



# Graviton $\rightarrow e^+e^-$ Update

SUSY/Exotics Meeting in Oxford, 19/03/10.



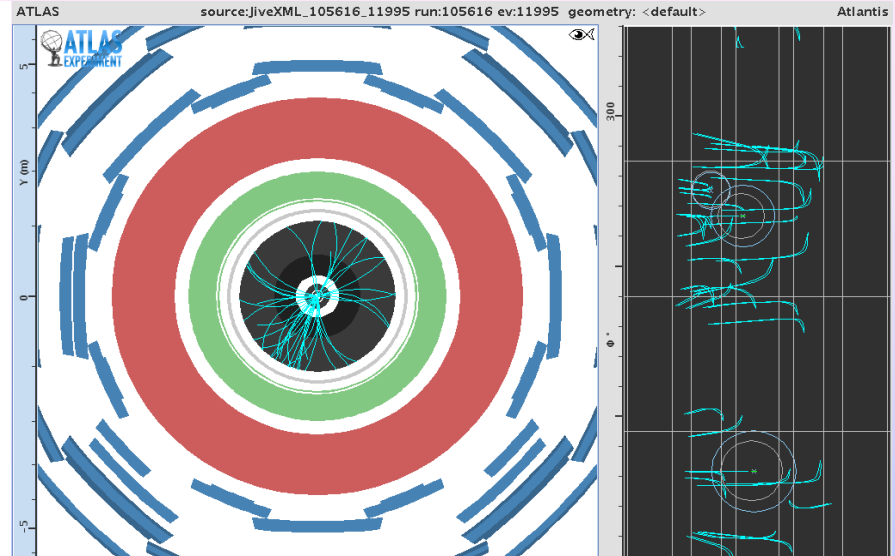
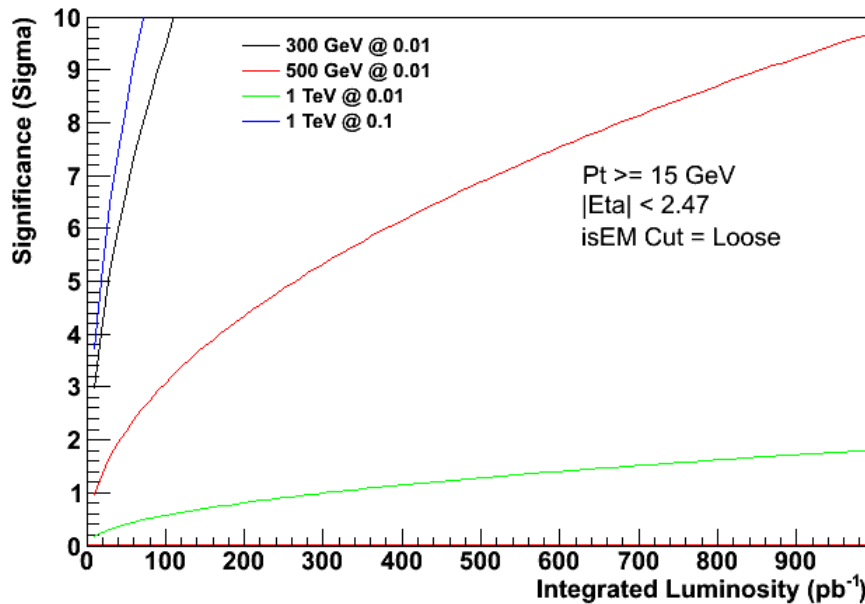
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# Contents

