



Experimental Input HVP Discussion Session

Discussion: Achim Denig

- Presentations today:
- CMD-II/CMD-III
 - New BABAR $e^+e^- \rightarrow \pi^+\pi^-$
 - KLOE
 - BESIII
 - SND
 - BELLE-II



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- Presentations today:
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*plenty of new results and
many more to come
→ badly needed ... !*

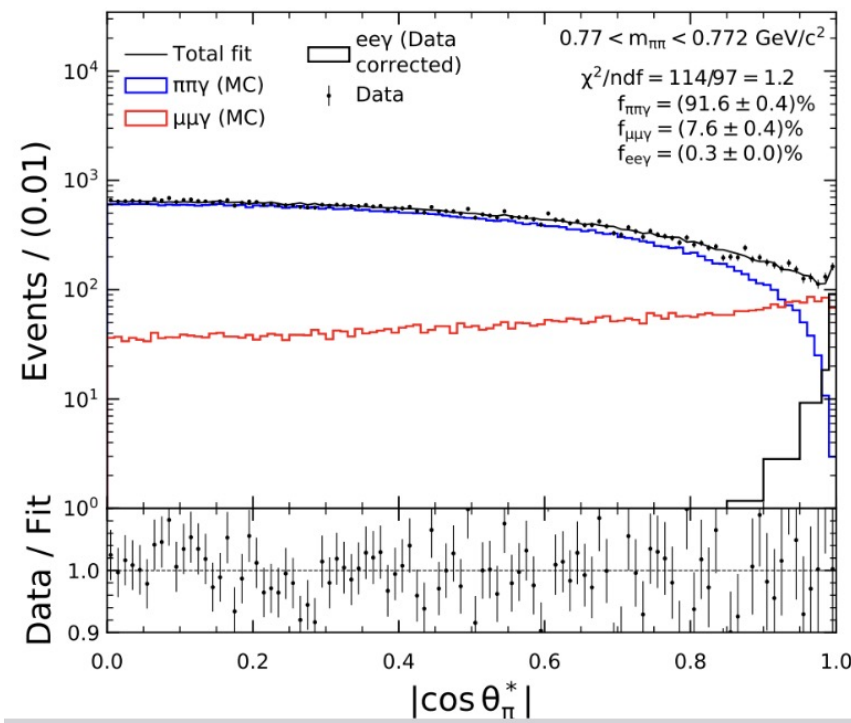
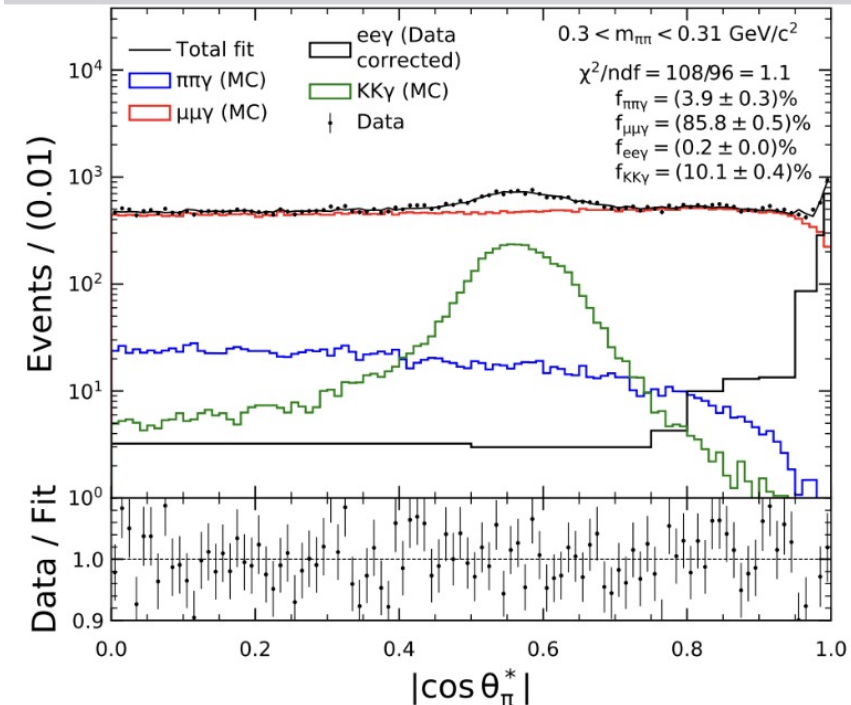
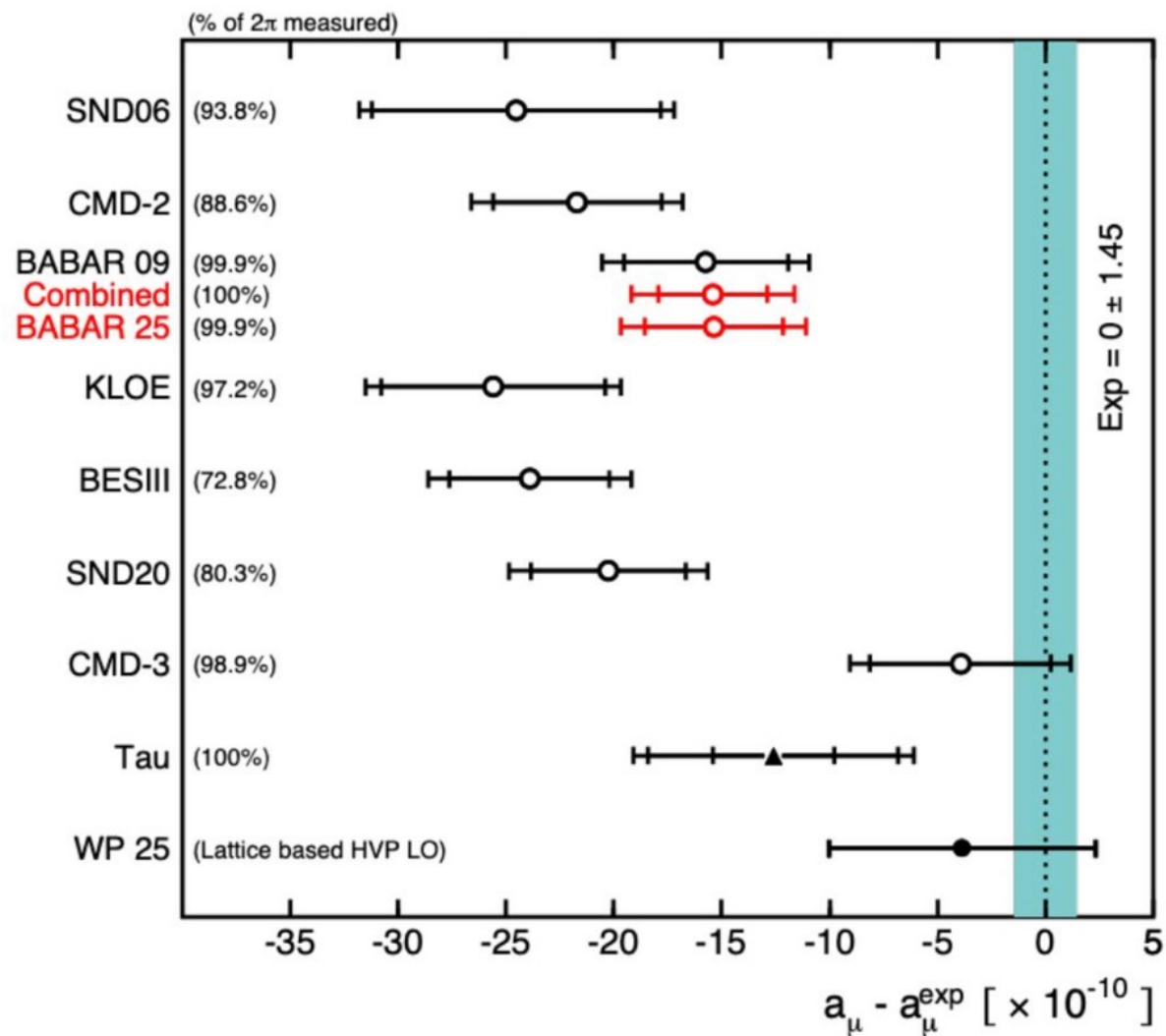
CMD-3 vs. CMD-2 Discrepancy

