Dark matter model comparison

Pat Scott

Imperial College London

on behalf of the GAMBIT Collaboration

gambit.hepforge.org

Many models, many constraints

Models

Scalar singlet
Fermion singlet
Vector singlet

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. . . Scalar doublet
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- axions
- axion-like particles
- self-interacting DM
- asymmetric DM
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- Precision measurements ($g-2$, EW S, T, U, etc)
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Ultimately, we want to use all of the left to choose between the options on the right.

GAMBIT: The Global And Modular BSM Inference Tool

gambit.hepforge.org

- Fast definition of new datasets and theoretical models
- Plug and play scanning, physics and likelihood packages
- Extensive model database – not just SUSY
- Extensive observable/data libraries
- Many statistical and scanning options (Bayesian & frequentist)
- *Fast* LHC likelihood calculator
- Massively parallel
- Fully open-source

ATLAS	F. Bernlochner, A. Buckley, P. Jackson, M. White
LHCb	M. Chrząszcz, N. Serra
Belle-II	F. Bernlochner, P. Jackson
Fermi-LAT	J. Conrad, J. Edsjö, G. Martinez, P. Scott
CTA	C. Balázs, T. Bringmann, M. White
CMS	C. Rogan
IceCube	J. Edsjö, P. Scott
XENON/DARWIN	B. Farmer, R. Trotta
Theory	P. Athron, C. Balázs, S. Bloor, T. Bringmann, J. Cornell, J. Edsjö, B. Farmer, A. Fowlie, T. Gonzalo, J. Harz, S. Hoof, F. Kahlhoefer, S. Krishnamurthy, A. Kvellestad, F.N. Mahmoudi, J. McKay, A. Raklev, R. Ruiz, P. Scott, R. Trotta, A. Vincent, C. Weniger, M. White, S. Wild

31 Members in 9 Experiments, 12 major theory codes, 11 countries

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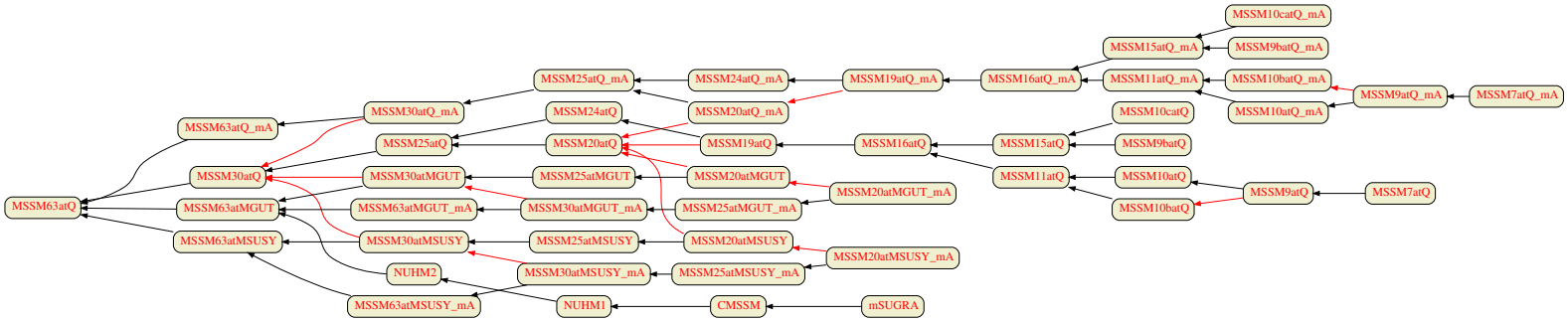

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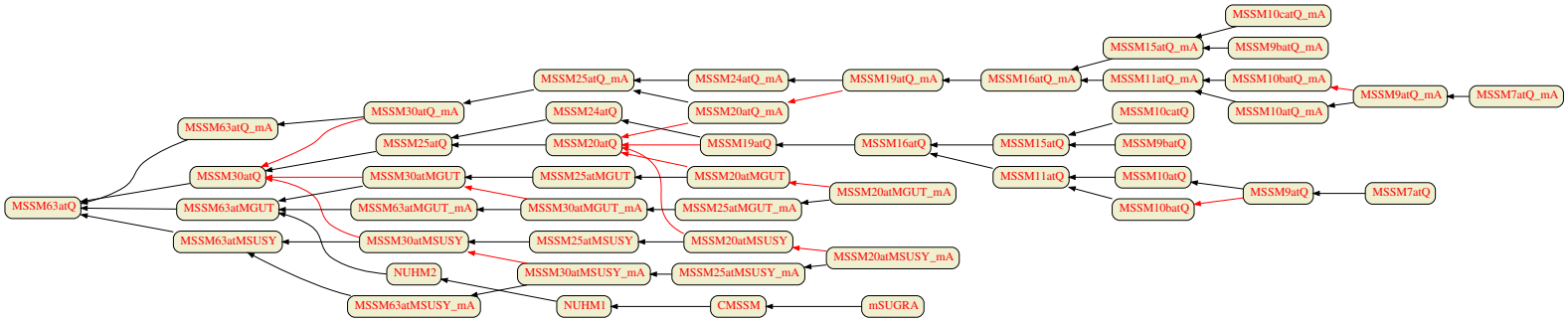