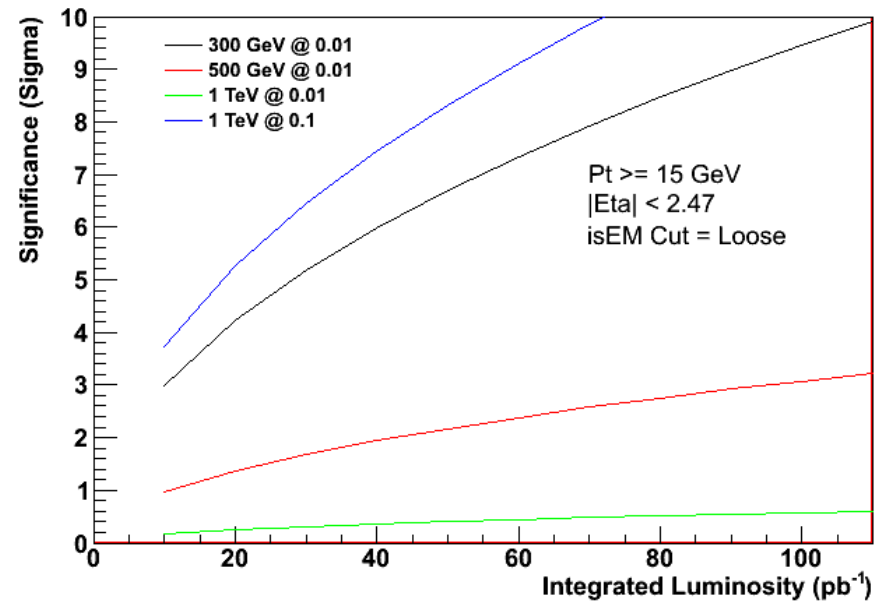
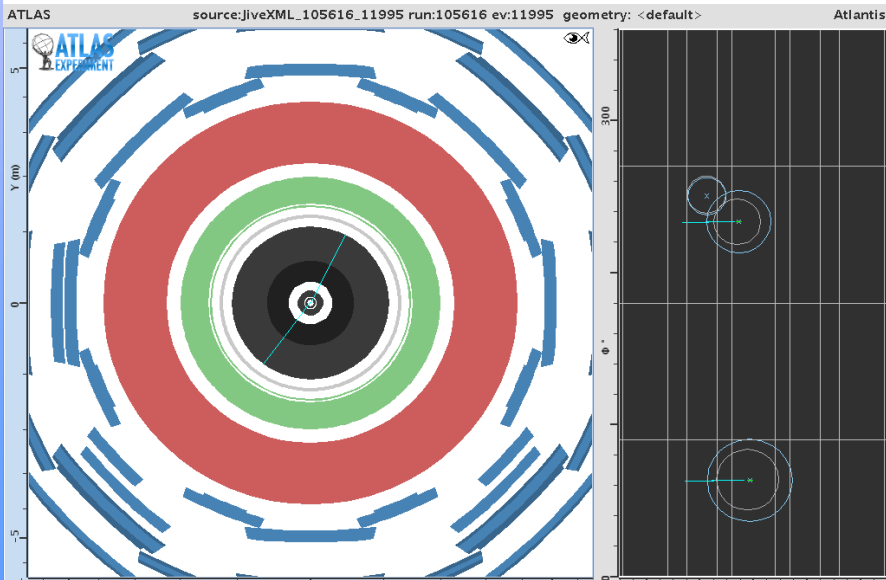
- Analysis with MC09 @ 10 TeV
- First Look with 900 GeV Data
- New MC09 Samples @ 7 TeV
- Expected Reach with Early Data
- Conclusion

