Looking At CP in $B^- \to K^- D^0$

$\hookrightarrow K^+\pi^-$ etc

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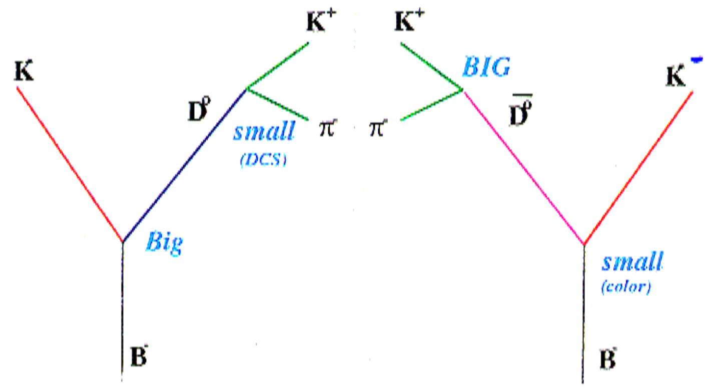


$$(Color\,Allowed) \times (Doub.Cabibbo\,Suppressed)$$
$$\approx (Color\,Suppressed) \times (Cabibbo\,Allowed)$$

- Numerically this balancing of amplitudes is

$$\frac{c\mathcal{B}_1}{\bar{c}\mathcal{B}_2} \approx \frac{(3 \times 10^{-4})(3 \times 10^{-4})}{(3.8 \times 10^{-2})(3 \times 10^{-6})} = .8 \approx 1$$

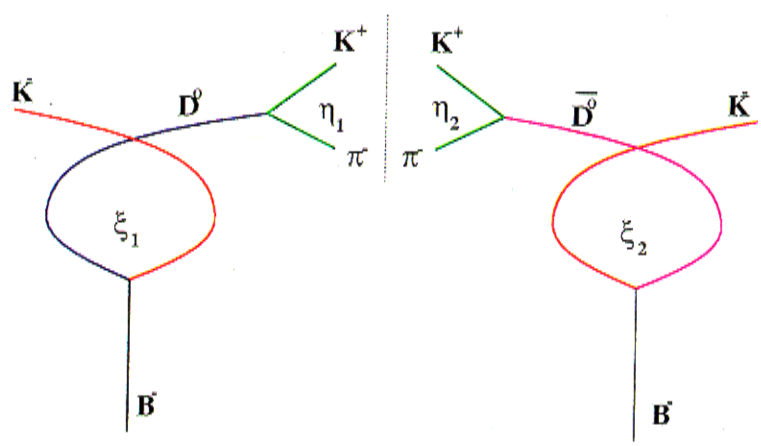
- Therefore the use of a hadronic tag to obtain $\mathcal{B}_2$ **Completely Fails**

- Alternatively, the Semi-Leptonic Tag: is free of quantum interference. However if you try to tag the $\overline{D}^0$ through the semileptonic decay $\overline{D}^0 \rightarrow e^- \overline{\nu} X$ you face a $O(10^6)$ background from the same sign lepton in semileptonic $B^- \rightarrow e^- \overline{\nu} X$ decay. **Extremely Difficult**

- It is therefore crucial to have a method for extracting γ that does not rely on the determination of $\mathcal{B}_2$!

