Drell-Yan measurement

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Outlook

- ▶ Nicola performed this analysis for PhD.
- ▶ Bringing the analysis towards publication.
- ▶ Cross checking and trying to improve.
- ▶ Nicola gave all the code with documentation.
- ▶ I am old fashioned and rewrote the code from scratch.

Preselection

- No Changes here.
- Trigger lines:
    - L0DiMuonDecision_TOS, Hlt1DiMuonHighMassDecision_TOS, Hlt2DiMuonDY(2,3,4)Decision_TOS
- Selection:
    - muminus_TrEta>2.0, muminus_TrEta<4.5, muplus_TrEta>2.0, muplus_TrEta<4.5, min(muminus_TrPChi2,muplus_TrPChi2)>0.001, min(muminus_P , muplus_P)>10000, min(muminus_PT , muplus_PT)>3000

Muon isolation

▶ We define an isolation for a single track:

$$\mu_{\mathrm{iso}} = \log\left((p_{\mathrm{T}}^{\mathrm{cone}}\left(\mu, 0.5\right) - p_{\mathrm{T}}^{\mathrm{cone}}\left(\mu, 0.1\right)) \cdot \frac{1}{\mathrm{MeV}/c} \right)$$

▶ And for 2 tracks:

$$\mu\mu_{\mathrm{iso}} = \max\left(\mu^{-}_{\mathrm{iso}}, \mu^{+}_{\mathrm{iso}} \right)$$
$$= \log\left(\max\left(p_{\mathrm{T}}^{\mathrm{cone}}\left(\mu^{i}, 0.5\right) - p_{\mathrm{T}}^{\mathrm{cone}}\left(\mu^{i}, 0.1\right) \right) \cdot \frac{1}{\mathrm{MeV}/c} \right)$$

▶ No changes here.

Background Templates

- ▶ Now I started playing around :)
- ▶ We have two sources of background: MissID and Heavy Flavour decays.
- ▶ For now I take MissID for same sign data, and Heavy Flavour decays from selecting muons with Vertex $\chi > 50$. This cut is much larger what it was before.
- ▶ For cross check I have 2 different sources of templates: MinBias(muon free), and IP cut(also tighter) instead of vertex.
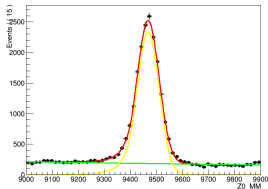
Signal Templates -Nicola approach
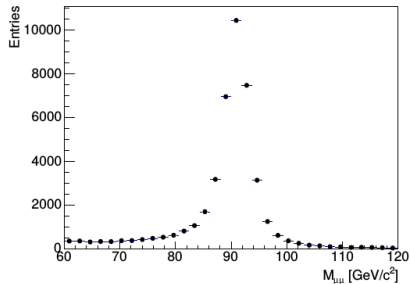
(a) Z

- Z^0 is background free, take range of $80, 100$ and we have a data $\mu\mu_{iso}$ for the Z^0.
- Determine the scale factor to minimalize the χ^2 in MC.
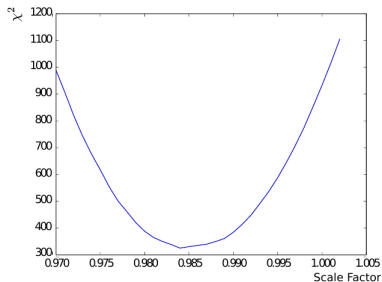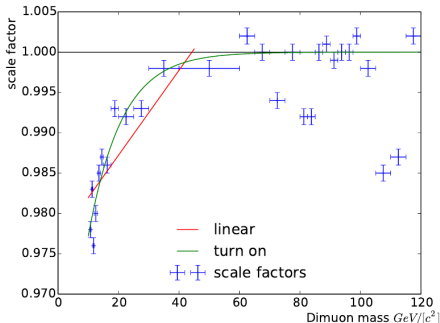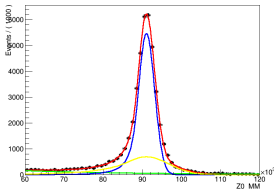
- Instead of extrapolating from Z^0, let's try interpolating :)
- Sploted Both Z^0 and $\Upsilon(1S)$.
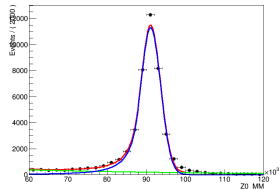
- For Z^0 we need to to use double CB.

Signal Templates - My idea

▶ Ok form `Splot` we have the $\mu\mu_{iso}$ for two mass points: M_Z and M_Υ
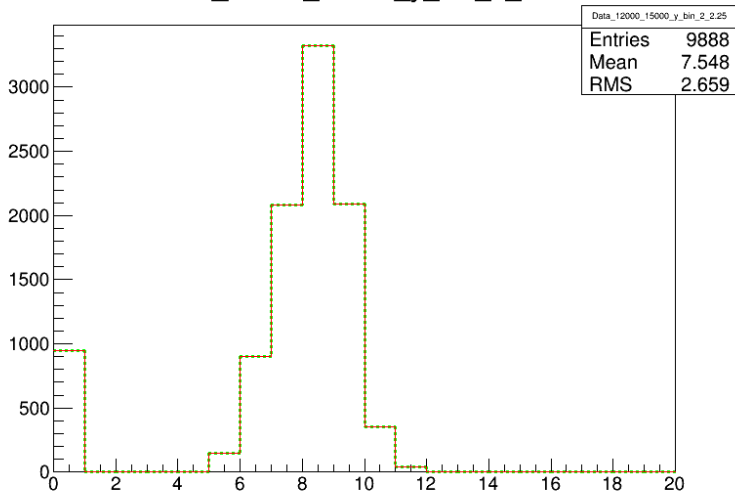
▶ Ad hoc anzats to get the signal template for M_X:

$$\mu\mu_{iso,M_X} = \frac{M_X - M_\Upsilon}{M_Z - M_\Upsilon} \times T_Z + (1 - \frac{M_X - M_\Upsilon}{M_Z - M_\Upsilon}) \times T_\Upsilon \quad (1)$$

Attention, from this slide work has been done on jet lag, during confernece talks, in airplane, or all above.

Signal Templates - My idea, results

- Some $M_{\mu\mu}, y$ bins don't converge.
- But the ones that do look awesome (to be checked):

Data_12000_15000_y_bin_2_2.25

Todo

- ▶ Those are just preliminary results! Don't bite my head off.
- ▶ Want to compare the two method of obtaining signal templates.
- ▶ Try different "mixing" functions.
- ▶ See why some bins do not converge.
- ▶ Lots of fun ahead.