# Analysis with MC09 at 10 TeV

Graviton->ee Discovery @ 10 TeV CME



Graviton->ee Discovery @ 10 TeV CME

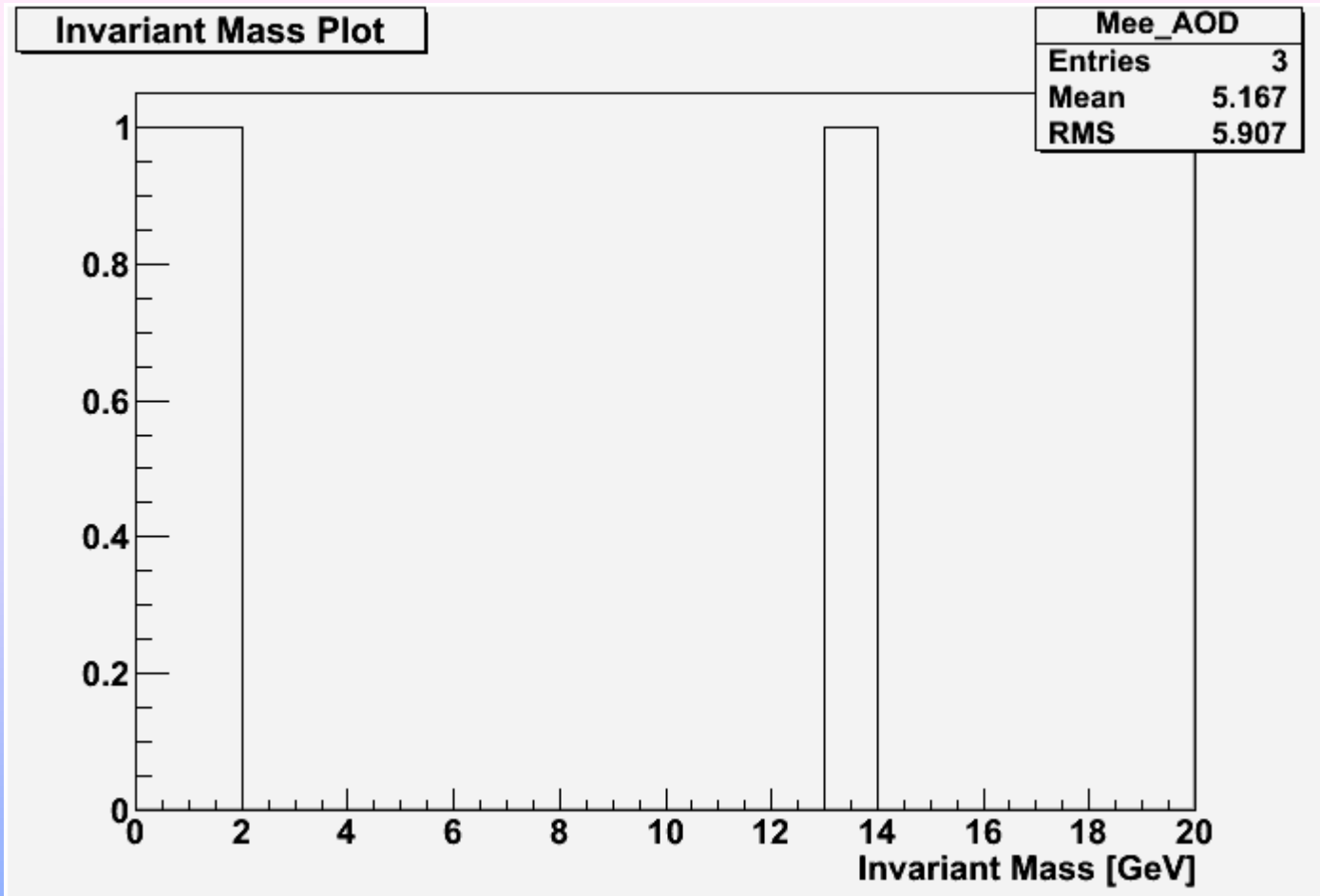


# First Look with 900 GeV Data

Have been looking at Energy Resolution Outliers with First Data for my Service Work, so decided to use the good runs / lumi-blocks to run my analysis on, see what I found;

Cuts:

- Only “Good Runs” and Lumiblocks in L1CaloEM Stream, with COLL CAND Tag.
- $P_t > 3 \text{ GeV}$ .
- $|\text{Eta}| < 2.5$  & Exclude Crack Region.
- IsEM = Loose.



Run Number	Event	Lumi-Block	Good?
142191	364462	130	No
142383	314017	249	No
142383	387576	260	Yes!

