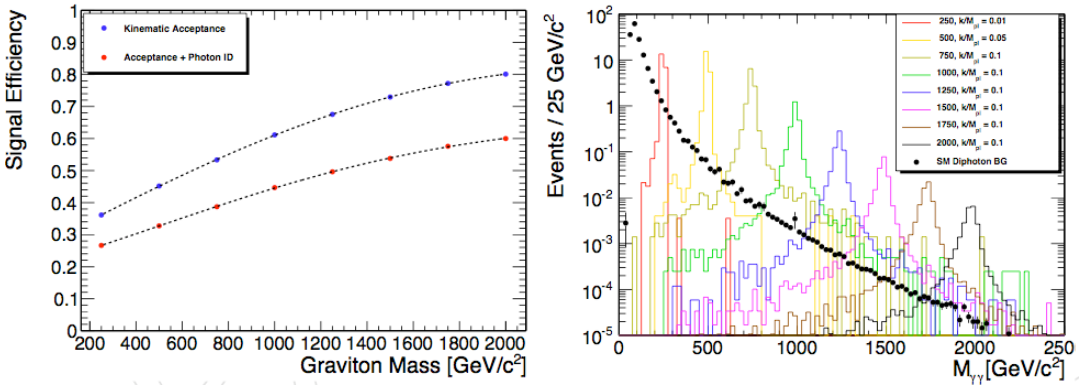
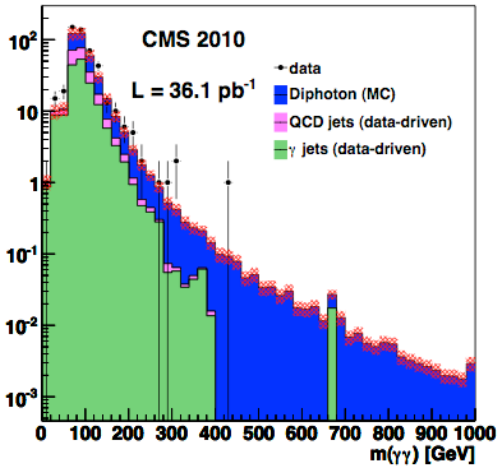
Yousi Ma – Summary for RS gravitons

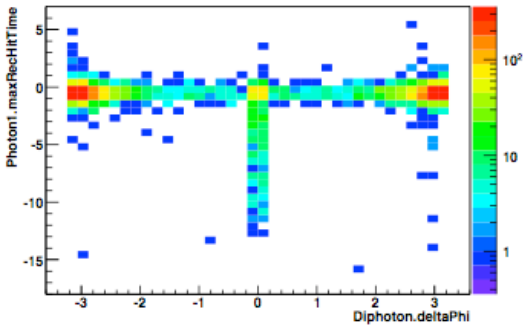
Gravitons appear as a tower of Kaluza-Klein excitations with masses and widths determined by the parameters of the RS-1 model: the mass of the first graviton excitation mode M1, or MG, and the dimensionless coupling parameter $\tilde{k} = k/\bar{M}$ Pl. Precision electroweak data require that $\tilde{k} > 0.01$, while the requirement that the model remains perturbative constrains $\tilde{k} < 0.1$. Our analysis of the lowest excitation decaying to photon pairs takes advantage of the larger branching ratio of diphotons, 4% compared to 2% for dileptons. The current most stringent results from the Tevatron are for the combined diphton and dilepton channels, excluding at 95% confidence M1 < 604 (1055) GeV/c2 at a value of the coupling parameter k/MPl = 0.01 (0.1)

Our analysis is based on the 36.1pb-1 of data from the 2010 run, and MC with 2010 collision conditions. From the MC, we derived the signal selection efficiency and acceptance, as well as the Standard Model (SM) diphoton contribution to the background.

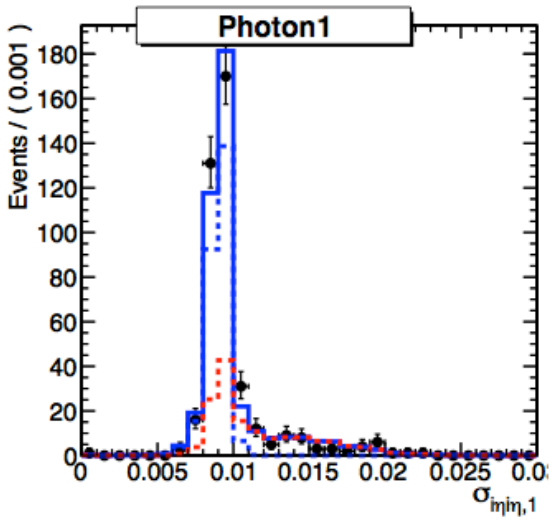


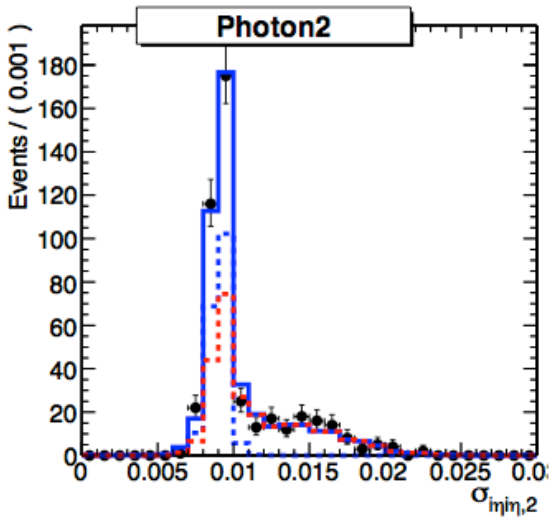
The remaining backgrounds from jets faking 1 or 2 photons are derived from data based on fake rates for misidentification. One of the key corrections was to remove the contribution of beam halo, which is much more significant in the diphoton channel than single photon studies, and is manifest as co-azimuthal deposits





After removal of these beam background pairs, our data driven background matches the observed data well in our low mass control region. Additionally, we cross checked this estimate with fitting by template shapes of photon and jet samples, and found agreement of the fraction of fake and real diphotons.





We then extrapolate this background into our high mass signal region, and obtain limits on the RS model parameters. For values of the coupling parameter ranging from 0.01 to 0.1, we find that at 95% confidence level, graviton masses below 371 to 945 GeV/c2 are excluded. Although we have not yet exceeded the Tevatron limits, we expect to achieve this by summer 2011 through 3 main avenues – combination with the CMS dilepton channel results, inclusion of the Endcaps, and increased statistics with the addition of 2011 run data.