$B \to K\tau\tau$ search in $B \to K\mu\mu$ decays

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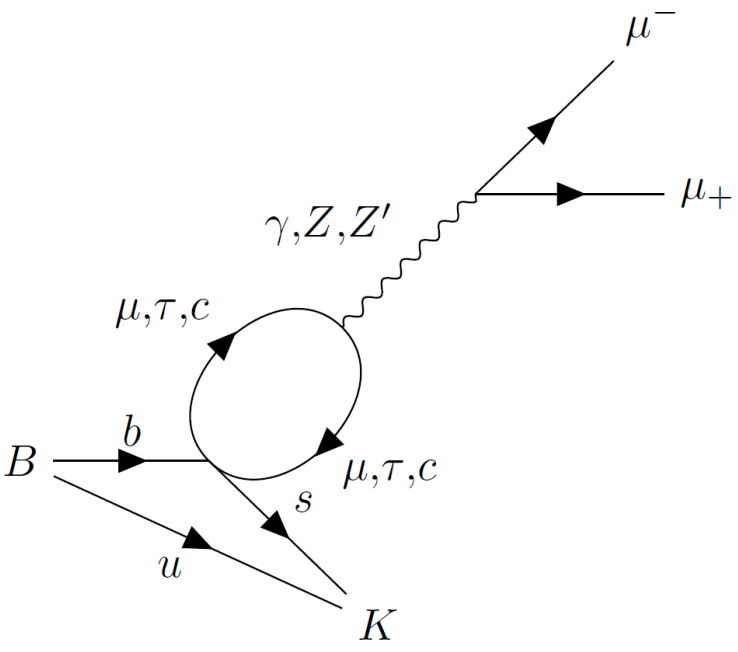
Overview

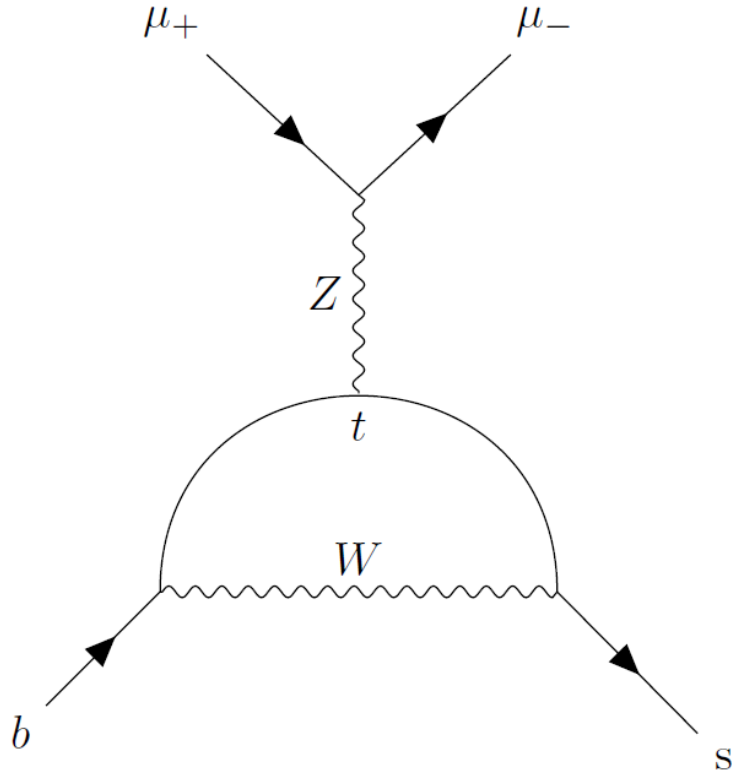
1. Decay
2. Search
    - Theory
    - Pdf and its parts
    - Where we are now
3. Outlook

All results and plots are very preliminary

Decay

- Anomalies gave rise to new search for possible lepton flavor universality violation
  - Different couplings to leptons of different generations
    - ▷ Most to τ, least to e
- ▷ How can we observe different generations at once?