# New MC09 Samples @ 7 TeV

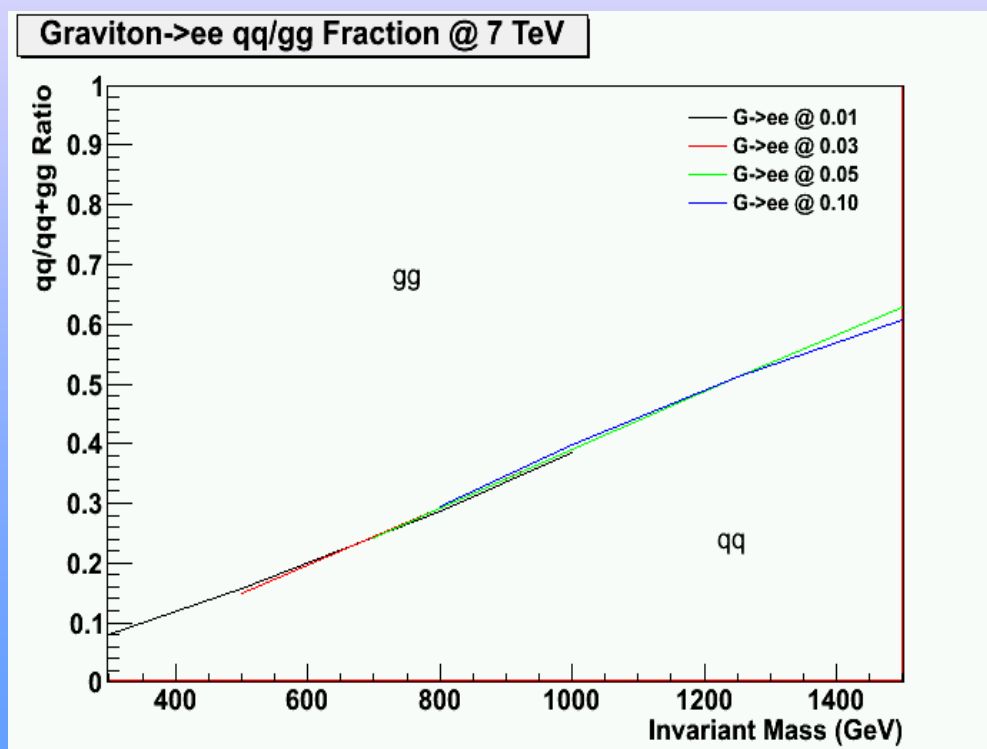
Now we know we are going to have ~18 months at 7 TeV to collect  $1 \text{ fb}^{-1}$  of data, makes sense to have samples remade @ 7 TeV. (previously 10 TeV).

## Samples on Request (Approved and in Production):

- $G \rightarrow e^+e^-$ , Masses = 300, 500, 800, 1000 GeV,  $k/M_{\text{pl}} = 0.01$
- $G \rightarrow e^+e^-$ , Masses = 500, 800, 1000 GeV,  $k/M_{\text{pl}} = 0.03$
- $G \rightarrow e^+e^-$ , Masses = 700, 1000, 1250, 1500 GeV,  $k/M_{\text{pl}} = 0.05$
- $G \rightarrow e^+e^-$ , Masses = 800, 1000, 1250, 1500 GeV,  $k/M_{\text{pl}} = 0.1$

- Mass Points & Couplings chosen for multiple reasons;
  1. Covers Tevatrons Current Limits and Reach for Imminent Data.
  2. Compliments Other Graviton Searches, i.e.  $G \rightarrow \mu^+ \mu^-$ ,  $G \rightarrow \gamma \gamma$ .
  3. Compliments Other Similar Searches, i.e.  $Z'$ .

Also, I took the liberty of making a qq/gg plot from all the validation I had to do!