Insights into CMD₂/CMD₃ difference

- We don't have means to do a full scale CMD-2 analysis – we can only get some hints about the potential sources of difference
- The radiative corrections are not the suspects.
- Suspect #1. **Subtraction of cosmic background**
At CMD-3 we've developed better method to count cosmic background. Now we know that CMD-2 method had unaccounted systematic error (but we can't estimate it).
The CMD-2 cosmic background was much larger: **6% - 15%** compare to **0.12%** for CMD-3
- Suspect #2. **Event separation based on energy deposition**
CMD-3: LXe only ($5X_0$) and full calo ($13X_0$), observed very different behavior/systematics; might be able to take Csl only data
CMD-2: Csl only ($8X_0$), systematics were estimated
- Suspect #3. **Trigger. (correction was small, but could be ...)**
Cmd2 had only one trigger with DC (4-6 superlayers), Z-chamber (2 layers) and Csl calorimeter with 40 MeV threshold in coincidence. Efficiency was studied assuming no correlations for π^+ and π^- . Correlated missing of both tracks could be – we have it with CMD-3

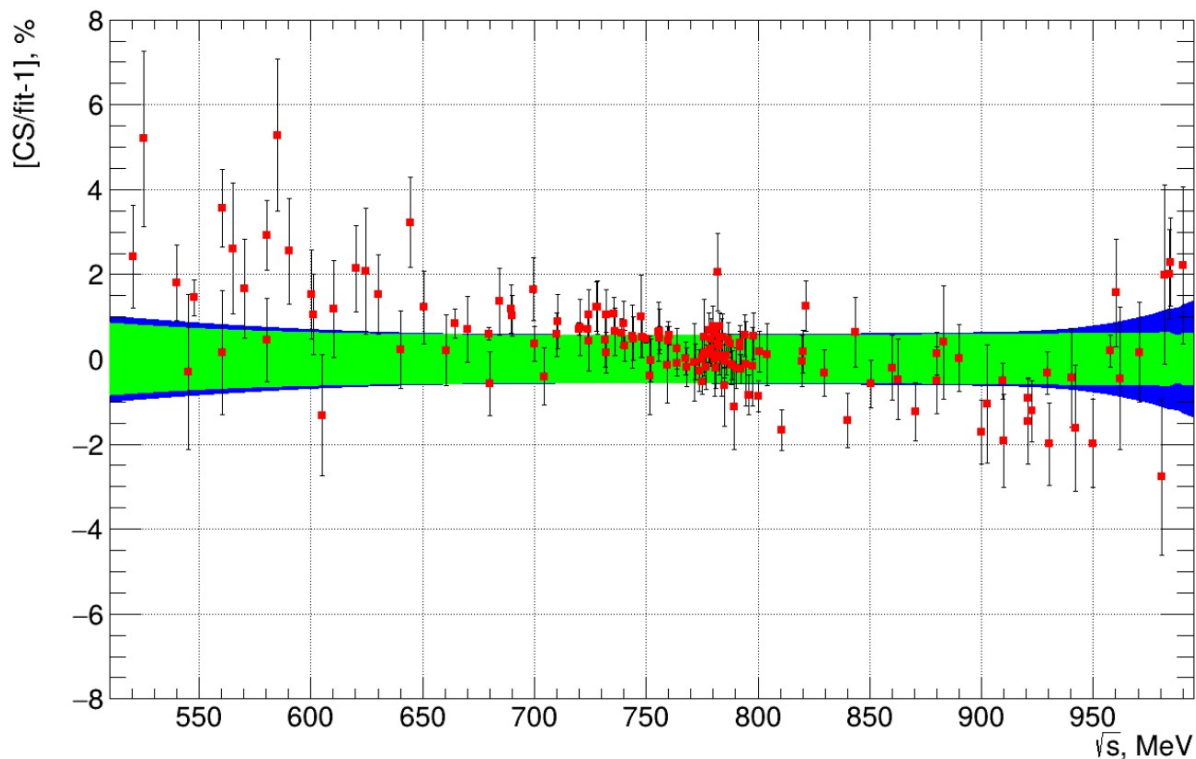
All above was discussed at the previous presentations – we did not see large effects

