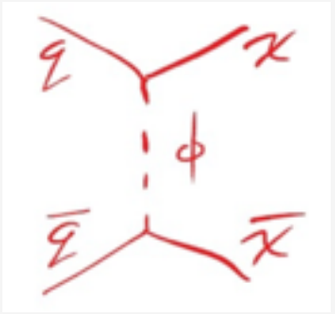
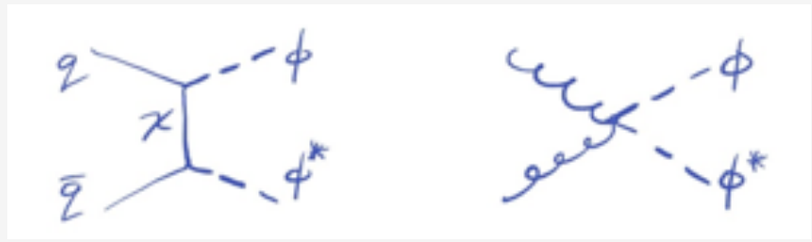
Progress on t-channel models

A. Natale, June WG Meeting

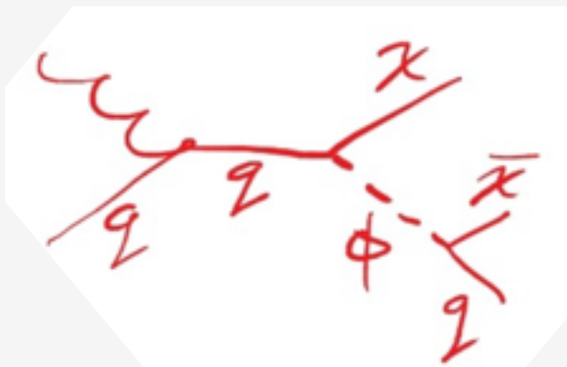
A. Difranzo, yesterday



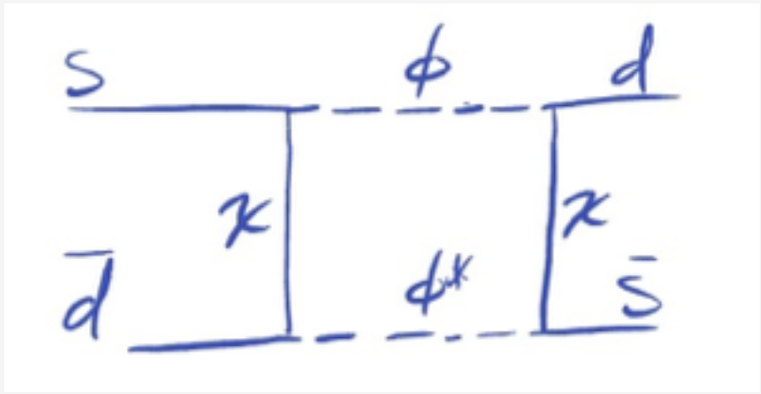
Possible models with potentially new phenomenology discussed in the Dark Matter Forum but less studied than s-channel models

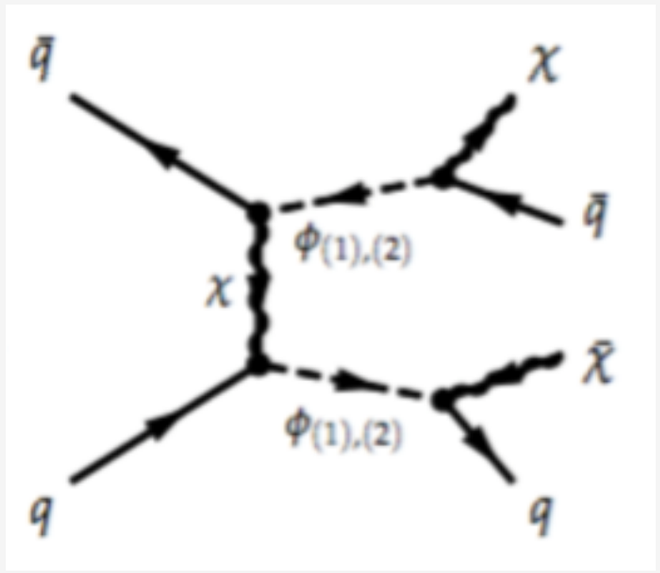


Potentially different signatures than other mono-X signals
Could evade resonance searches (no q-q-mediator vertex)
For couplings between MSSM-like (g~O(0.1)) and non-particle limit (>1), single production of mediators may produce Jacobian peaks