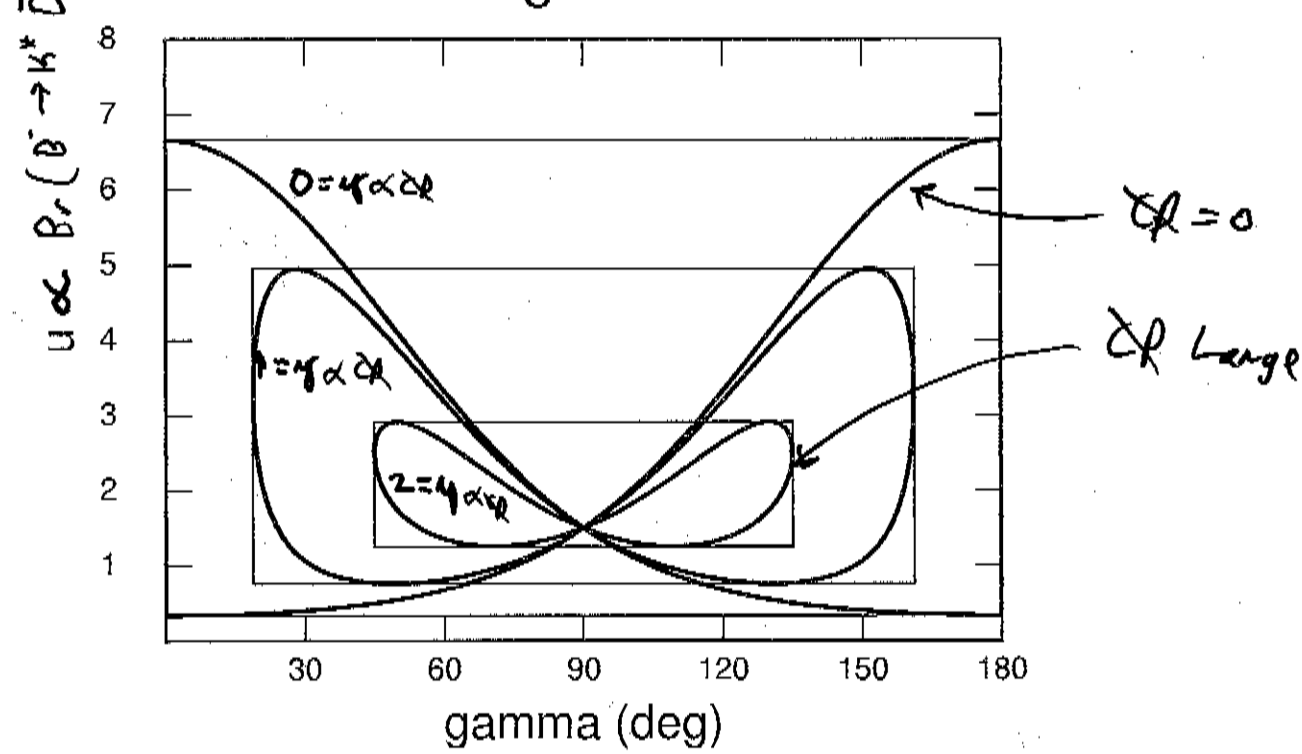
Extracting γ without knowing $\mathcal{B}_2$

- Turn the interference "problem" into an advantage by using non-CP eigenstates for ab eg. $ab = K^+\pi^-$.
- Thus the large interference effects mentioned above imply that there will also be order unity CP violating effects in $B^- \to K^-[K^+\pi^-]$!
- In this class of final states then $c \neq \bar{c}$ and $\eta_1 \neq \eta_2$ are fully general:



- We can also take advantage of the fact that different modes have different strong phases and $c/\bar{c}$ and obtain a new recipe for extracting γ

