

# WG1 summary

# Overview

- The WG1 contributions spans three areas:
  - Top quark physics
    - FCNC production ( $t\bar{c}$ ) in the context of MSSM, 2HDM models
    - MSSM contributions to  $t\bar{t}$ ,  $t\bar{b}$ ,  $tW$  production
    - Top FCNC decays
  - Supersymmetry
    - Non-diagonal mass matrices, flavour-violation in susy particle decays
    - Measurement of Stop mass and decays – models with a light stop motivated by electroweak baryogenesis
    - Constraints on SUSY parameters and low-energy observables from LHC measurements
  - Other New physics models
    - E6 singlet quarks, 4<sup>th</sup> generation, Randall-Sundrum, Little Higgs

# Top quark physics - 1

- We had talks on the computation of  $t\bar{c}$  production cross section from Barcellonaa group

**S. Bejar, Higgs dcays into top quarks in the 2HDM**

**J. Guasch, Single top production by durement supersymmetric FCNC at the LHC**

- Mediated by Higgs in the context of 2HDM(2 Higgs doublet extension of SM)
- In the context of Supersymmetry
- Cross section of up to 0.5 pb if light gluino
- Not clear if it can be observed at LHC. Huge background from  $t\bar{t}$ , SM single top,  $W$ +jets etc.

# Top quark physics - 2

- An other presentation shows the calculation of the complete 1-loop electroweak Supersymmetric contribution to  $tW$  production

## **C. Verzegnassi, A complete 1-loop MSSM production of $tW$ production**

- SUSY effects unfortunately very small (few per cents)
- Top pair and other single-top channels discussed in November, with some experimental study (ATLAS)
- Some work also started on the effect of  $tWb$  anomalous couplings on the angular distributions of top decay products (Theory+CMS)

## **M.M. Najafabadi, $tWb$ anomalous couplings**

# Top quark physics -3

- Other work on this area include:
  - $W$ +top+Higgs precision tests (presentation by Heinemeyer in November)
  - Some interest to update predictions of FCNC top decay rates in MSSM, compare effect/sensitivity with  $t\bar{c}$  production

# Supersymmetry

## **S. Paktinat, Search for stop in CMS**

- Study of the scalar top production in gluino decays started in CMS
- Models with produce baryogenesis at electroweak scale predict a light scalar top (120-160 GeV). They inspired two contributions:
- **A. Raklev, Search for a light stop**

Review of theory constraints, production of the light stop in gluino decays, measurements of kinematical endpoints (possible with moderate statistic – 30 fb<sup>-1</sup>)

- **T. Lari, Search for a light stop with ATLAS**

Search for stop direct production, followed by  $W^*b \chi_0$  decay.

Possible to subtract top background, see a signal and measure some kinematical endpoints (mass relations) with just 2 fb<sup>-1</sup> in favourable model

## **B. Fuks, SUSY CKM matrix**

Dealing with mixing (CKM-parametrized) in squark sector, and effects on production cross sections in various channels

Plus, of course, the study of Polesello presented at the plenary yesterday

# Other BSM models

- Contributions:

- G. Unel, Update on E6 isosinglet quark studies**

- The model foresees new singlet quark states. The discovery reach in various channels was refined, and the possibility to measure mixing angles with SM singlet quarks was investigated. ATLAS experimental study

- Plus, of course, the contributions on Randall-Sundrum, Little Higgs and 4<sup>th</sup> generation presented at the plenary yesterday

- Activity started on various topics, communication between groups improving
- Synergy with other WG to be improved
  - A Wg1+3 sub-group on lepton flavour violation in susy particles decay is being set up
  - Also: susy flavour-violating benchmarks, tools to relate LHC and b-physics measurements
- Next talk reports on the tools activity