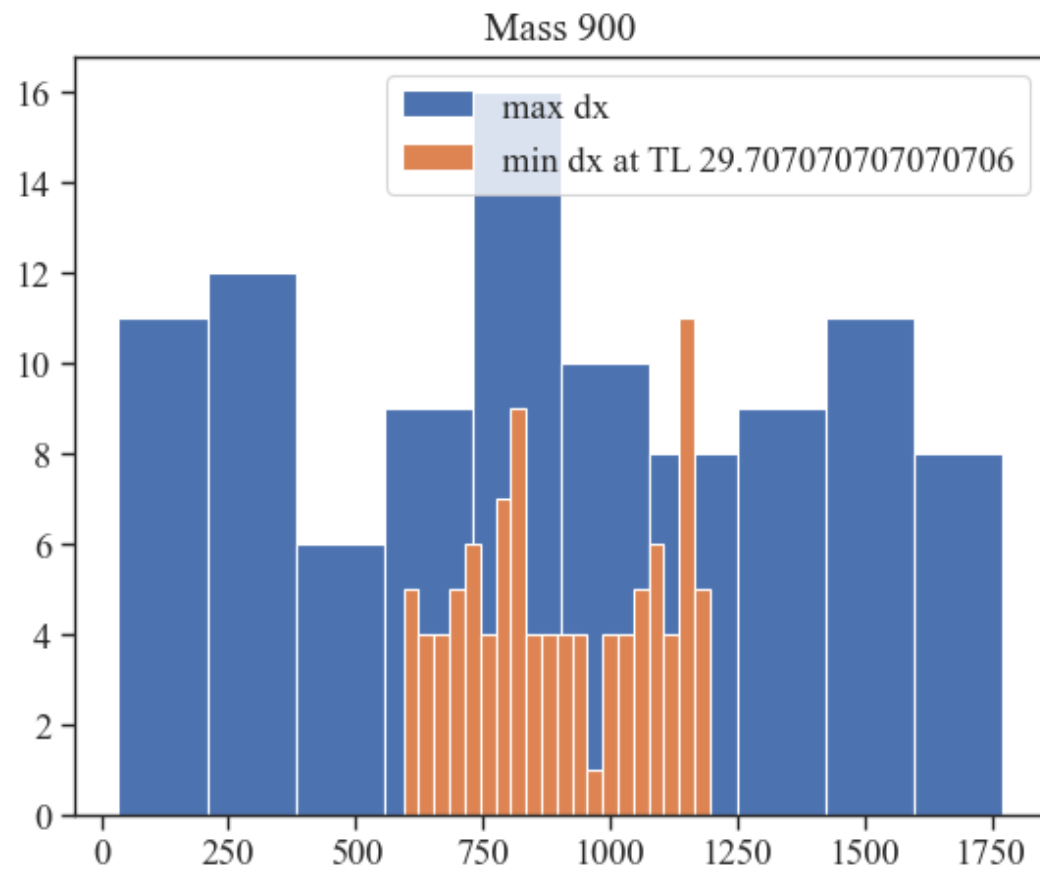
Removing one particle



Old



Current



In Progress...

- With Humberto, convergence tests
- With Mohammad, looking at the proposal and posterior distribution from fake SM and real data
- With Wolfgang, looking at the penalty term for signal regions