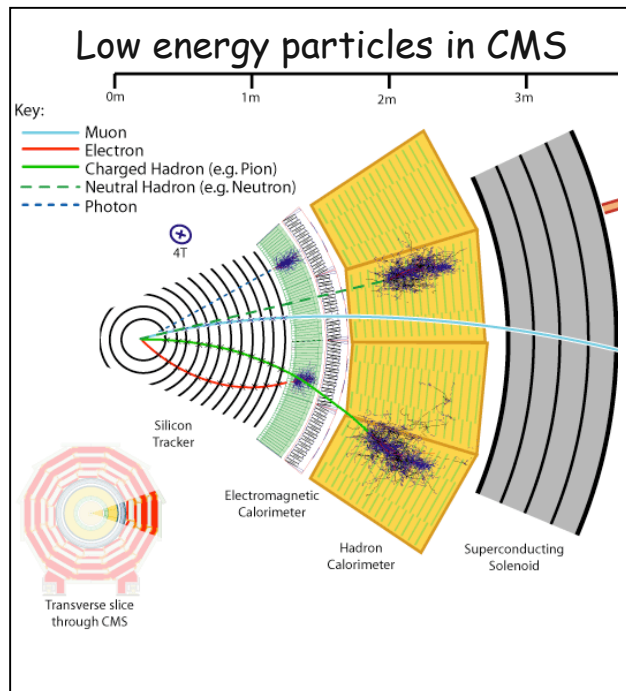


# Search for very massive resonances in the di-e channels

- Work in the frame of the Randall-Sundrum model :  
Search for TeV resonances in the di-electron mass spectrum
- SM background : Drell-Yan (k factor =1.3)  
[ Jet faking an electron: Dijet,  $\gamma$ -jet, e-jet which is negligible in comparison to Drell-Yan ]

# Full Simulation & Reconstruction Analysis

Generation with **PYTHIA** with a correct description of the energy evolution of the squared amplitude + inner Bremsstrahlung with **PHOTOS**



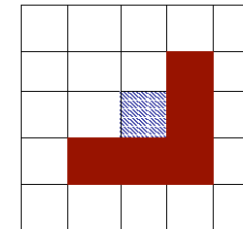
**Full Simulation and Reconstruction chain of CMS (CMSIM & ORCA without pile-up):**

- Very high energetic electrons! Work on the electron reconstruction
- Synchrotron radiation is included but found to be negligible in comparison to Bremsstrahlung in the tracker
- Possible saturation of the ECAL electronics

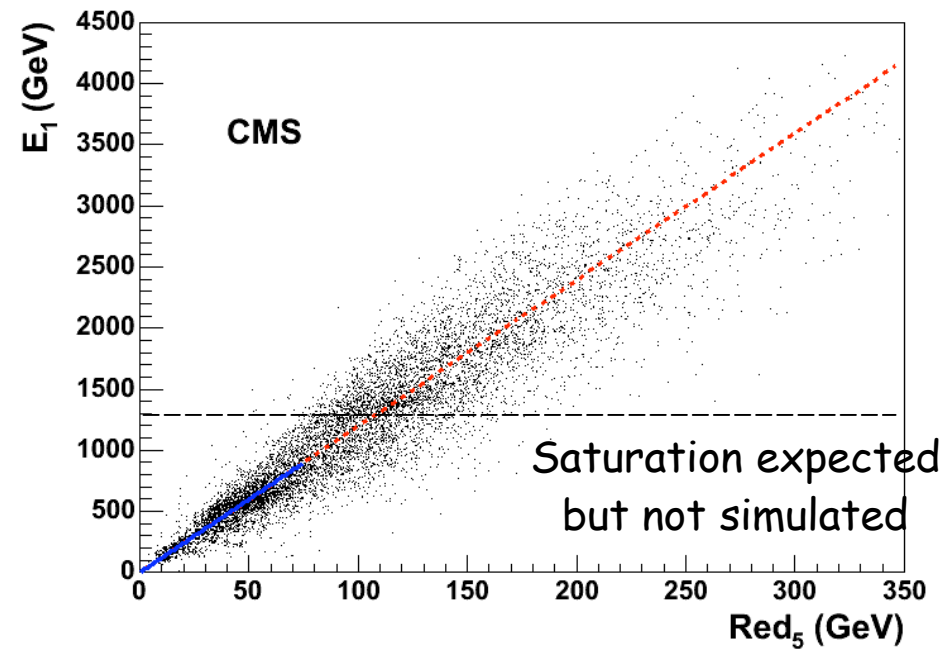
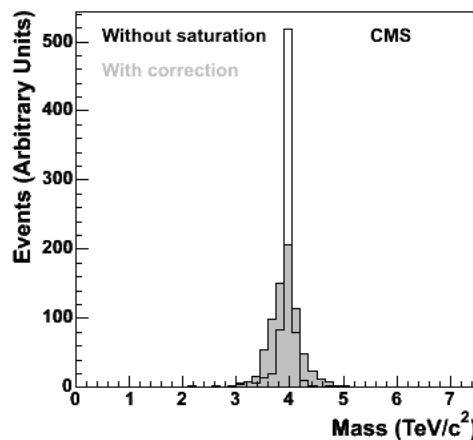
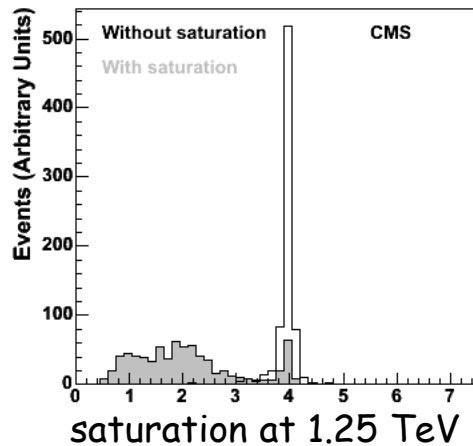
# Saturation of the ECAL electronics @ 1,7 TeV in the barrel