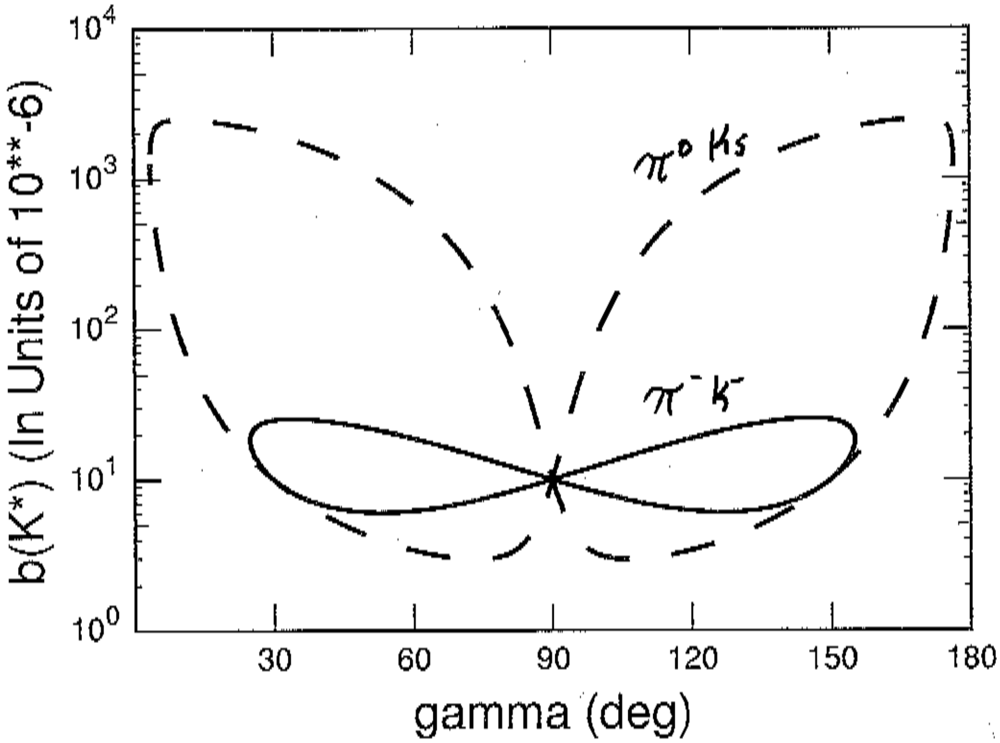
Figure 1



Larger CR ⇒ Better Bounds on γ
for a Single mode
→ Conclusion → <u>hunt for a mode with Large CR!</u>

