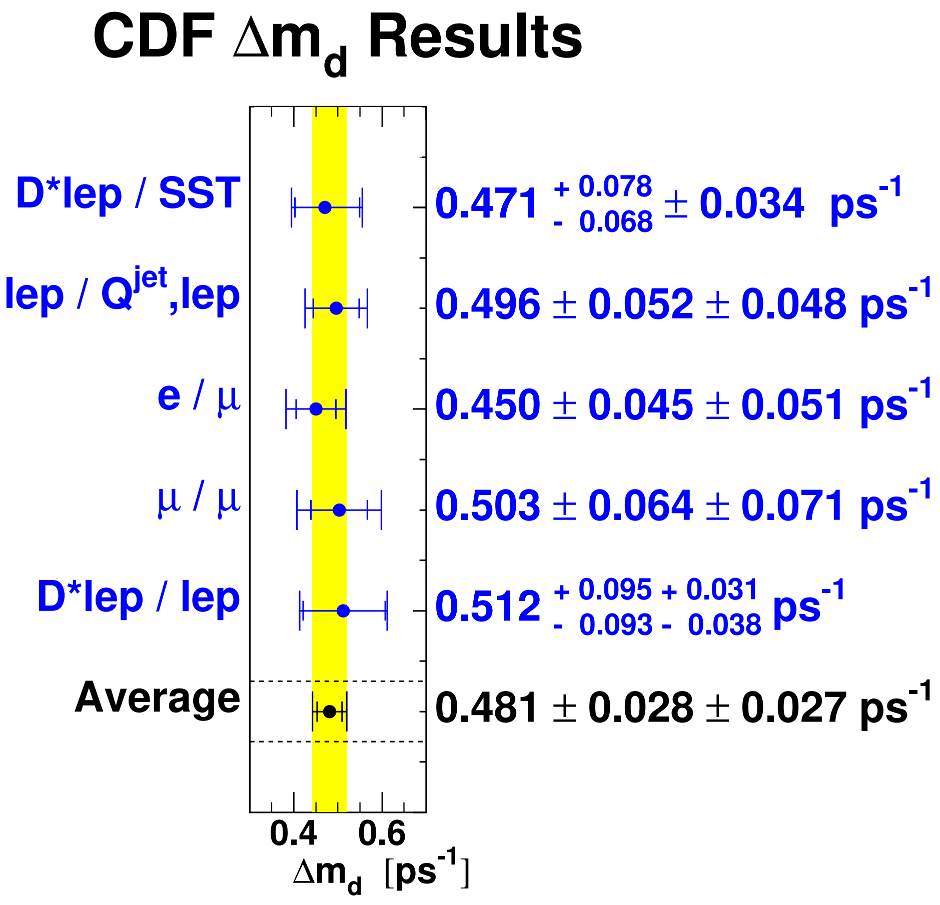
$B^0 - \bar{B}^0$ Mixing

The B_d mixing frequency has been measured using different B decay modes and exploiting several tagging methods.
(For Same Side Tagging see K. Kelley Talk)

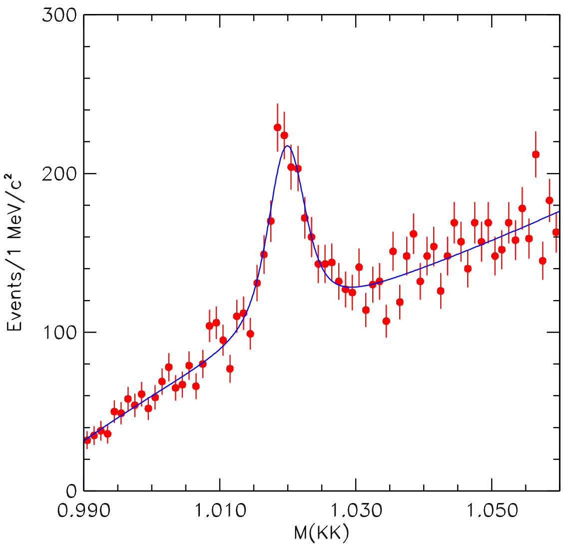


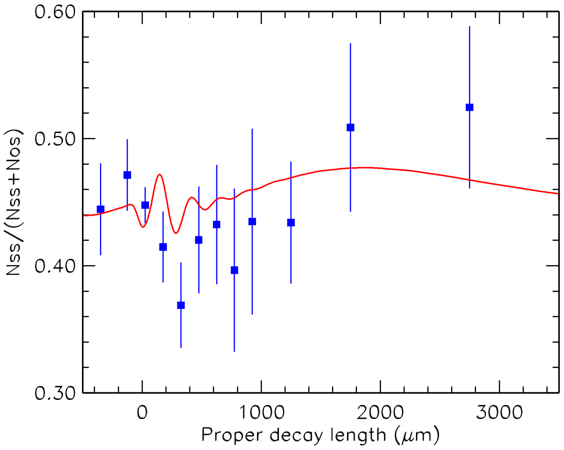
$B^0{}_S - \bar{B}^0{}_S$ Mixing

CDF has one measurement up to now:

- $B_S \Rightarrow D_S^- l^+ \nu$
  $\hookrightarrow D_S^- \Rightarrow \phi h^- X$
  $\hookrightarrow \phi \Rightarrow K^+ K^-$
- Flavour tagging: leptons e μ Mistag Rate, R = 0.30
- From K^+K^- inv. mass: $N_s = 1068 \pm 70$, $S/B = 1/2$
- Sample composition: $B_S : 61\%$ $B^0 : 24.5\%$ $B^+ : 14.5\%$

$$\Delta m_S > 5.8\ ps^{-1} \quad @95CL$$
$$(\text{Aleph av. } \Delta m_S > 10.4\ ps^{-1} \quad @95CL)$$





$B^0{}_S$ Mixing in Run II

Theoretical expectations (Ali hep-ph/9801270):

$$12.2 < X_S < 24.2$$

CDF will have several possibilities:

- Exploit the SVT ditracks Trigger;
  idea: the 2 highest P_t tracks in the decay chain

  $$B_S \rightarrow D^+{}_S \pi^- \text{ or } B_S \rightarrow D^+{}_S \pi^- \pi^+ \pi^-$$

  pass the impact parameter trigger.

  M.C. study:
  Expected $\sim$ 1600 fully reconstructed and tagged B_S

  $$X_S \approx 20 \text{ can be measured.}$$

$B^0{}_S$ Mixing in Run II

- highmass dilepton trigger events;
- the single lepton trigger
  $B_S \Rightarrow D_S^- l^+ \nu$
  $\hookrightarrow D_S^- \Rightarrow \phi h^- X$
  $\hookrightarrow \phi \Rightarrow K^+ K^-$

$$X_S \approx 15$$

If $X_S > 20$ CDF II may be able to measure it via the lifetime difference. Model dependence $\sim 20\%$

$$\frac{\Delta\Gamma_{B_S}}{\Delta m_{B_S}} \sim \frac{m_b^2 \, \eta_{qcd}^{\Delta\Gamma_{B_S}}}{m_t^2 \, \eta_{qcd}^{\Delta m_{B_S}}}$$

It has been calculated that for $X_S \sim 15$ a 7% difference in lifetime is expected. The CDF sensitivity on $\Delta\Gamma \sim 3\%$