New BABAR Result (ISR, blinded)

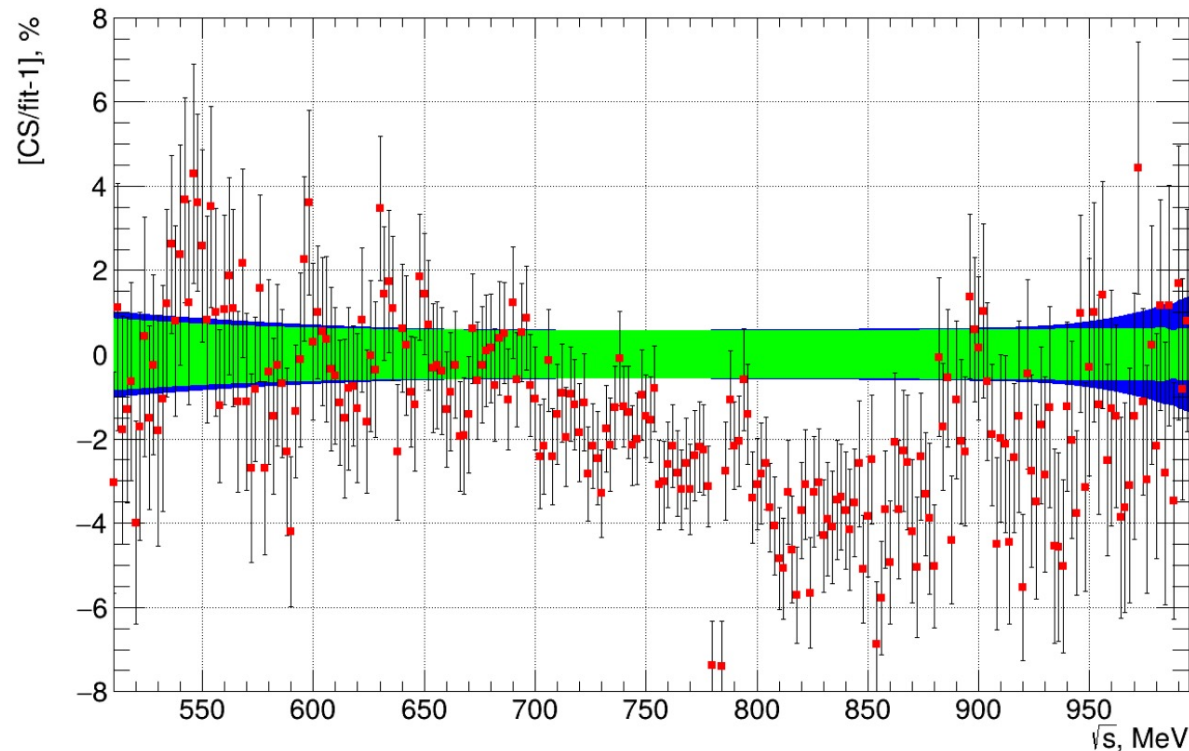


New SND Result (energy scan, blinded)

CMD-3(2022)/SND(2025)



BABAR(2009)/SND(2025)



