Partial Reconstruction

$$B_d \to D^{(*)\pm}\pi^{\mp}$$

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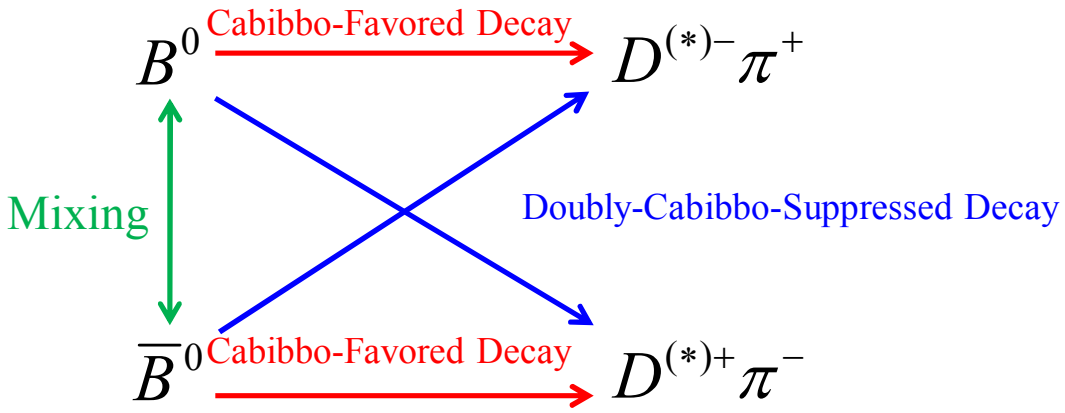
$B_d \to D^{(*)\pm}\pi^{\mp}$



$$\frac{A_{DCSD}}{A_{CFD}} \approx 0.02$$

$$\lambda(B_d \to f)\lambda(B_d \to \bar{f}) = e^{-2i(2\beta+\gamma)}$$

$$\lambda = \frac{q}{p}\frac{\overline{A}_f}{A_f},\ f = c\bar{d}\ d\bar{u}$$

Partial reconstruction

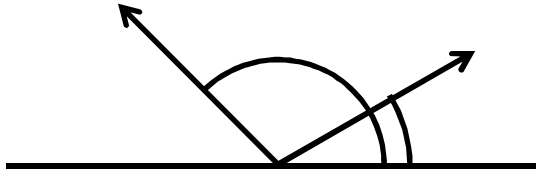
$$\overline{B}^0 \to D^{*+}\pi_f^-$$

$$\hookrightarrow D^0\pi_s^+$$

- D-meson を再構成しない
- 二つのπ (fast pion, slow pion)の情報のみ必要
- レプトンタグのみ使う

Signal event selection

- 正確なvertex の決定のための Fast pion への要求
- Impact parameter
  - radial : $dr < 0.1\,cm$
  - longitudinal : $|dz| < 2.0\,cm$
  - SVDにヒットをもつ
  - Polar angle in the laboratory frame : $30° < \theta_{lab} < 135°$



- The vertex positions are obtained by fits of the candidate tracks with the IP.
- Lepton, kaon hypothesis と一致しない
  - Based on information from the CDC, TOF and ACC.
- Fast pion cms momentum : $1.83\ {}^{GeV}\!/_{c} < p_{\pi_f} < 2.43\ {}^{GeV}\!/_{c}$

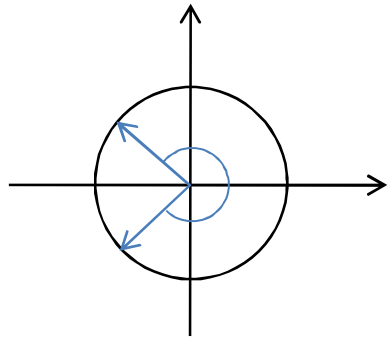
Signal event selection

- Slow pion cms momentum : $0.05\ {}^{GeV}\!/_{c} < p_{\pi_s} < 0.30\ {}^{GeV}\!/_{c}$
- Particle identification のとき、slow pion には何の条件も課さない
  - Vertexing に使用しない
  - IP から生じることのみ要求する