# Expected Limits with Early Data

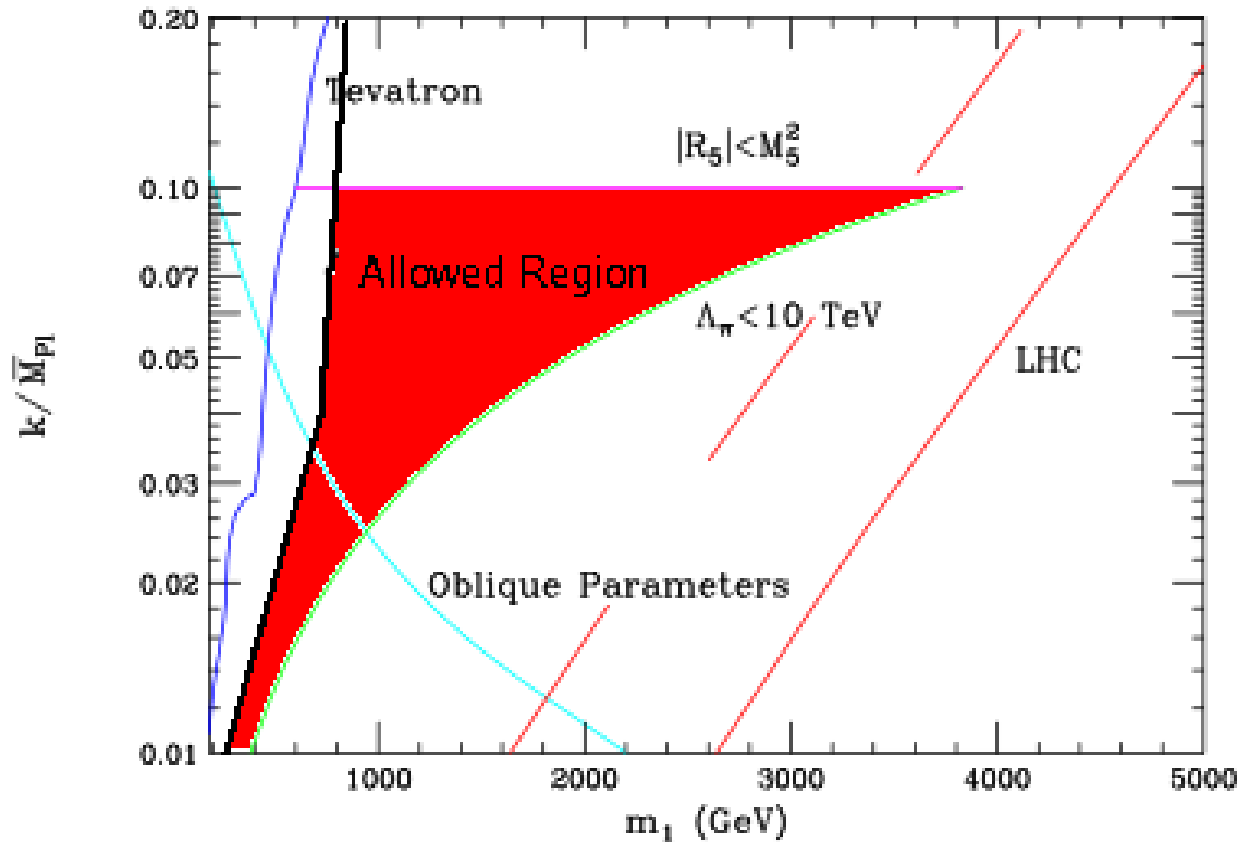
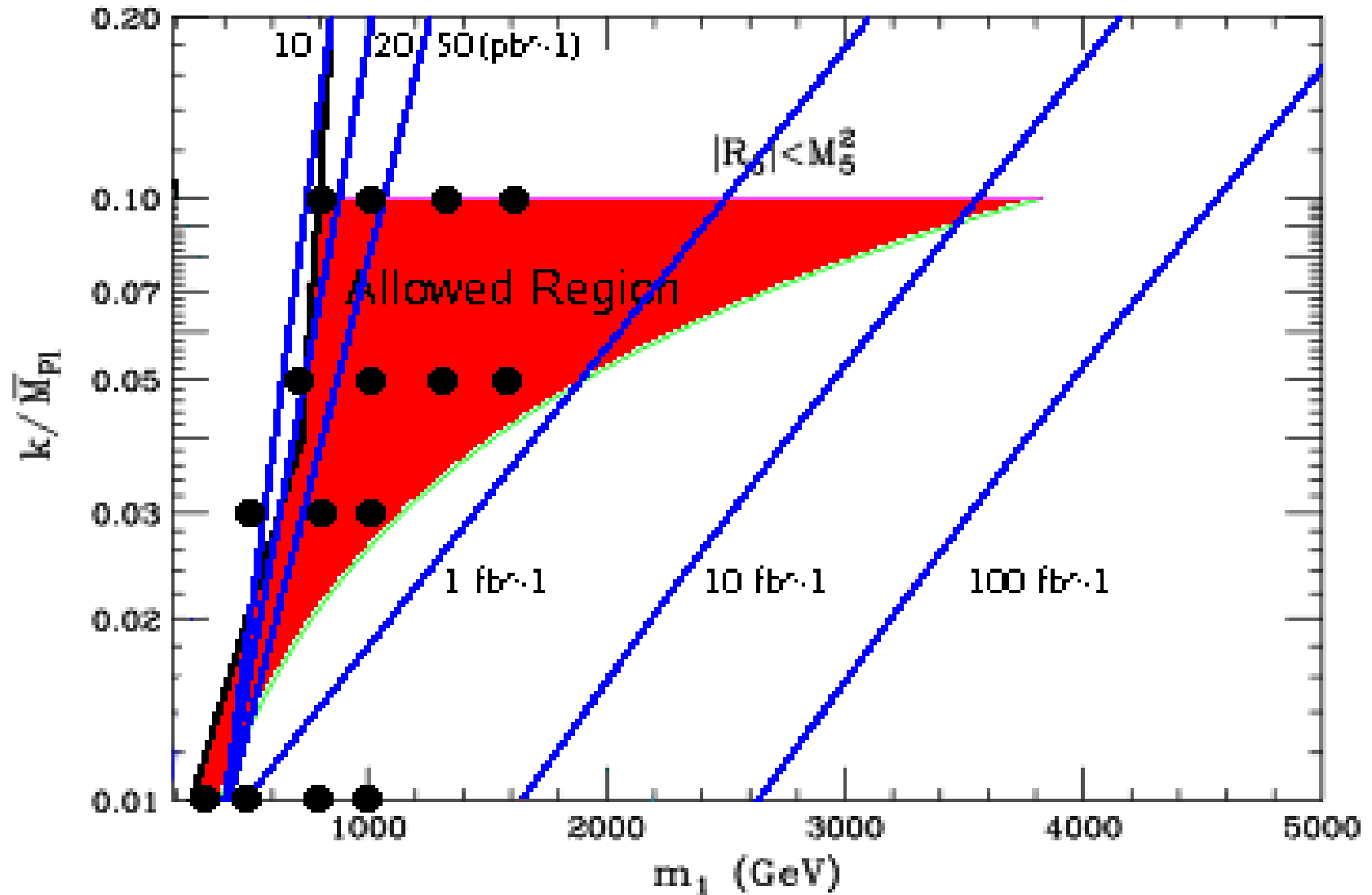


Figure 6: Allowed region in the RS model parameter space implied by various theoretical and experimental constraints from Ref.[21]. The regions to the left of the horizontal lines are excluded by direct searches at colliders. The dashed(solid) line for the LHC corresponds to an integrated luminosity of 10(100)  $\text{fb}^{-1}$ . The present anticipated parameter space is inside the triangular shaped region.



# Expected Reach with Early Data



# Conclusion

- Exciting Time with imminent 7 TeV Data.
- 7 TeV Data Samples in the pipeline.
- Could have Hints/Discovery as early as Summer/Winter Conference if Graviton is just around the corner!