

Simplified Models *for* Hidden Dark Sectors

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Work in progress with Tim Cohen, Tim Lou, and Siddharth Sharma

Typically, LHC dark matter searches are cast in terms of

- simplified models for supersymmetry
- effective theory of dark matter interactions

WIMP paradigm has been the primary motivator for current dark matter program at LHC

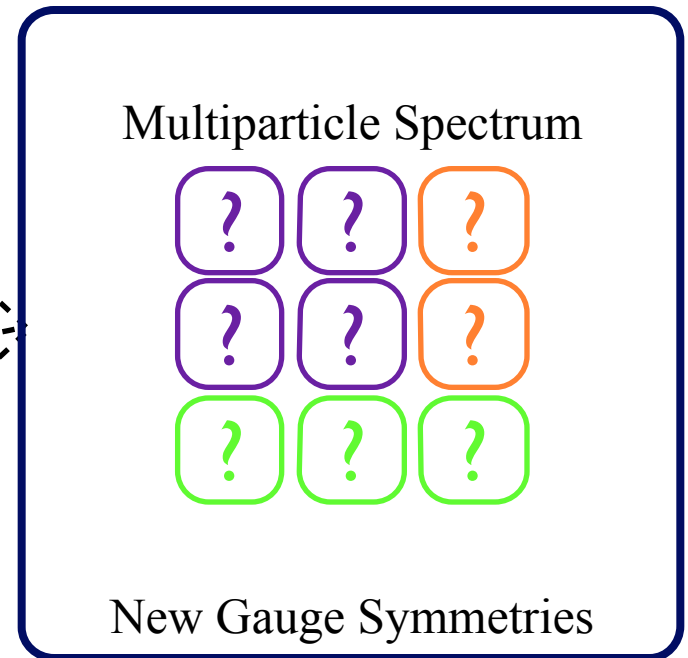
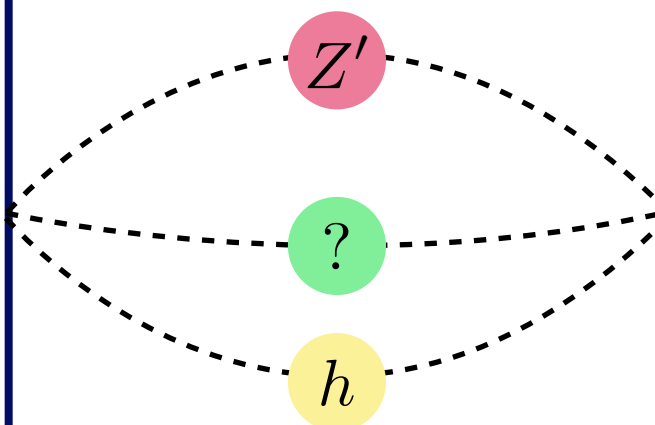
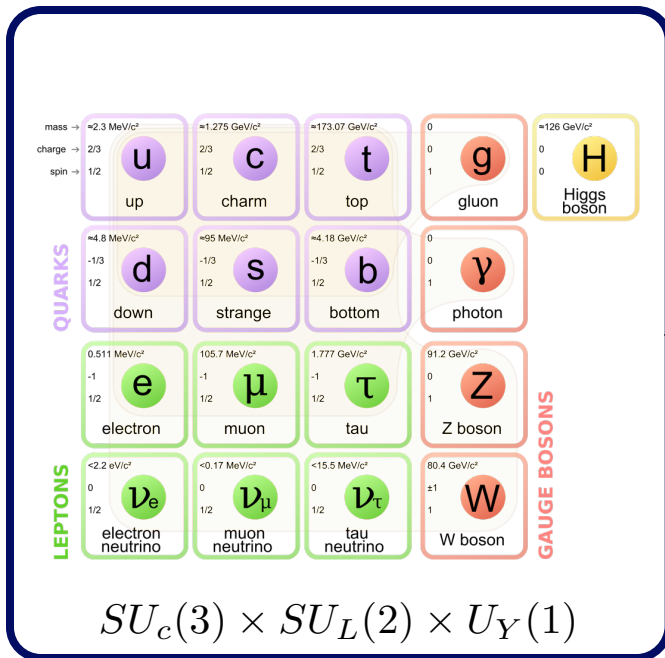
Important to consider other well-motivated dark matter scenarios to ensure that all possibilities are fully explored