Allanach, Grab, Haber arXiv:1010.4261
Chang, Edezhath, Hutchinson, Luty 1307.8120
An, Wang, Zhang1308.0592
Bai, Berger 1308.0612
Agrawal, Blanchet, Chacko, Kilic arXiv:1109.3516
Difranzo, Tait, Rajaraman, Nagao arXiv:1308.2679
Papucci, Vichi, Zurek arXiv:1402.2285
Bell, Cai, Leane arxiv:1512.00476
Brennan et al. arXiv:1603.01366
Ko et.al. 1605.07058





Considerations:
- Respect EW symmetries
- Respect flavor constraints
- May contribute to classic SUSY multijets+MET signal regions

Progress on t-channel models

McDonald and Ratti, yesterday

Model class described in Dark Matter Forum report now studied in detail by ATLAS
Compared signal kinematic distributions with MSSM benchmark

MadGraph level cross section (pb)

m=450 M=500 g=0.1					
Split	Process	0-j	1-j	2-j	Sum(0,1,2 -j)
1	pp > sq sq	1.4e+00	4.9e-01	1.1e-01	2.0e+00
2	pp > sq dm $ sq	9.6e-03	3.9e-03	1.0e-03	1.5e-02
3	pp > dm dm $ sq	1.4e-05	5.4e-06	4.3e-06	2.4e-05
nom	pp > dm dm	1.4e-05	1.7e-04	6.9e-03	7.0e-03

m=450 M=500 g=1					
Split	Process	0-j	1-j	2-j	Sum(0,1,2 -j)
1	pp > sq sq	1.8e+00	5.5e-01	1.2e-01	2.5e+00
2	pp > sq dm $ sq	9.6e-01	3.0e-01	6.3e-02	1.3e+00
3	pp > dm dm $ sq	1.4e-01	2.3e-02	3.7e-03	1.7e-01
nom	pp > dm dm	1.4e-01	3.7e-02	2.7e-02	2.1e-01

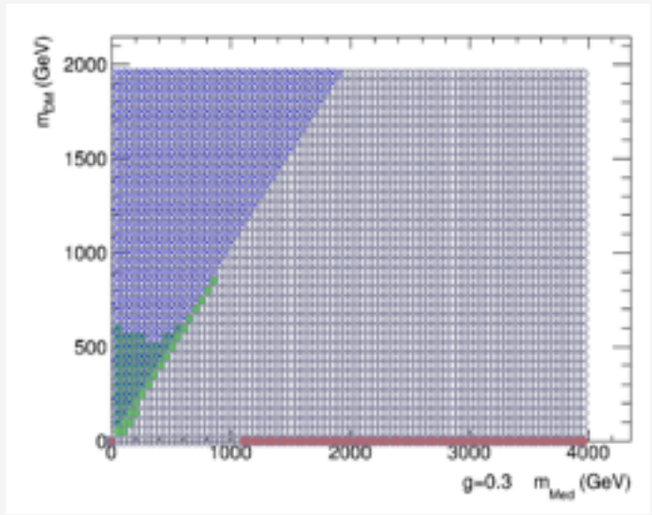
m=450 M=500 g=3					
Split	Process	0-j	1-j	2-j	Sum(0,1,2 -j)
1	pp > sq sq	4.0e+01	6.6e+00	1.8e+00	4.8e+01
2	pp > sq dm $ sq	8.7e+00	1.1e+01	2.5e+00	2.3e+01
3	pp > dm dm $ sq	1.1e+01	1.8e+00	5.8e-01	1.4e+01
nom	pp > dm dm	1.1e+01	2.0e+00	2.2e+00	1.6e+01