The saturation has a big effect on the mass reconstruction of heavy resonances.

5x5 crystals



Idea for correction:  
Correlation between  
 $Red_5 = E_9 - E_4$  and  $E_1$

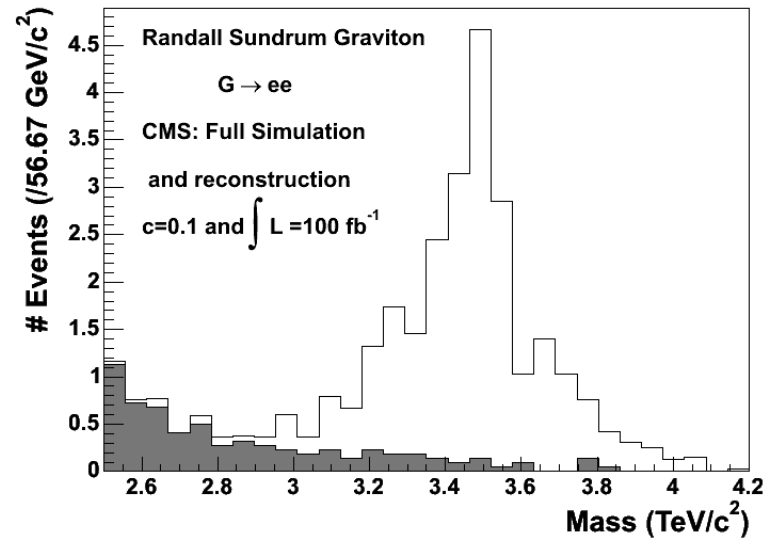
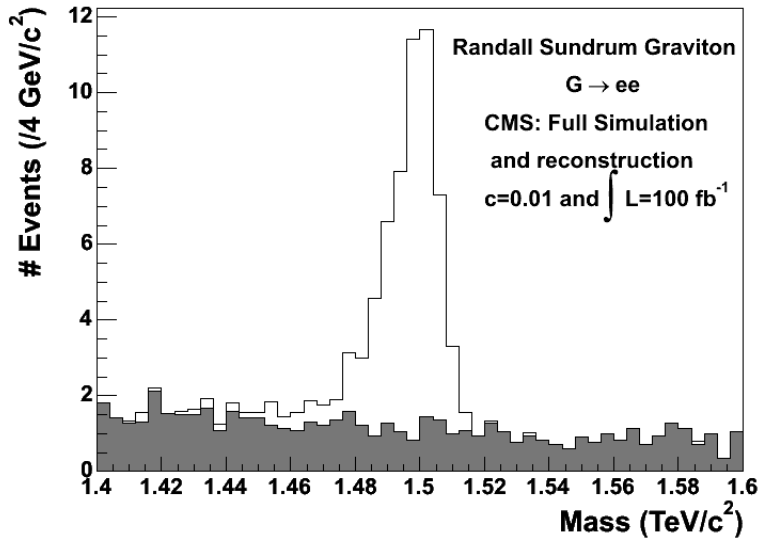