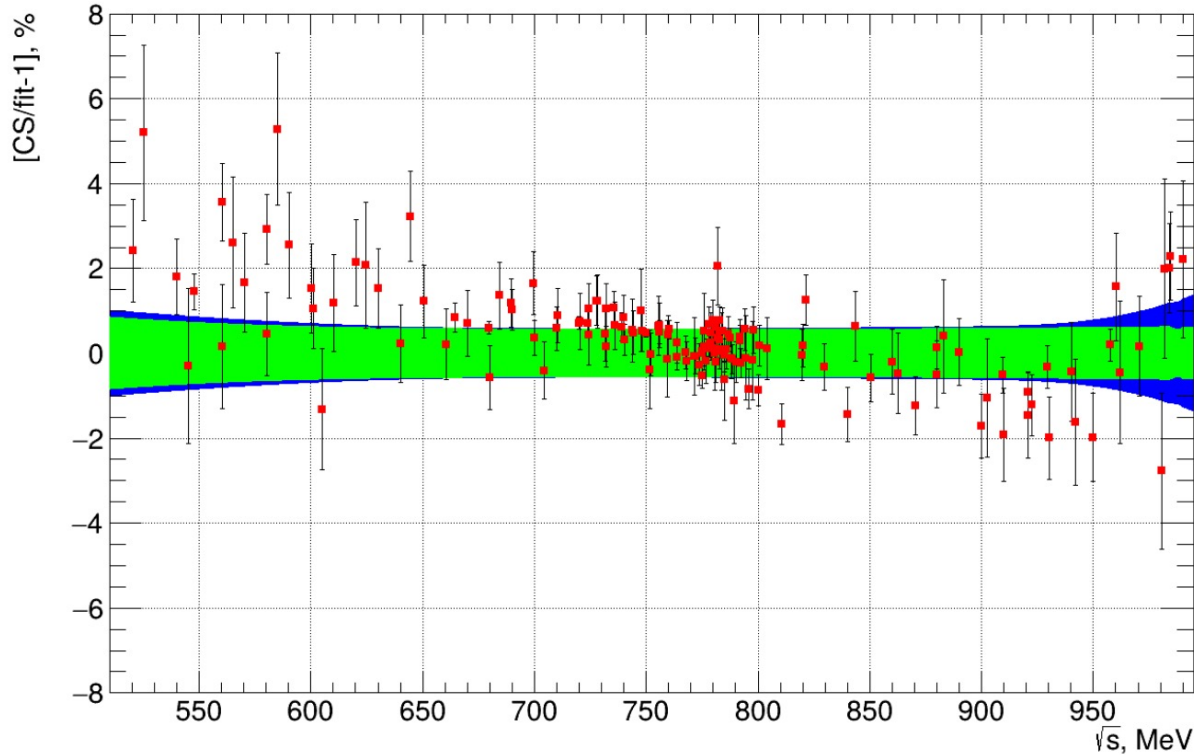
$$a_\mu \times 10^{10} = 431.11 \pm 3.52 \text{ vs.}$$

$$\text{CMD-3: } a_\mu \times 10^{10} = 433.62 \pm 3.76$$

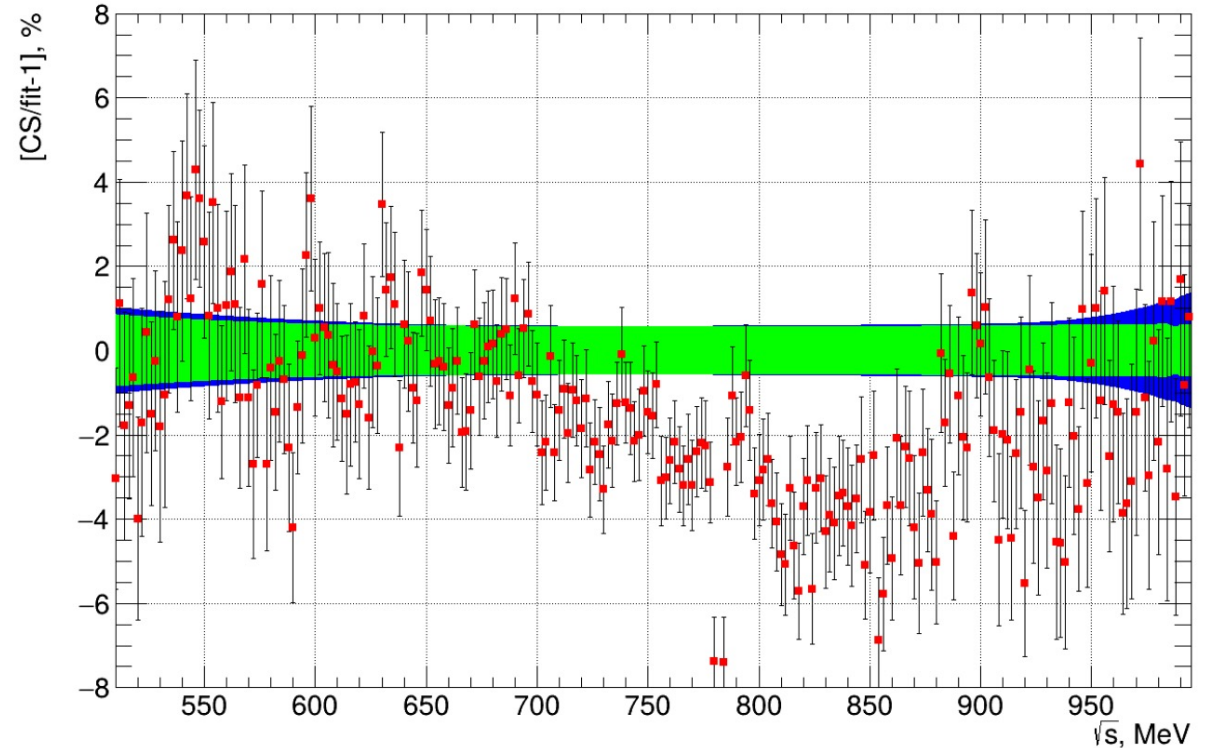
$$\text{BaBar: } a_\mu \times 10^{10} = 423.87 \pm 2.06$$

