Search for electroweak SUSY production at CMS

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Introduction:

Despite the lower cross section with respect to hadronically produced SUSY, electroweak production has become accessible due to the excellent performance of the LHC, delivering roughly 20 fb^{-1} worth of 8 TeV data to CMS in 2012. This result is based on **PAS SUS-13-006**

Object-, and signal selections:

• standard CMS leptons with distinct features of
--> p_T > 20/10 GeV
--> well **isolated**
• little to no requirement on hadronic activity in the events, since we don't expect much from weakly produced SUSY
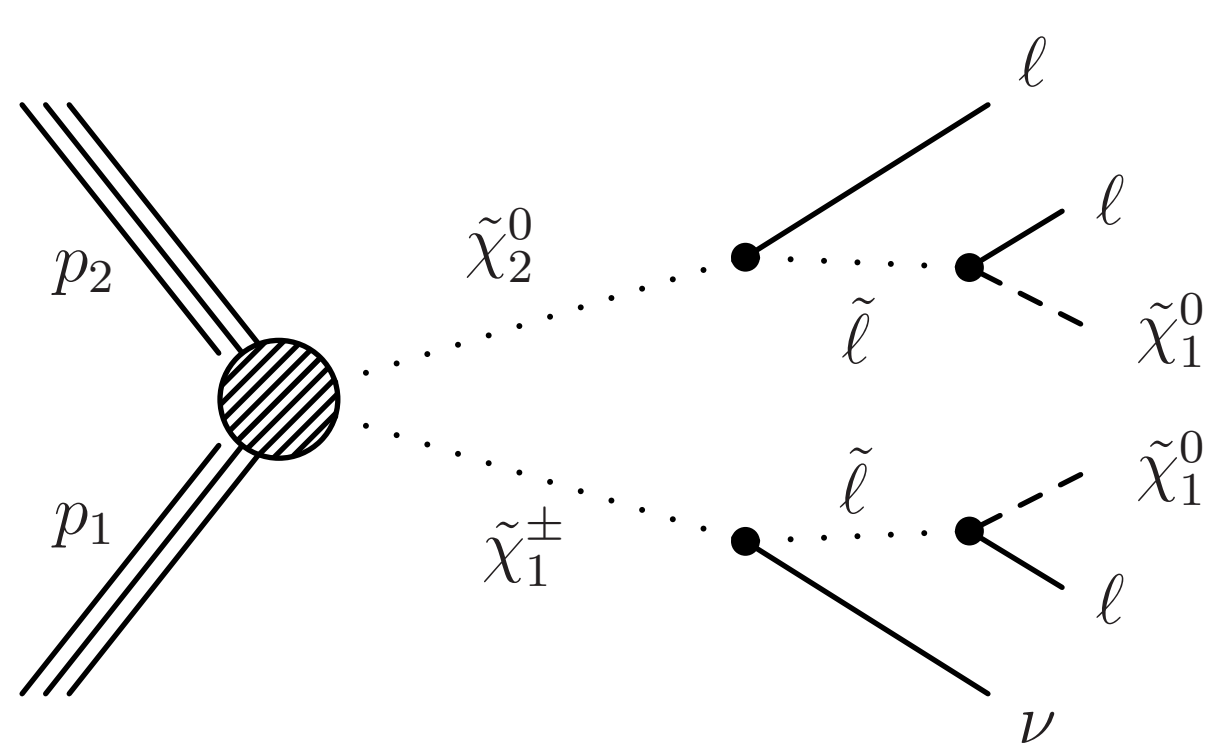
• analysis done in **different multiplicities of the leptons:**

--> **2 leptons of same sign (e/μ)**
--> **2 leptons of opposite sign (e/μ)**
--> **3+ leptons of any flavor**

Targeted signal models:

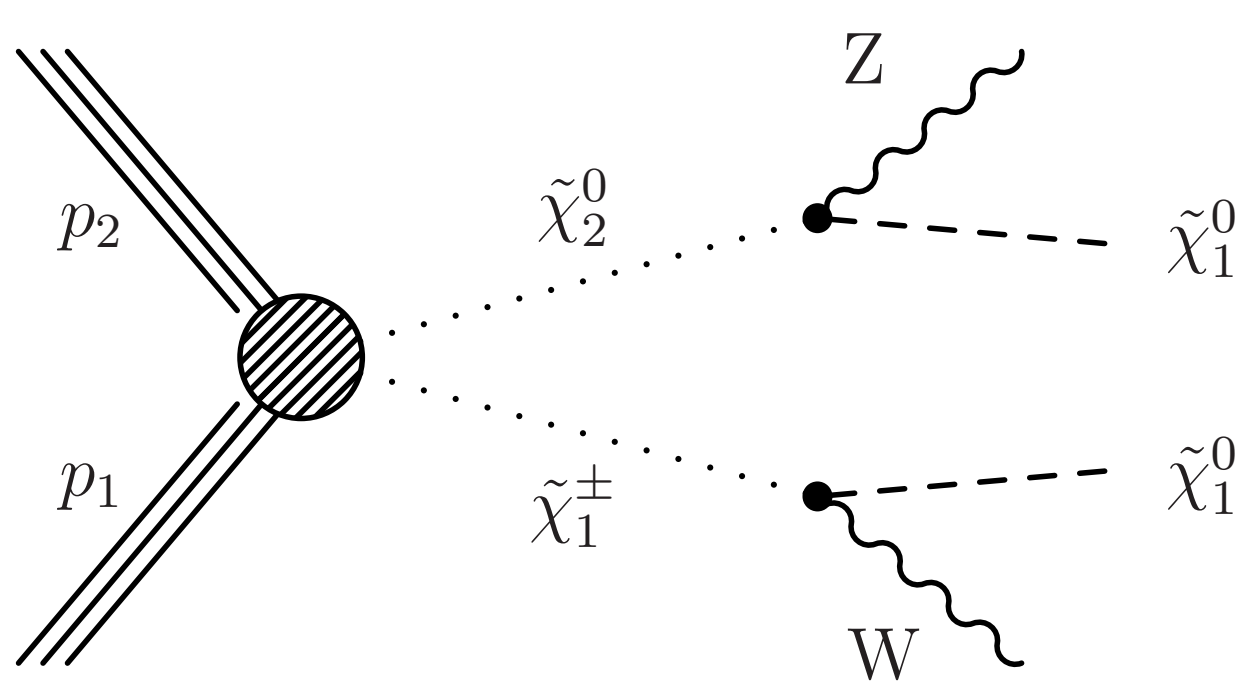many different signal models of electroweak production of SUSY

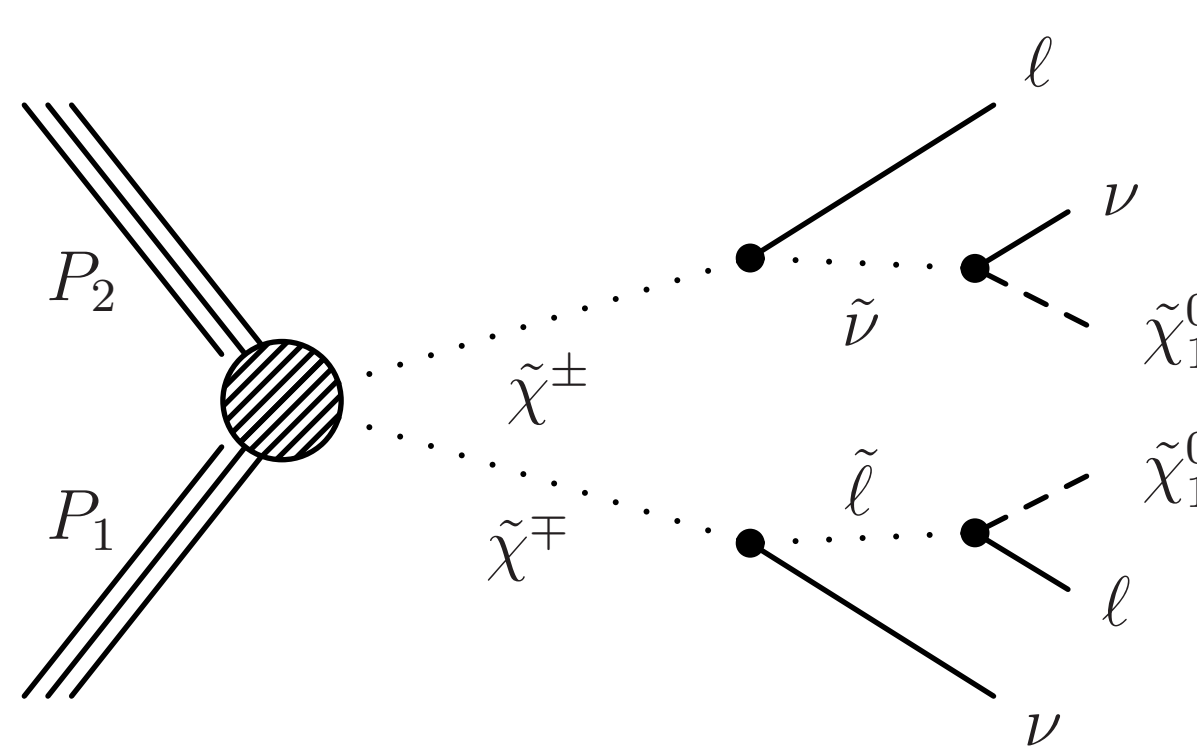### chargino - neutralino production:

3 different scenarios:
- -> **flavor democratic decays**
- -> **chargino decays to tau-leptons**
- -> **chargino and neutralino to taus only**

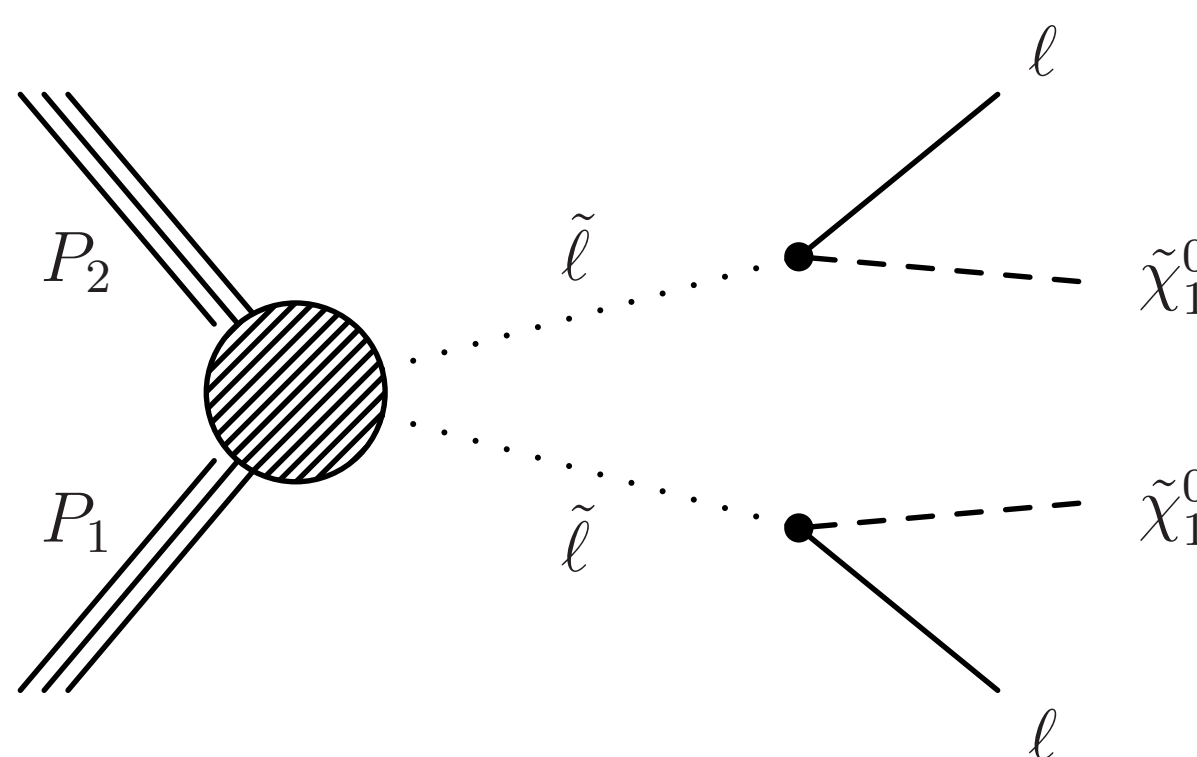if the sleptons are too heavy, decays are to W and Z bosons

chargino - chargino production:

charginos can decay either way: 4 possibilities

slepton pair production:

only (s)electrons and (s)muons considered here

Analysis strategies:

• many strategies employed to cover a wide range of final states and backgrounds

fake-rate method
based on a tight-to-loose estimation method for the leptons. probabilities measured in auxiliary samples in data and applied to sidebands in data

charge mis-ID
probability measured in data and applied to sideband regions

template method
measure and fit the ME$_T$ spectrum in corrected auxiliary data samples which feature similar kinematics as the backgrounds

M$_{CT}$
a variable which reduces SM backgrounds (similar to MT$_2$) is used and the distribution is fit on data at low values to extrapolate to the signal region

MC simulation
irreducible backgrounds taken from MC with validation on and corrections from data where possible

The limits:

• **no significant excesses** observed
--> in any of the final states and signal regions
--> **upper limits** are set on the described models

• only some example exclusions shown here
--> more can be found online and in the PAS
--> follow this to find all the information

• a final update of this analysis will follow shortly
--> probing lower mass splitting, including off-shell W