# Selection Cuts

$$pp \rightarrow G \rightarrow e^+e^-$$

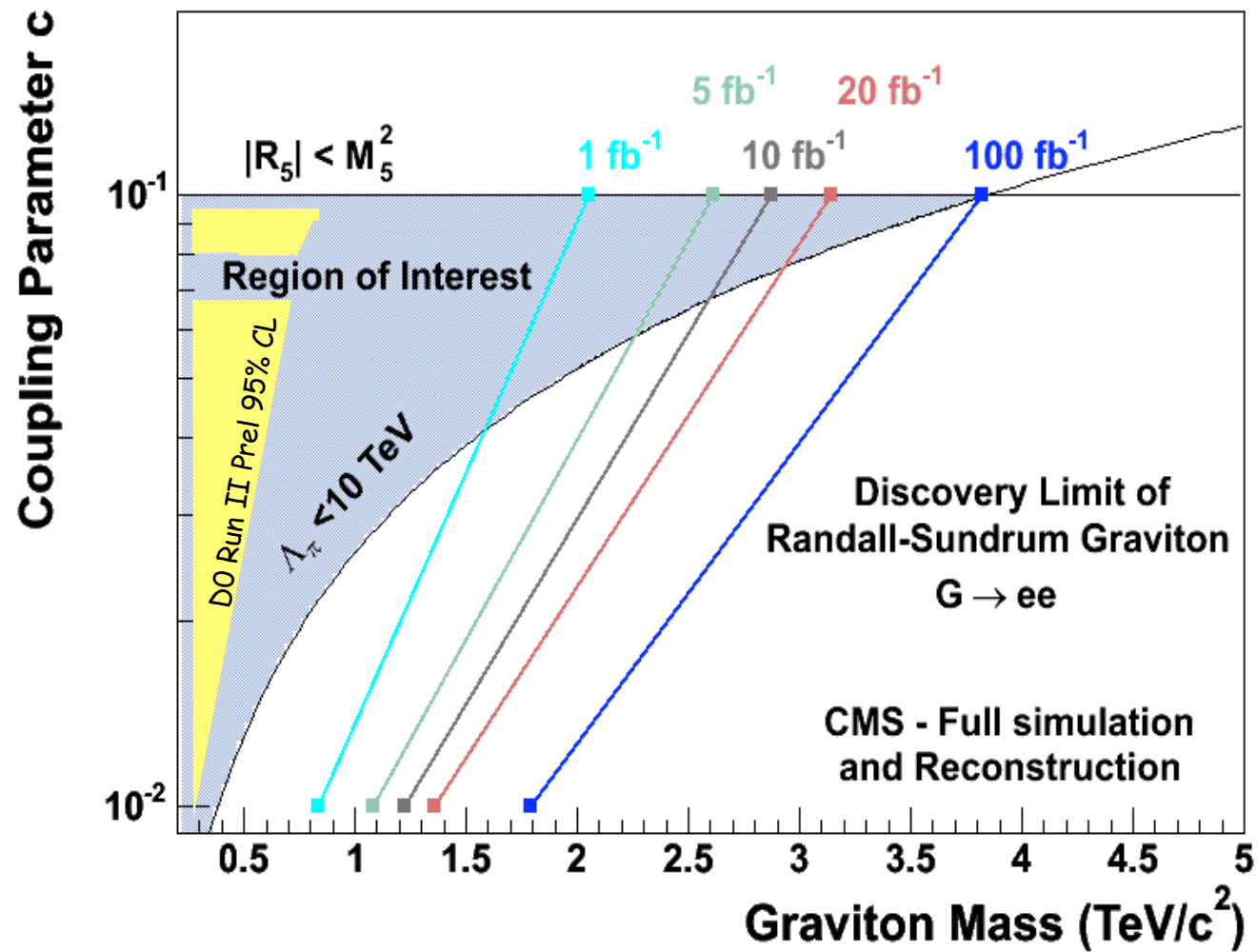
- Trigger up to Level 2.5
- 2 electrons
  - o Super-Clusters:
    - $p_T > 100 \text{ GeV}$ ,
    - $|\eta| < 1.4442$  (barrel)  
or  $1.566 < |\eta| < 2.5$  (endcaps)
  - o Isolated:  $E_T^{\text{cone}} < 0.02 E_T^{\text{SC}}$  in cone  $\Delta r < 0.5$  (to kill big jets)
  - o Electromagnetic:  $H/E < 0.1$  (to kill  $\pi^+/\pi^-$ )
  - o Charged: 2 tracks with at least 2 hits (to kill  $\pi^0/\gamma$ )

# Search for a resonance



- Fit of a Gaussian to the signal distribution
- Mass window for  $N_S$  and  $N_B$  estimation:  $\langle M \rangle \pm 3\sigma$
- For low coupling values:  $E_1 < 1.25 \text{ TeV}$
- For large coupling values: correction of the saturation coming from the ECAL electronics