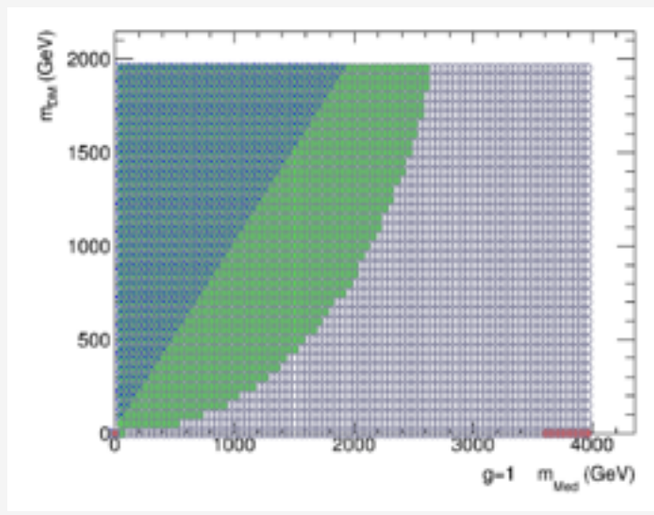
m=450 M=500 g=SUSY					
	Process	0-j	1-j	2-j	Sum(0,1,2 -j)
	pp > sq sq	1.4e+00	4.9e-01	1.1e-01	2.0e+00

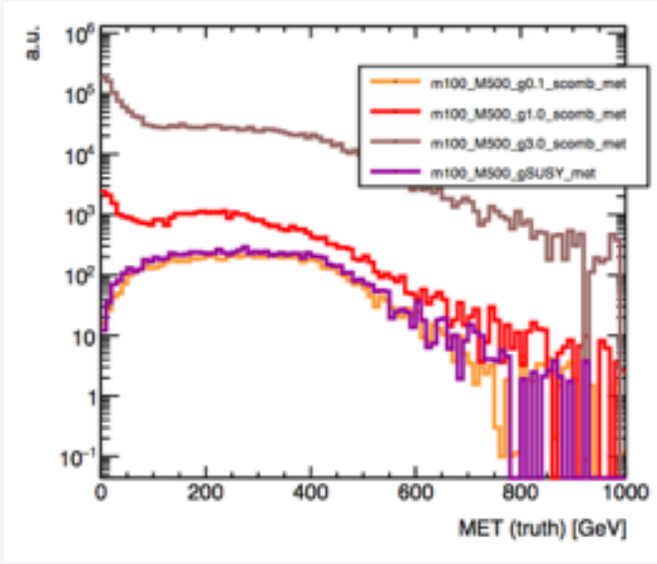
Private mssm production, switched off RH squarks

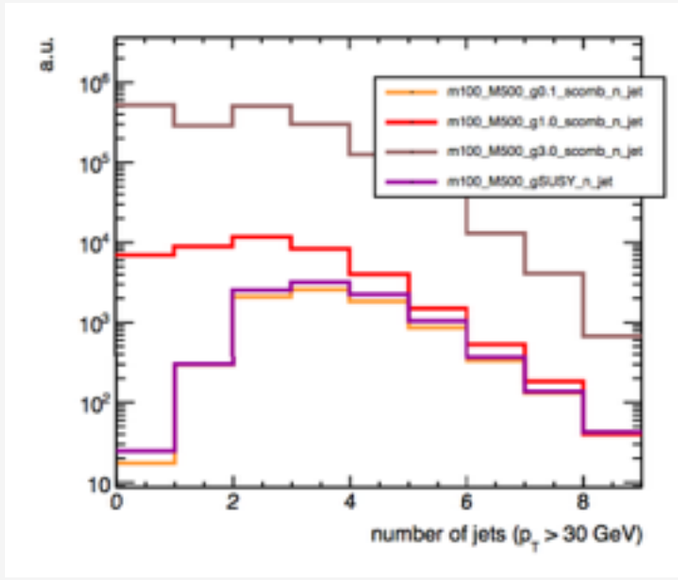
(validated with official ATLAS MC production)

19/09/16









Outstanding points:

Sensitivity of modern SUSY multi jets + MET signal categories
Optimal split/merging/matching scheme