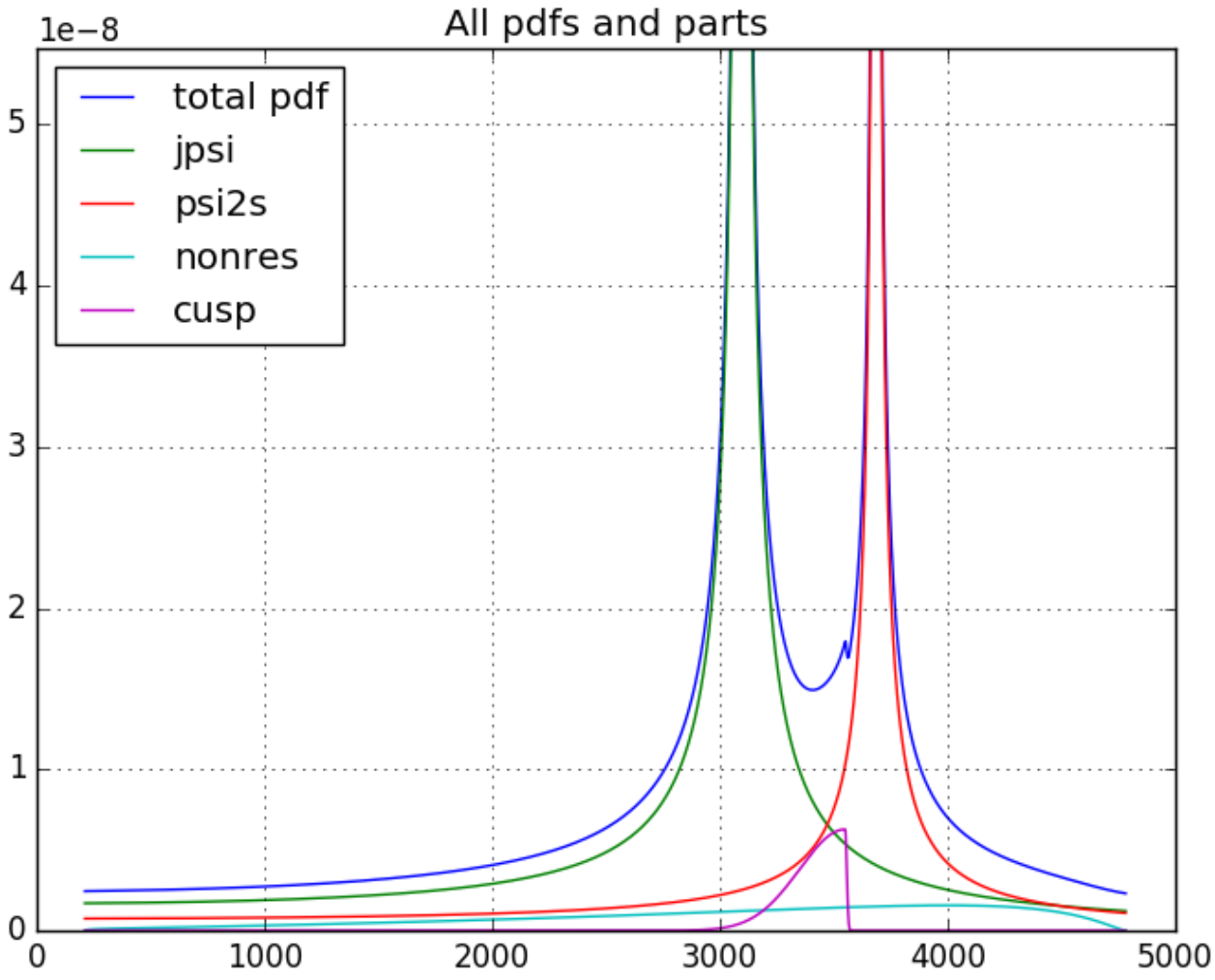
Search

- According to SM the τ contribution should not be visible in the dimuon spectrum
  - Dependent on Wilson coefficients ($C7$), $C9$, $C10$
- ▷ Some SUSY models predict an amplification of the τ contribution:
  - ▷ Amplification due to new channel
  - ▷ Amplification factor: **10 - 1000**