# Discovery potential of CMS



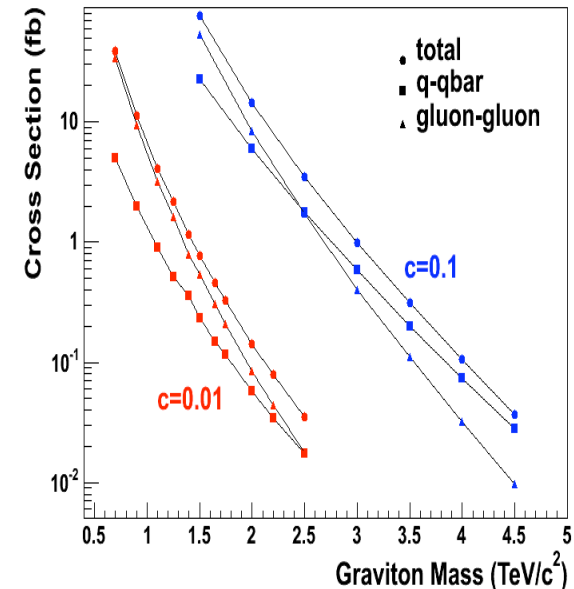
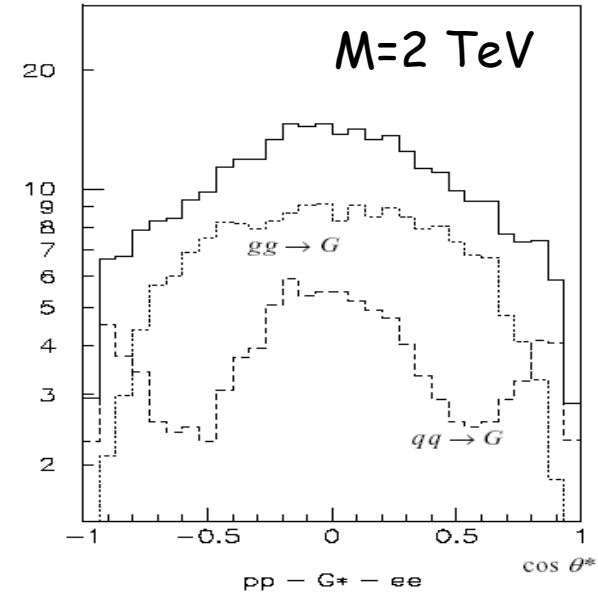
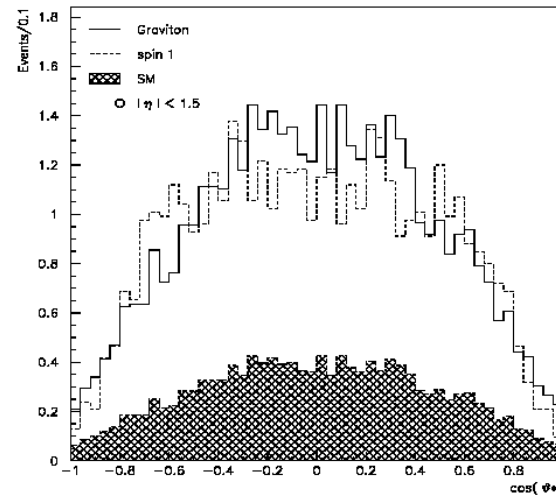
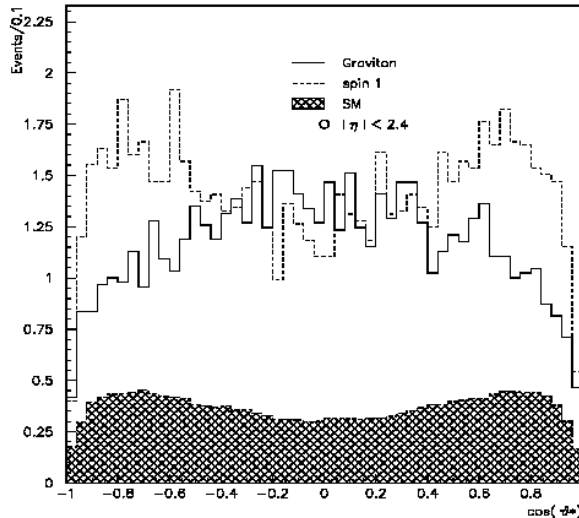
# Angular Distribution

Analysis with fast simulation (CMSJET)

$|\eta| < 2.4$

$M=1.5$  TeV

$|\eta| < 1.5$



- Need of the endcaps!

- Dependence on the Graviton mass

⇒ Need to do the study with the full simulation and reconstruction chain of CMS