ξ=30
γ=90

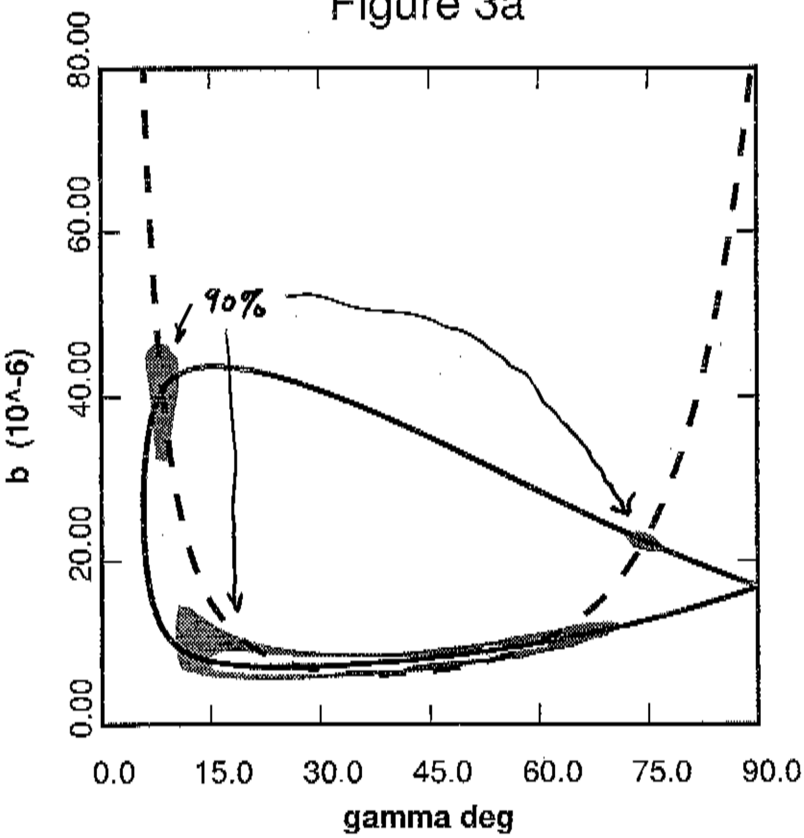
Figure 2

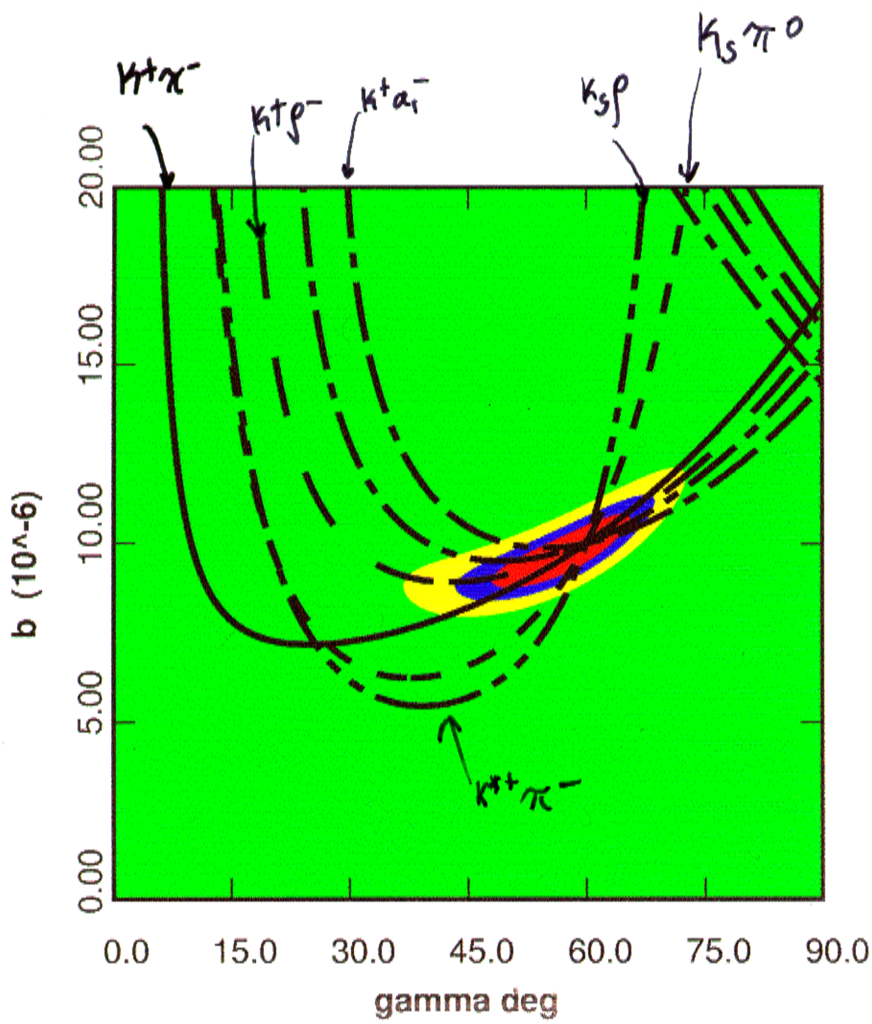


$\hat{N}_B = N_B(\text{acceptance}) = 10^8$

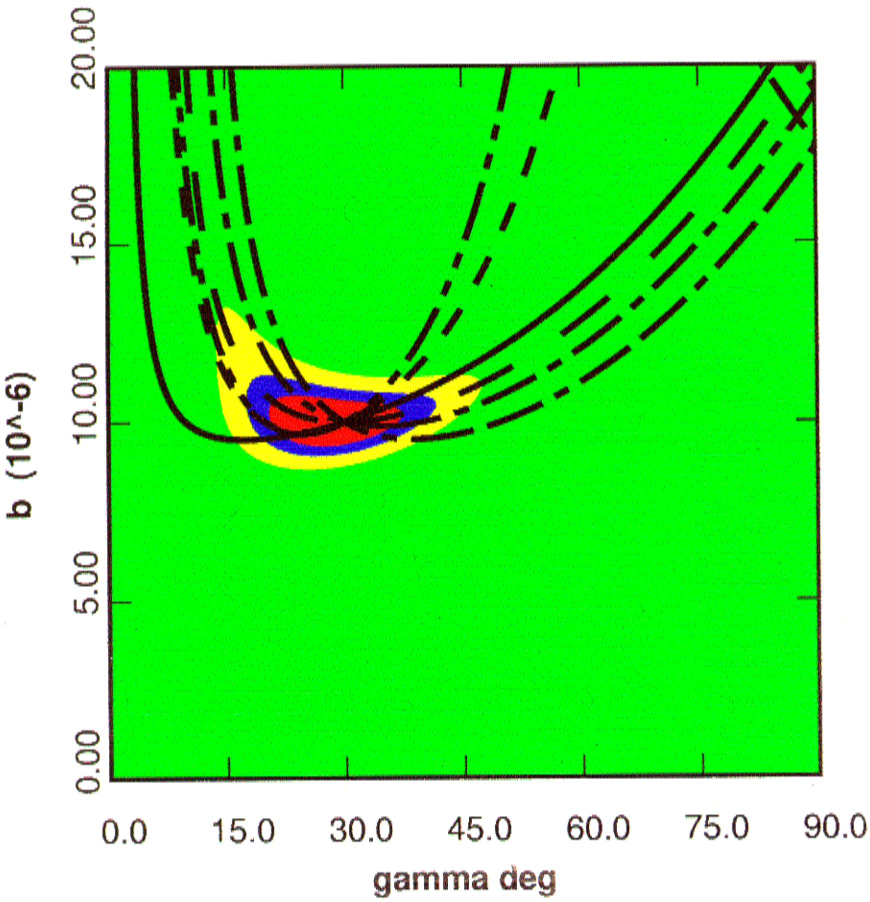
90% Likelyhood
Contours for
$K^+\pi^-$ with $K_s\pi^0$