$\Rightarrow$ τ contribution should become visible

- Cusp like shape in between J/Ψ and $\Psi(2S)$ resonances
- At the moment still a bifurkated gaussian
  (shape will slightly change once we get the exact shape)

Search


All pdfs and parts
1e−8
total pdf
jpsi
psi2s
nonres
cusp
0
1
2
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5
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1000
2000
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4000
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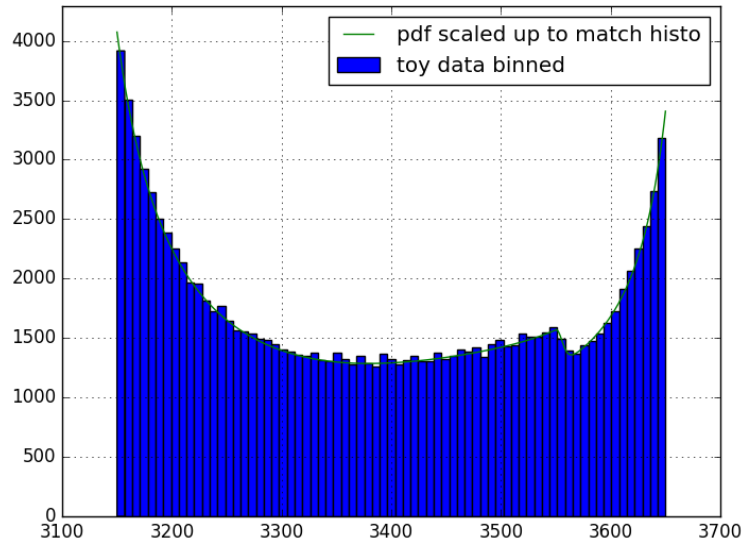
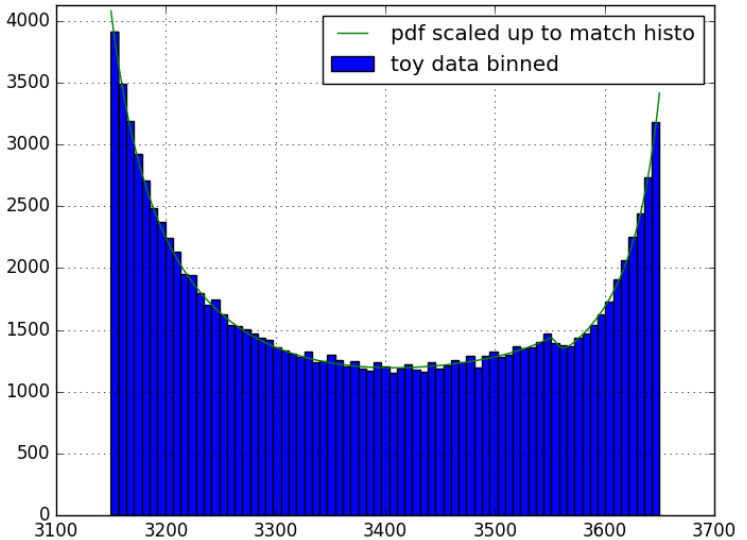
Search

Extremely sensitive to cusp amplitude

Cusp amplitude: $6 \cdot 10^{-7}$



Cusp amplitude: $4 \cdot 10^{-7}$



Search

What can we do for now:

- Generate toys (equivalent size of data taken in run I and II)
- Running model of the dimuon spectrum and the relevant contributions for this search
  - Rare nonresonant
  - J/Ψ
  - $\Psi(2S)$
  - *Cusp*
  - Will be added in the future: cc, $B \to DDK$, DD^*K, D^*D^*K
- Binned fit pdf to the data and calculate likelihood