- fast pion とslow pion は逆の電荷をもつ

Flavor tag

- イベントの中に a high momentum lepton が必要
  - To tag the flavor of the associated B-meson
  - To reduce background from continuum $e^+e^- \to q\bar{q}\ (q = u, d, s, c)$
- Lepton は確実にidentify されていなくてはならない
  - Electron ← CDC, ECL, ACC
  - Lepton ← CDC KLM
- Lepton momentum : $1.2\ {}^{GeV}\!/_{c} < p_{l_{tag}} < 2.3\ {}^{GeV}\!/_{c}$
- Fast pion となす角 in the cms : $-0.75 < \cos\delta_{\pi_f l}$



→再構成しない Dから来る leptonの寄与を無視してよい levelに減らす

- 他に1 GeV/c以上の leptonがいないこと
  - mistagging probabilityが下がる
  - Leptonic charmonium decayからの寄与が減る

Flavor tag

- Identical vertexing requirements to those for fast pion candidates are made in order to obtain an accurate Z_{tag} position.
- 少し残った continuum backgroundを抑えるため
  - The ratio of the second to zeroth Fox-Wolfram moments, $R_2 < 0.6$

Kinematic fit

- Signalと backgroundの区別 : kinematic variable

- $\cos\delta_{\pi_f\pi_s}$: fast pion の方向とslow pion の逆方向のなす角 in the cms
  - +1 にシャープなピーク : slow pion はD*とほぼ同じ方向に飛ぶ

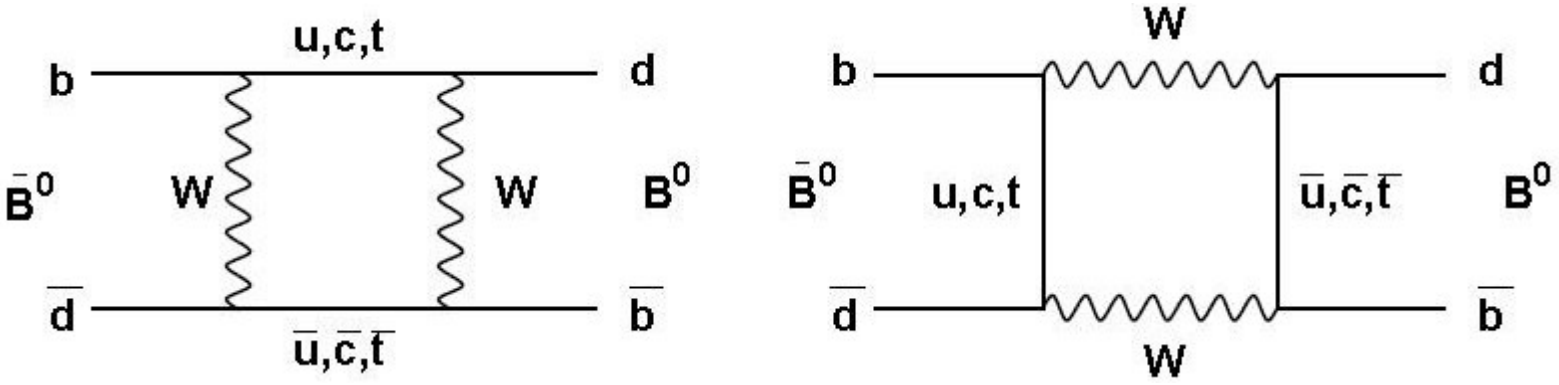
- $\cos\theta_{hel}$: slow pion の方向と Bの逆方向のなす角 in the D^* rest frame
  - Signalの場合、$\cos^2\theta_{hel}$ に比例
  - Bと Dの崩壊の kinematic constraintを用いて計算する
  - Background : $\left|\cos\theta_{hel}\right| > 1$

Kinematic fit

- Background event
  - $D^{*\mp}\rho^{\pm}$: kinematically similar to the signal
  - correlated background : the slow pion originates from the decay of a D* that in turn originates from decay of the same B candidate as the fast pion candidates (e.g., D**π).
  - uncorrelated background : includes everything else (e.g., continuum, Dπ)

Backup

mixing


b
d
$\bar{B}^0$
W
W
B^0
$\bar{d}$
$\bar{b}$
u,c,t
$\bar{u},\bar{c},\bar{t}$
b
d
$\bar{B}^0$
u,c,t
W
$\bar{u},\bar{c},\bar{t}$
B^0
$\bar{d}$
$\bar{b}$
W

Theoretical Framework

- $B_d \to D^{(*)\pm}\pi^{\mp}$: Pure tree decays