Hidden Dark Sector

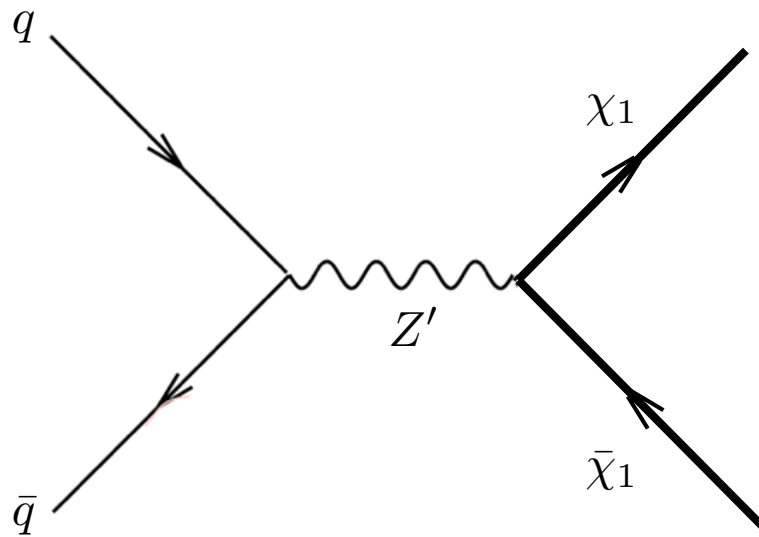
Visible Sector

Portal

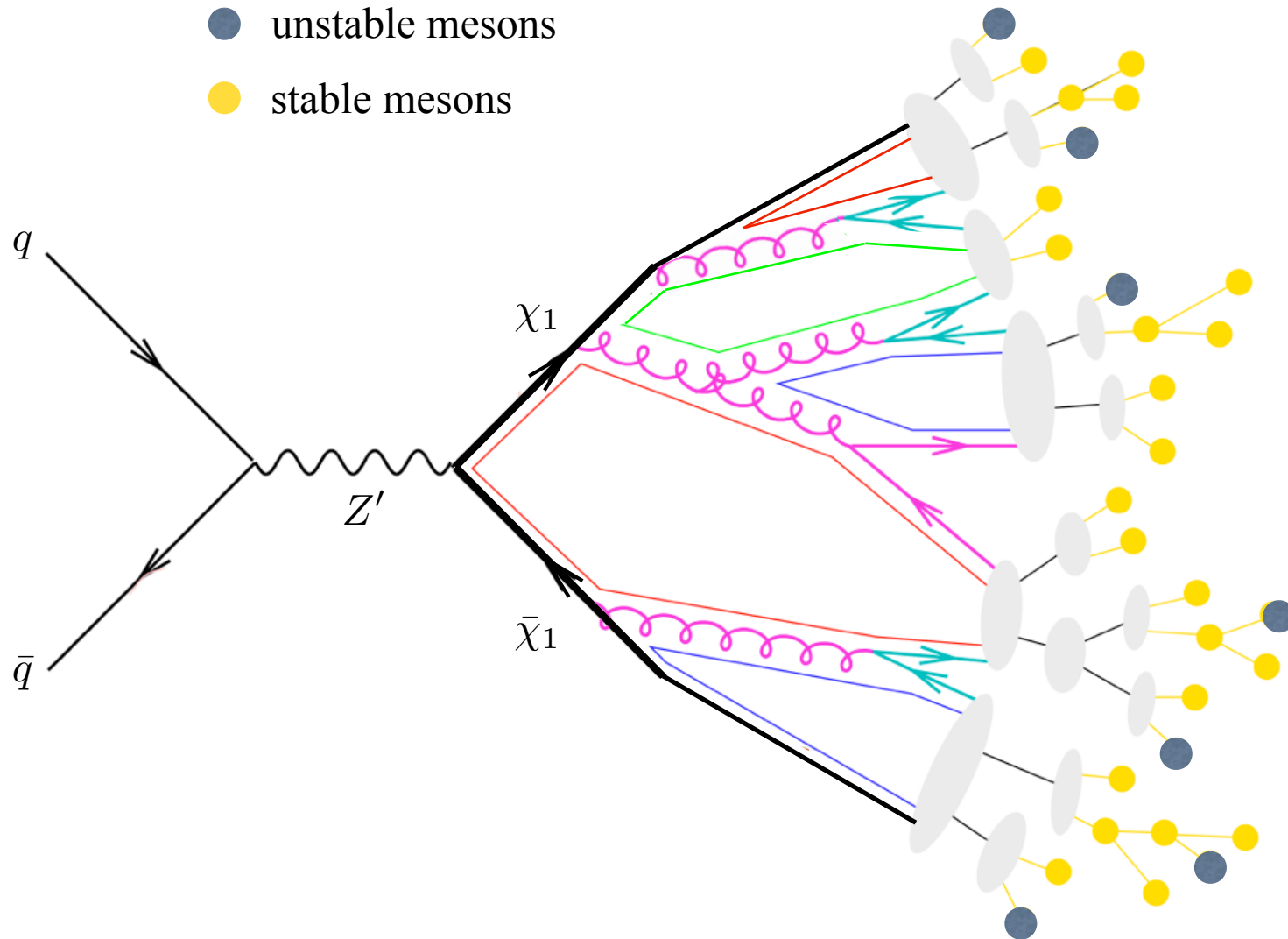
Dark Sector



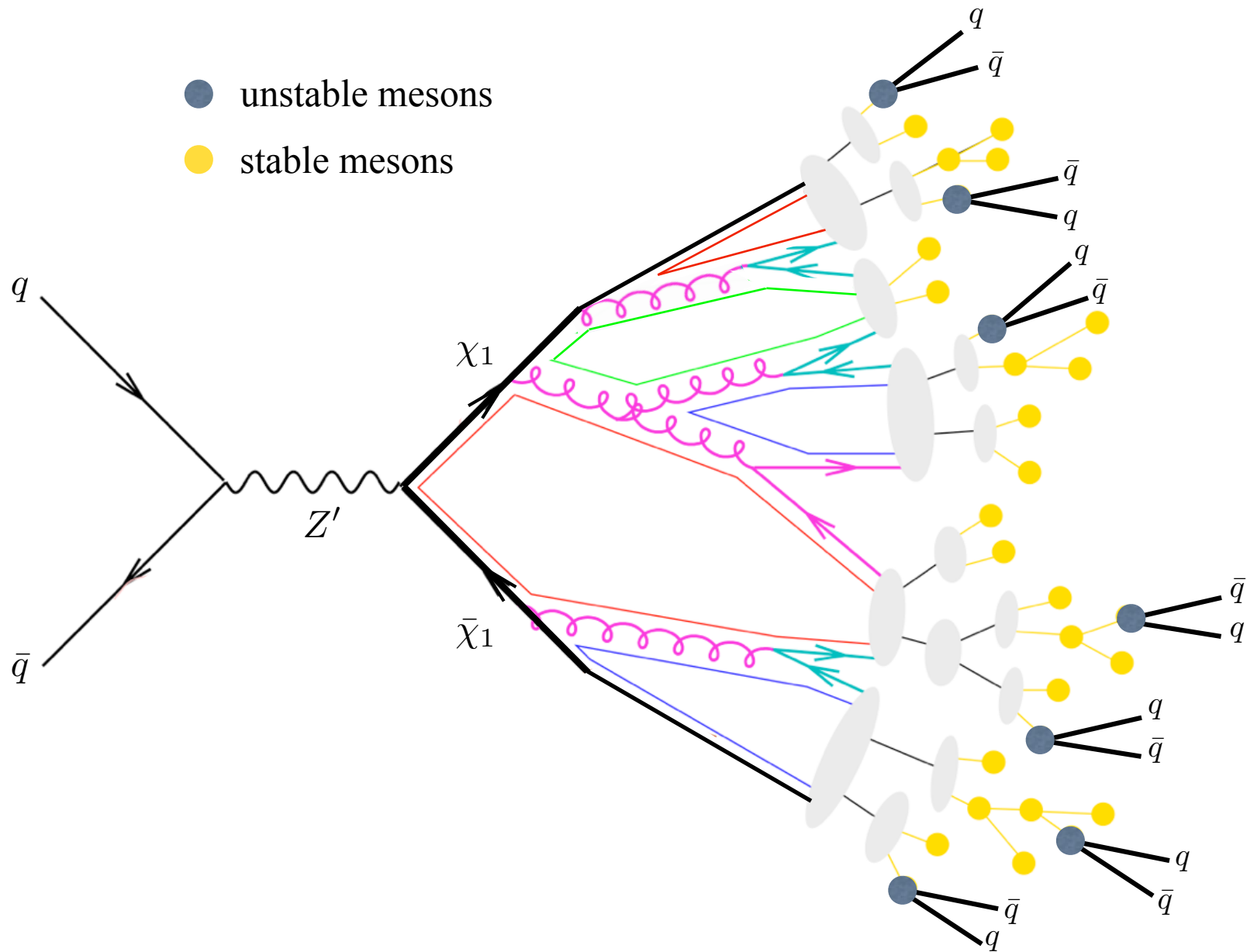
Anatomy of a Signal



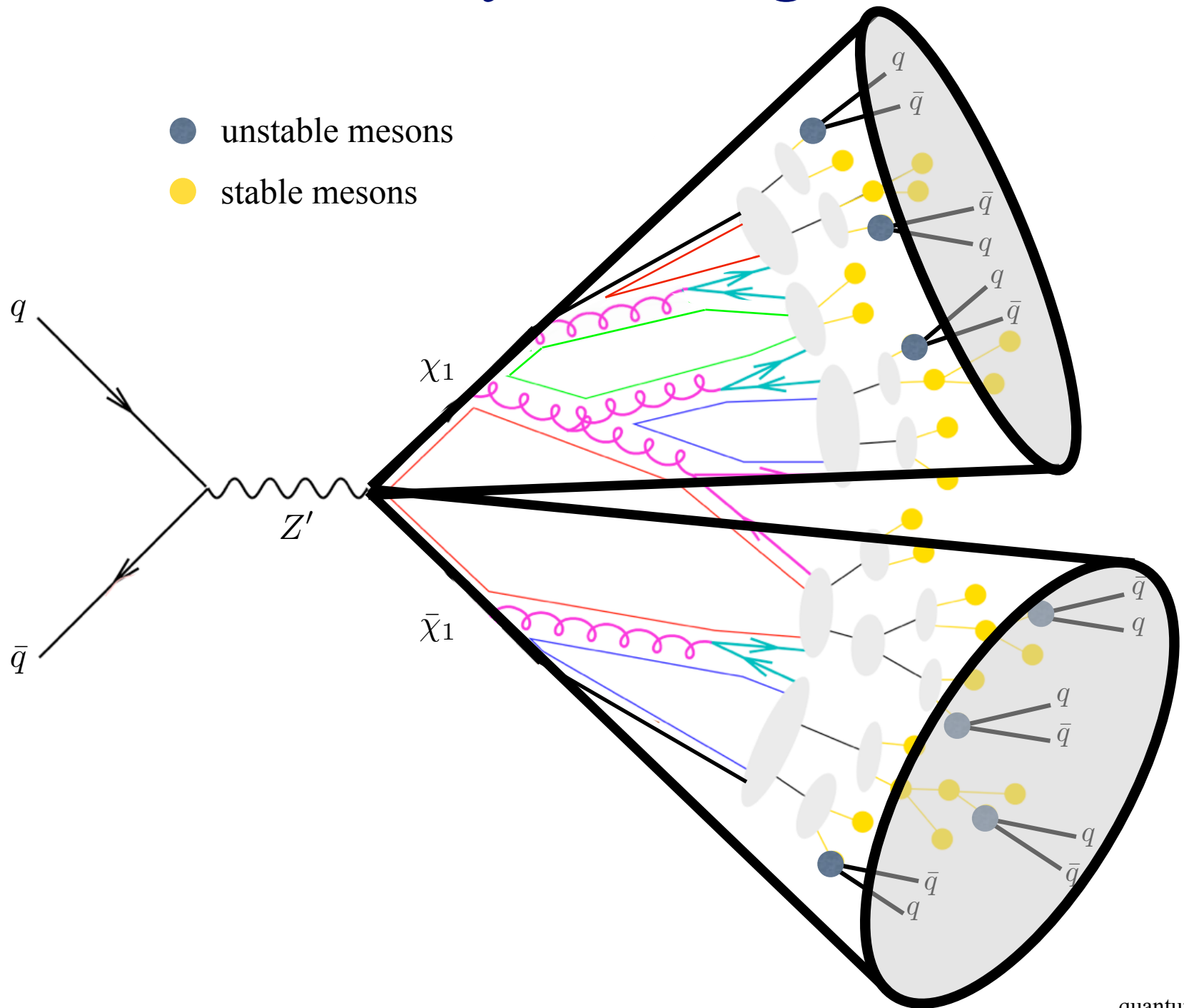
Anatomy of a Signal



Anatomy of a Signal



Anatomy of a Signal



Simplified Model Approach

Seemingly infinite possibilities for the dark sector

At first glance, may seem impossible to develop a systematic search strategy to scan relevant parameter space

However, many of the details of the dark sector spectrum are not relevant for quantities measured in the detector

Focus on dark sector parameters that are most important for observable quantities

Parametrization

Portal

Dark
Sector

	DESCRIPTION	BENCHMARK
$\sigma \times \text{Br}$	cross section \times branching ratio	80 fb
$M_{Z'}$	Z' pole mass	3 TeV
M_d	dark hadron mass scale	20 GeV
$\alpha_d(1 \text{ TeV})$	running dark coupling	0.2
r_{inv}	ratio of stable to unstable	0.3

Bump Hunt

Use of transverse mass effectively turns this search into a massive resonance bump hunt