Figure 3a





Six modes
$\gamma = 60$



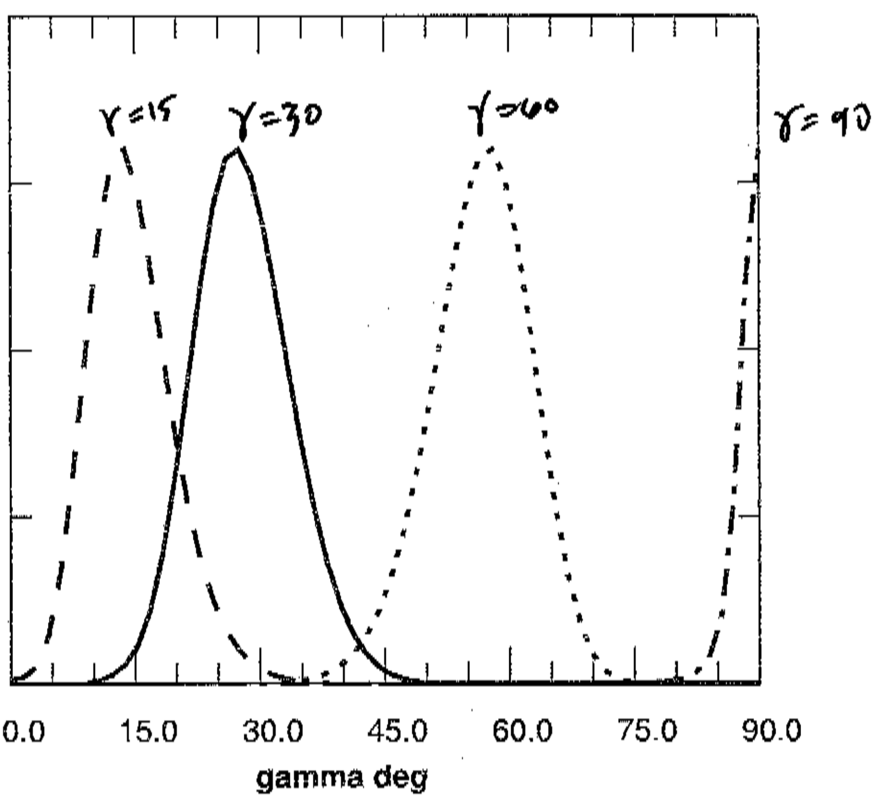
Six modes together

$\gamma = 30$

9

Likelyhood
Projected onto
γ axis

Figure 4



$B \to K^* D^0$
$\hookrightarrow K^+ \pi^- \pi^0$

Dalitz Plots with Large strong Phase diff.