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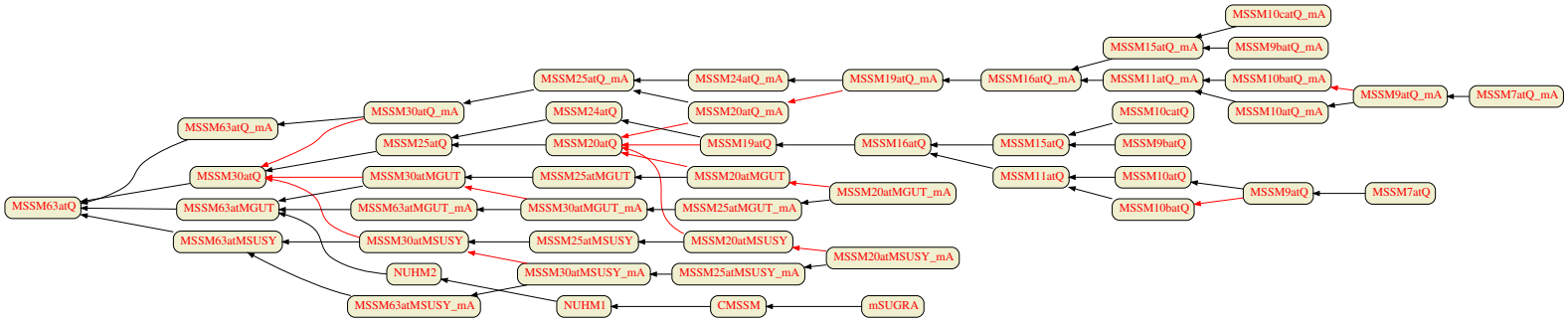

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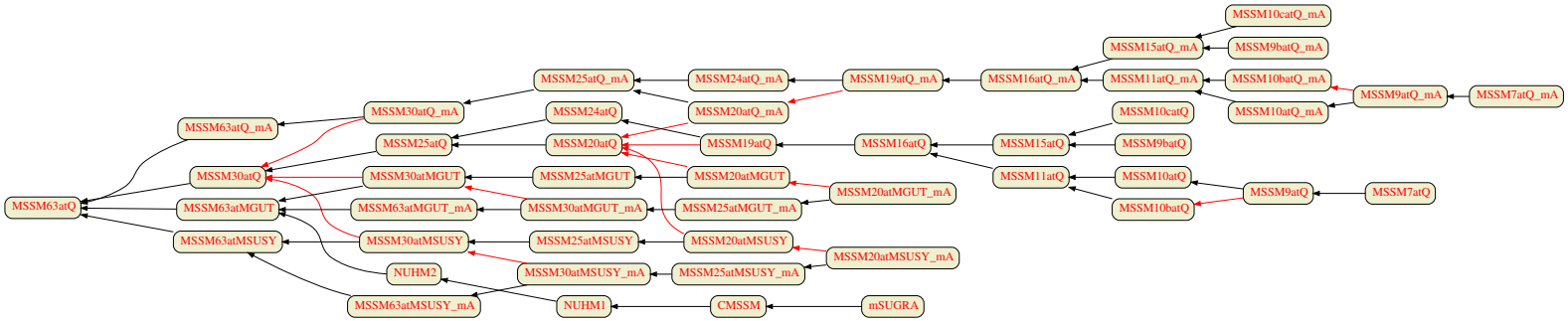

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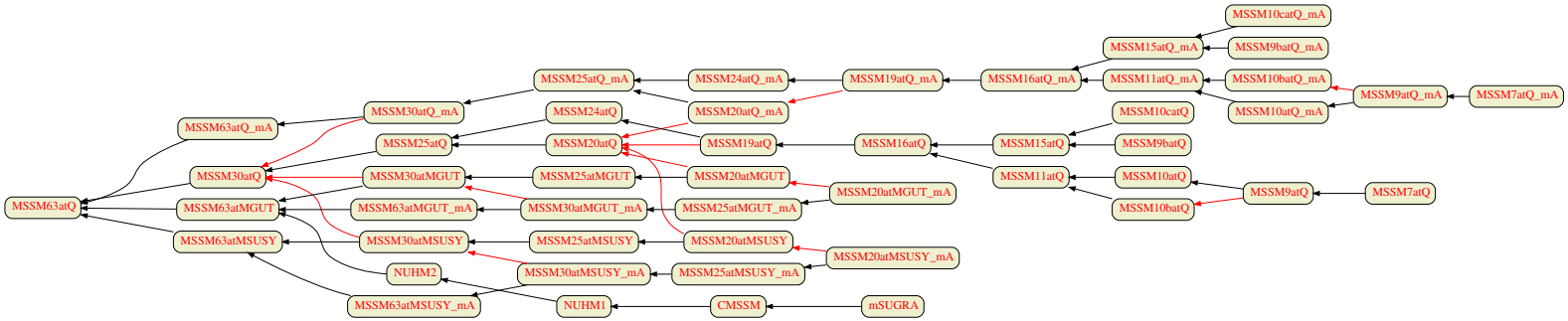

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- Entropic priors? (e.g. arXiv:0906.5609)
  Is this the same as minimising the K-L divergence?

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- Information geometry / Fisher forecasting? (e.g. arXiv:1712.05401)
  - Can help with determining *dof* of test statistic at least.
  - Also useful for saying how well a given idealised experiment *could* distinguish models.
  - But how to rigorously use for discriminating between models given real data?