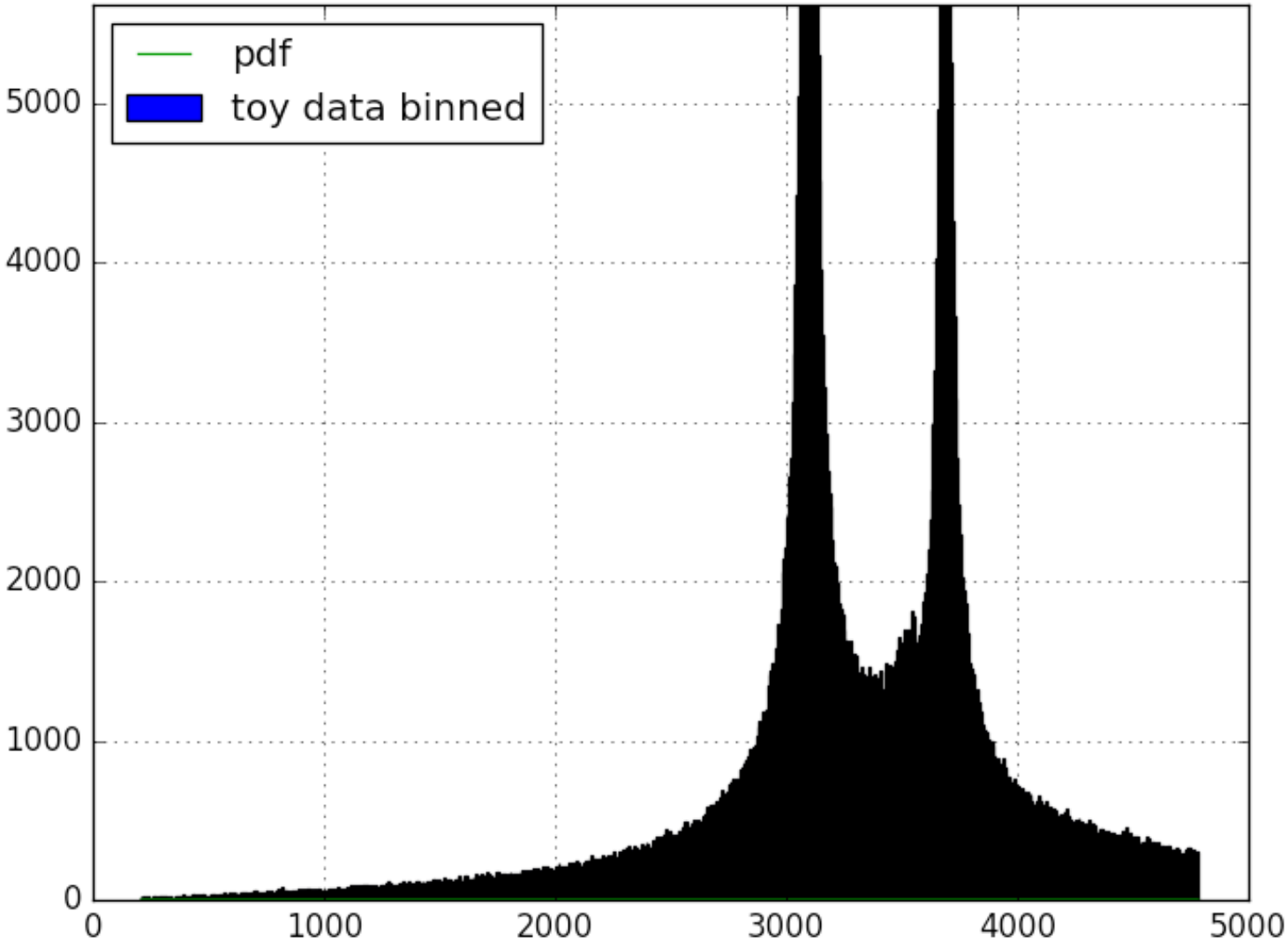
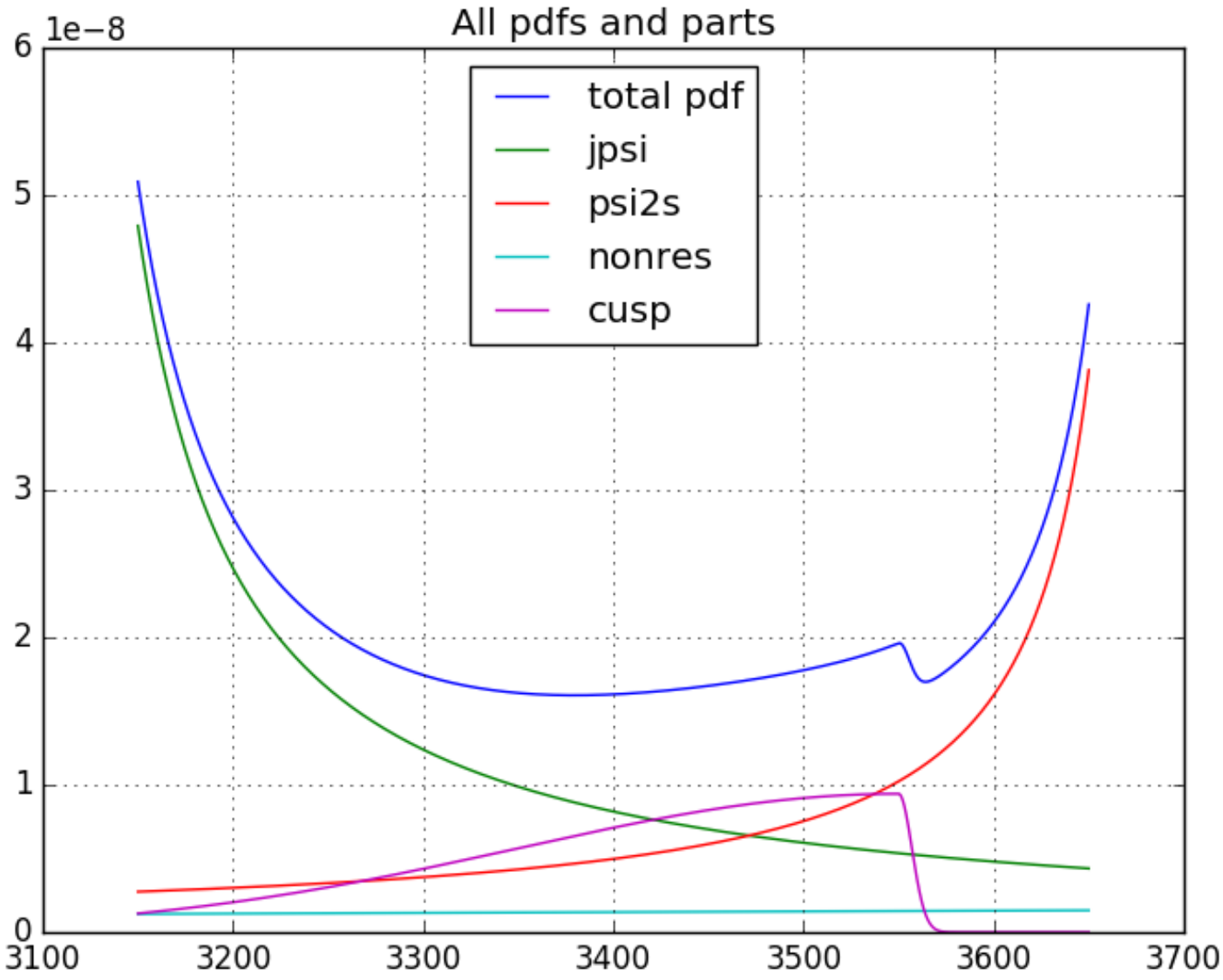
Outlook

Next steps:

- Integrate true shape of the cusp
- Add cc, $B \to DDK$, DD^*K, D^*D^*K
  - ▷ Only $B \to DD^*K$ nonresonant
- Implement additional crosschecks
- Analyze resolution
- Low energy regime fit:
  - ▷ Improve sensitivity on c part and τ tail by including a constraint from low q^2

YOUR ATTENTION
I THANK YOU
FOR

Backup Slides



Backup Slides