Figure 5a

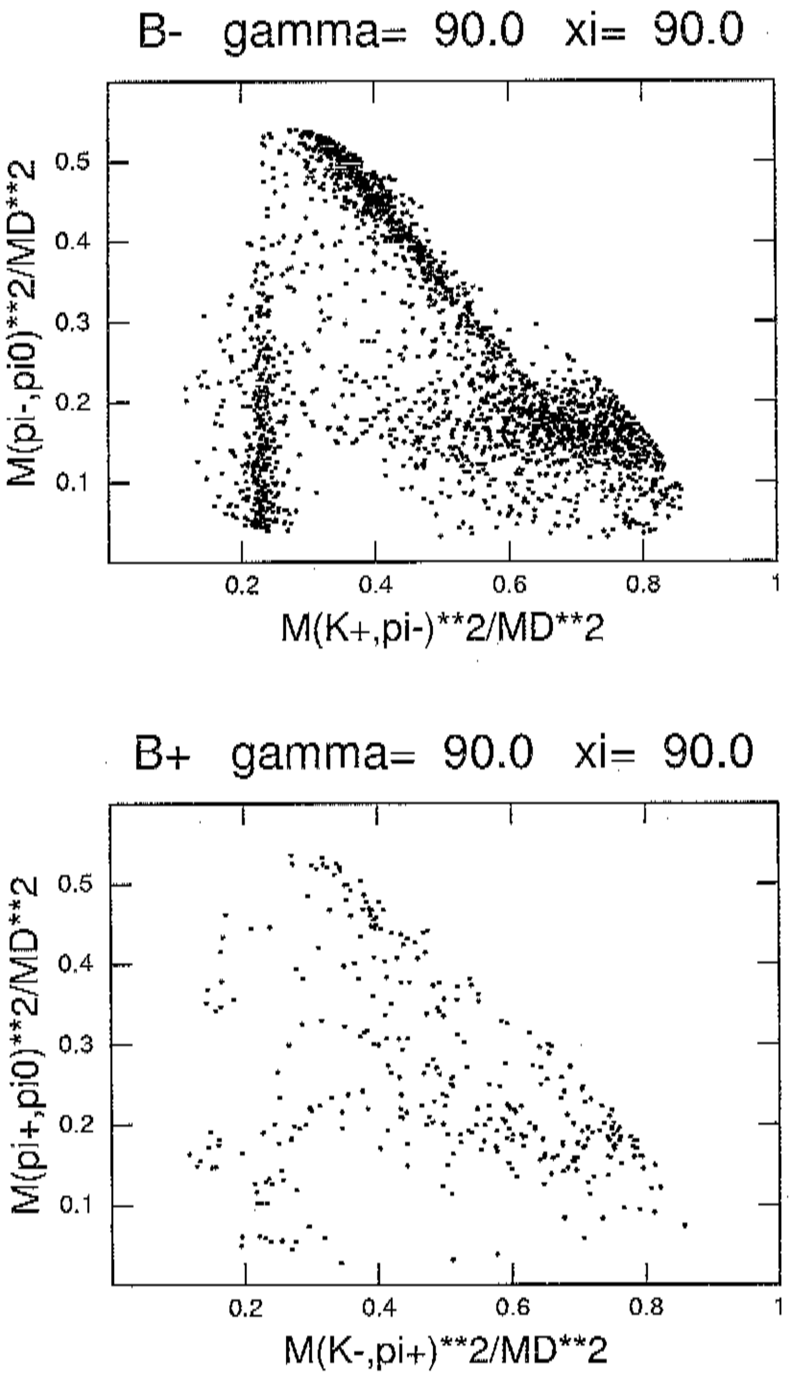
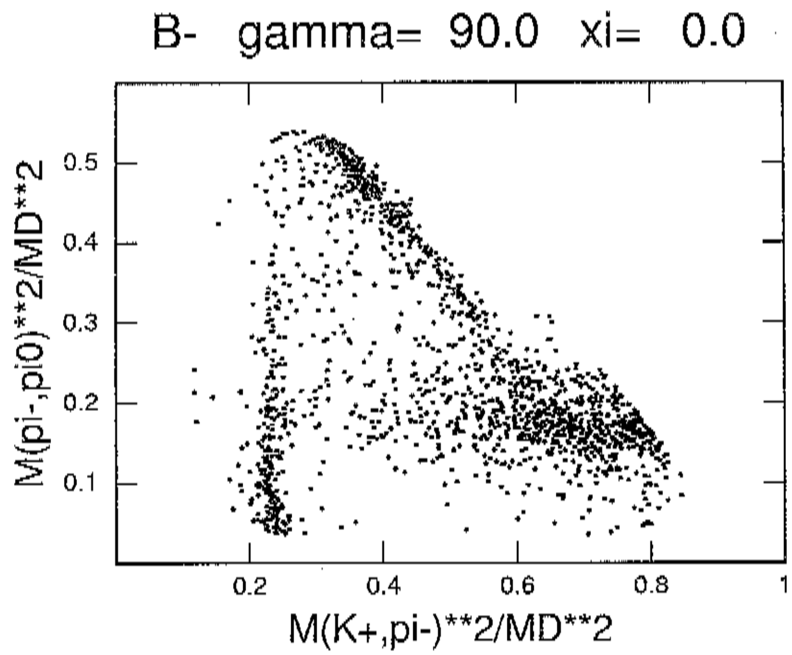


Figure 5b

(9)