New SND Result (energy scan, blinded)

CMD-3(2022)/SND(2025)



BABAR(2009)/SND(2025)



-0.6 σ

$$a_\mu \times 10^{10} = 431.11 \pm 3.52 \text{ vs.}$$

+1.8 σ

$$\text{CMD-3: } a_\mu \times 10^{10} = 433.62 \pm 3.76$$

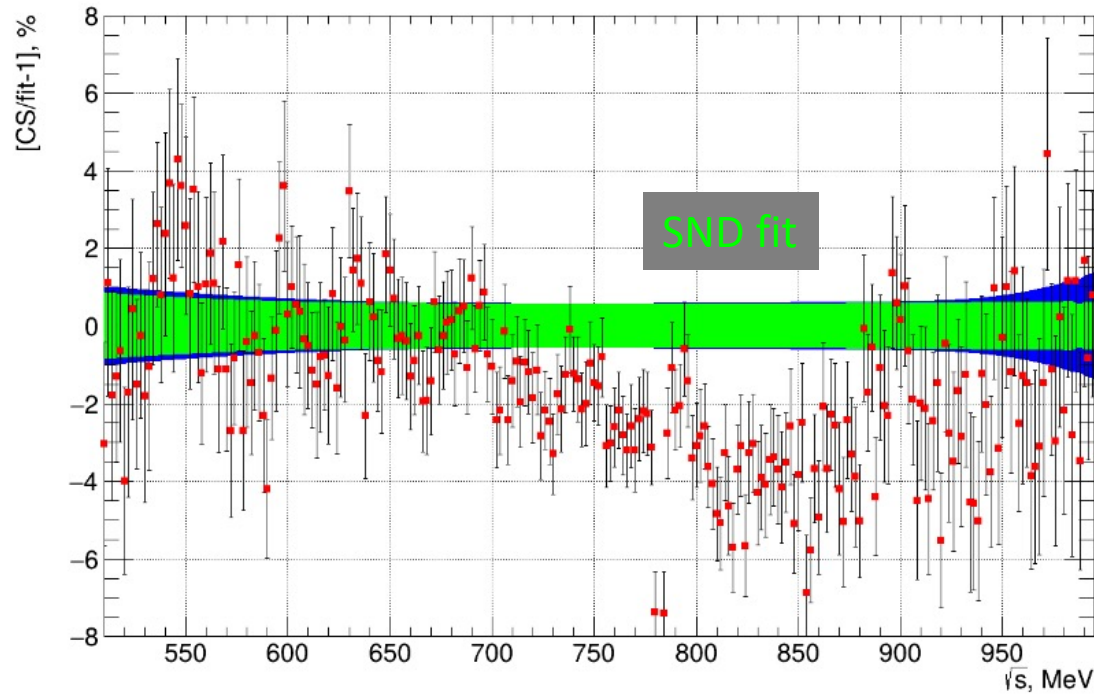
$$\text{BaBar: } a_\mu \times 10^{10} = 423.87 \pm 2.06$$

