

FLAVORED GAUGE MEDIATION WITH A GAUGED HORIZONTAL SYMMETRY

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Flavor Structure in the Squark Sector

- Initial paradigm for SUSY LHC searches:
A universal soft mass \tilde{M}^2
- Flavor structure in the squark sector can affect LHC searches
- Any mechanism generating **quark** flavor structure (Horizontal symmetry, Extra Dimensions, etc.) can affect the **squark** sector as well
- Must be consistent with flavor observables

Flavored Gauge mediation

Gauge Mediated Supersymmetry breaking (GMSB):

- Matter fields get ~~SUSY~~ from gauge loops
- Flavor universal squark masses
- Zero A-terms @ messenger scale

Giudice, Rattazzi, 1998

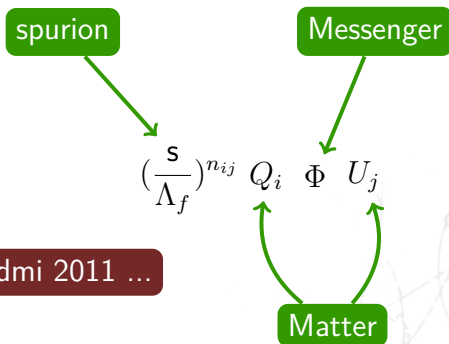
Flavored Gauge Mediation:

- GMSB messengers couple directly to matter superfields in a flavor dependent way
- Additional **flavor dependent** contribution to squark masses & A-terms

Szabo, Shadmi, 2011

How to control messenger matter couplings?

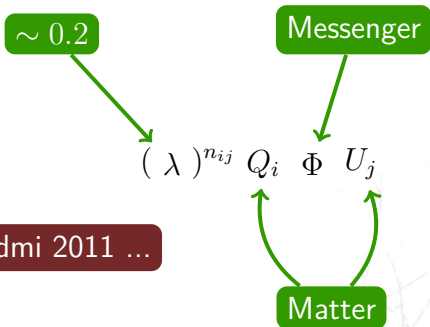
- An abelian Horizontal symmetry - different flavors carry different charges
- broken by spurions at a high scale
- Ordinary Yukawas and messenger-matter couplings obtained in a Froggatt-Nielsen like mechanism



Szabo, Shadmi 2011 ...

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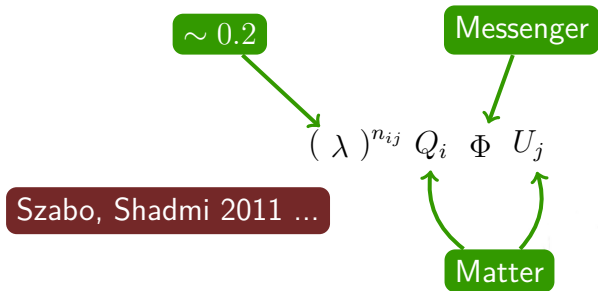
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n_{ij} , the suppression of each term, is given by the overall matter charge under the horizontal symmetry.

A Gauged Horizontal Symmetry?

- Need quark-squark alignment to fulfil flavor constraints
- For a SUSY gauge symmetry:
 - Anomaly cancellation
 - No D-term VEV from spurion VEVs
- simplest possibility:
 - 2 spurions of opposite charges
 - Very hard to get alignment (no "holomorphic zeros")

A Gauged Horizontal Symmetry: Multiple Spurions

Solution: use **three spurions** or more, with equal VEVs and charges that sum up to zero.

- D-term constraint automatically satisfied
- Much more freedom in selecting matter charges that:
 - Are anomaly free
 - Generate quark-squark alignment

Many consistent charge assignments!

A gauged horizontal symmetry consistent with flavor bounds

Phenomenologically interesting squark flavor structure

Can get:

- MFV & large stop mixing
- heavy first generation squarks
- stop-scharm mixing

A gauged horizontal symmetry consistent with flavor bounds

Phenomenologically interesting squark flavor structure

Can play with messenger charge to get:

- MFV & large stop mixing
- heavy first generation squarks
- stop-scharm mixing

Thank You!