Dalitz Plots
with small St Ph
diff



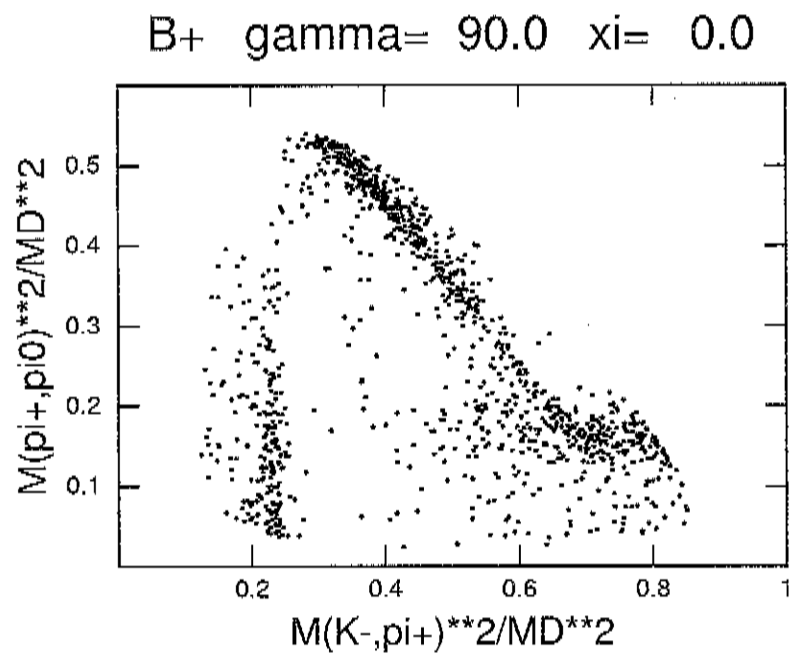


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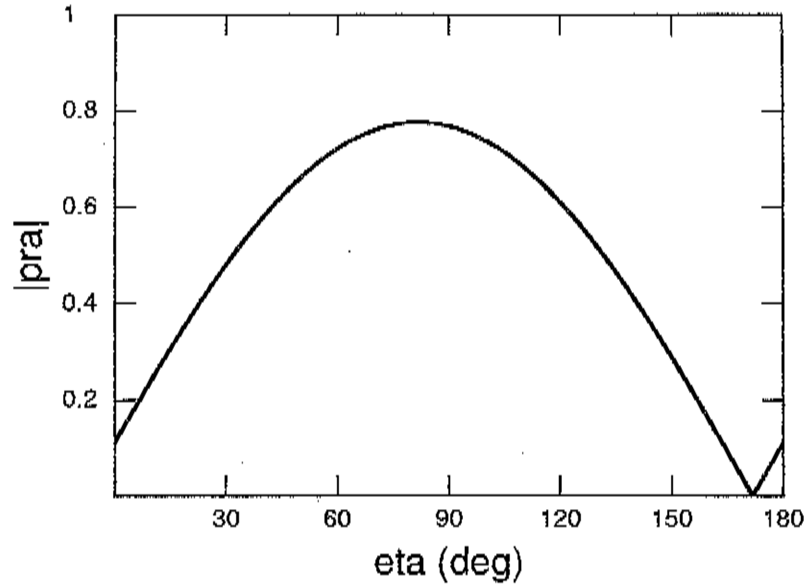
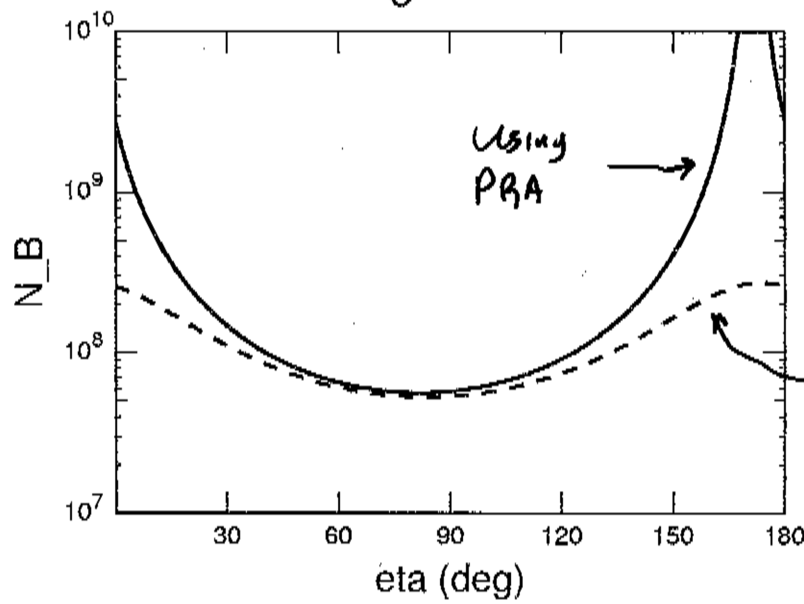
Figure 6a



Partial Rate asy. vs strong Phase diff

Figure 6b



Number of B's required for 3-σ signal

using optimal observables.