BABAR vs. SND

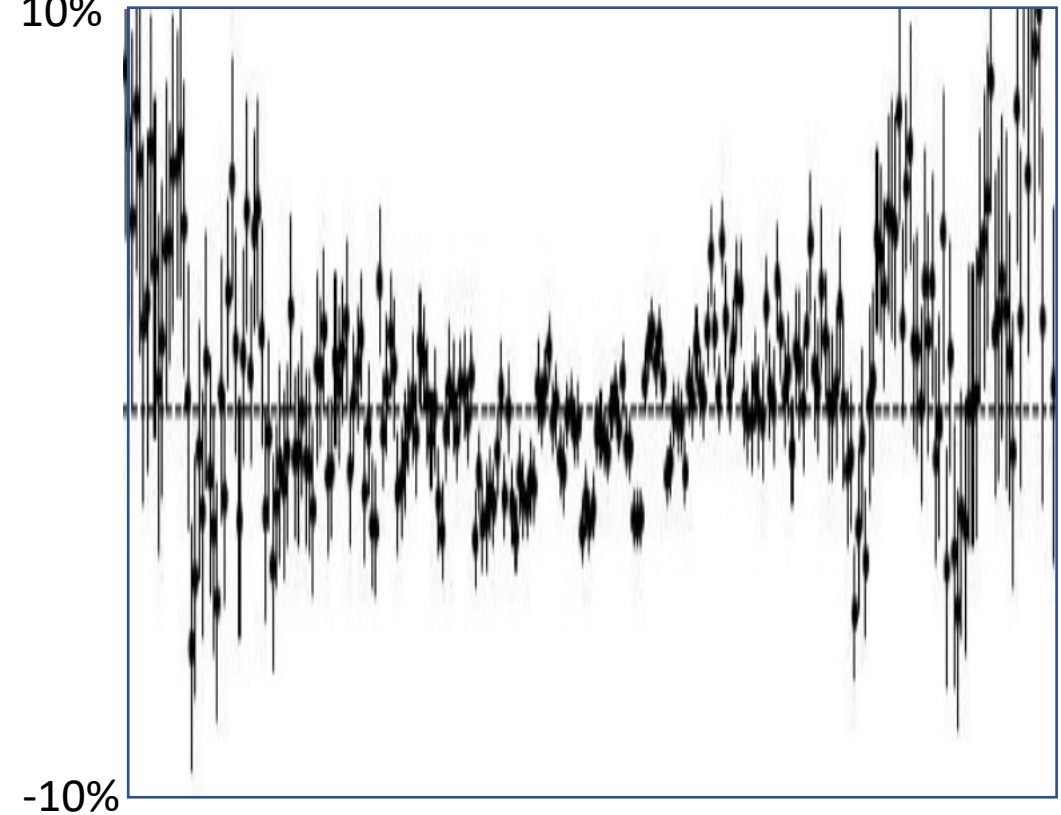
(both preliminary)

BABAR₍₂₀₂₅₎/BABAR₍₂₀₀₉₎

BABAR₍₂₀₀₉₎/SND₍₂₀₂₅₎



10%




500 MeV

1000 MeV

Discussion items

1. How to deal with significant local discrepancies far beyond claimed uncertainties?
2. Impact of existing MC results on measurements?
3. What is appropriate blinding?
4. Updates of experiments with significant changes, but reason for change unknown (e.g. CMD-2 vs. CMD-3). How to deal with it?
5. Task forces to be introduced for all new precision experiments?
6. How to improve on systematic covariance matrices?
7. Status and comparisons after new experimental results?
8. Progress on comparison of conflicting data sets?
9. At which point will there be a recommendation to discard (older) data sets?



Tuesday
discussion
(?)