Status of τB^0 analysis with Inclusive $B->l\ D^*\nu$

Improvements since last meeting (13/6)

- More complete Systematics Evaluation (τB^+ , D bias in Tag Vertex)
- More Consistency Checks (Stability vs θ *lepton* , ϕ *lepton* , *P*pion*)

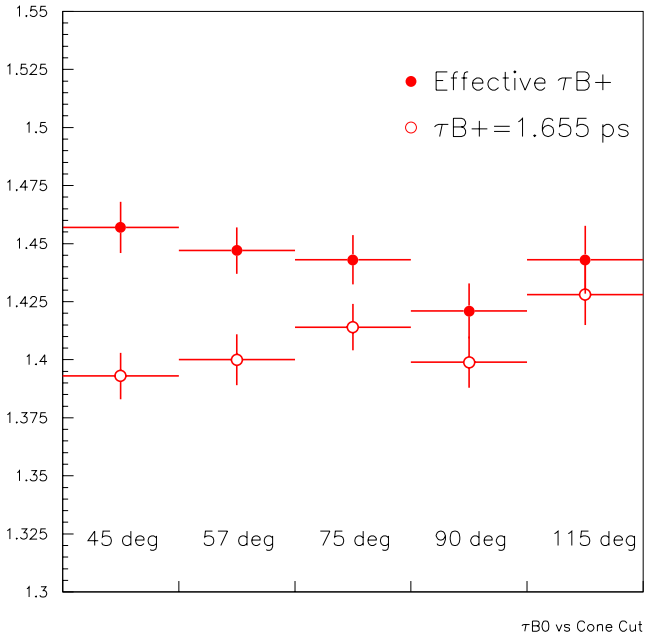
➔ Use "Effective" τB^+ depending on Cone Cut:

B^+ has two biases:

D^0, D** tracks pull tag Vertex towards Reco one (effect~ twice B^0 one)

➔Effective vs fixed τB^+

After the correction for D^0 bias (Blind)



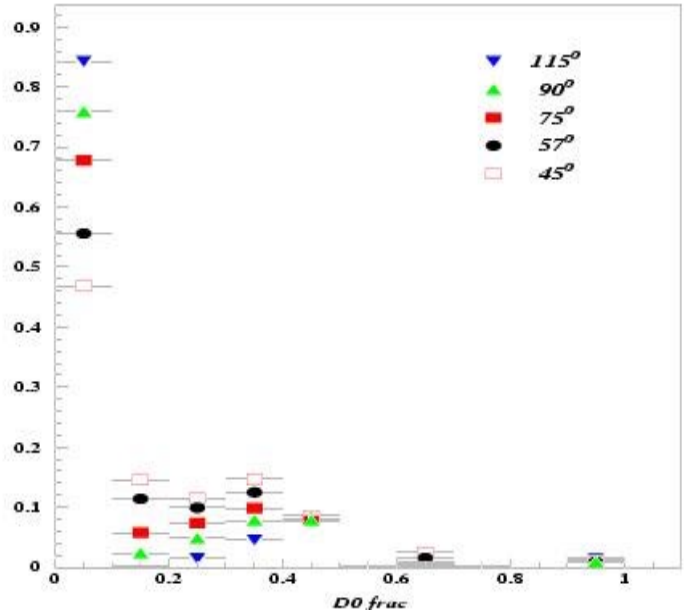
Status of $B->l\ D^*\ \nu$

$\delta(\ \tau\ B^+\ ) = \delta(\ PDG\ ) \oplus \delta(\ D^0\ bias\ ) \oplus \delta(\ D^{**}\ bias\ )$

- $\delta(\ PDG\ ) = 1.6\%$
- δ (D bias) from 5% variation in the fraction of events with no D tracks in Tag Vtx:

  $\delta(\ D^0\ bias\ ) = 0.9\%$ (Cone90)

  $\delta(\ D^{**}\ bias\ ) = 1.6\%$ ''



➔ $\delta(\ \tau B^+\ ) = 2.4\%$ ⟶ $\delta(\ \tau B^0\ ) = 0.5\%$

Status of $B->l\ D^*\ \nu$

Tracks from the charmed hadron from Btag displace the Tag Vertex position

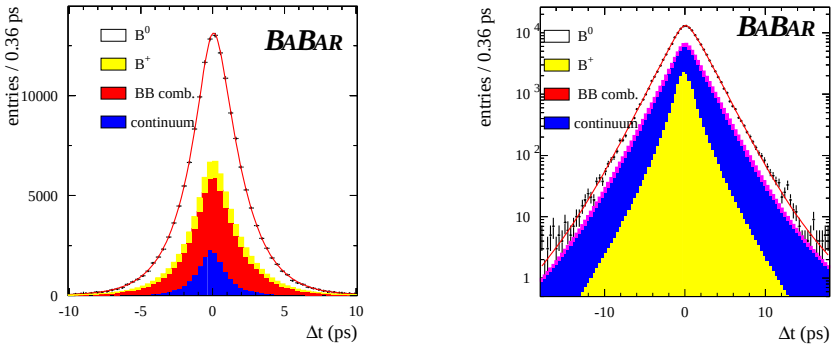
⟶ Bias of the Δt distribution.

➔Systematics Evaluation from MC

reweighting the charm species from the Btag decay

	Channel	Variation	$\delta(\tau\ B^0)$ (%)
B^0⟶	charmless	+−30%	0.125
	$D\bar{D}X$	+−10%	0.05
	D^+	+−10%	0.10
	D^0	+−10%	0.09
	Ds	+−20%	0.01
	Λc	+−50%	0.03
Total			$\delta(\tau\ B^0)$= 0.19%

Preliminary Results and Systematics Errors



90° Cone Cut

$\Delta Z < 3mm$; $\sigma(\Delta Z) < 1mm$

Note: $\Delta Z = Z(tag) - Z(reco)$

(opposite convention...)

Source	Range of Variation	$\sigma(\tau_{B^0})/\ \tau_{B^0}$ (%)
B^+ fraction	$5.0 \pm 2.6\%$	∓ 0.40
continuum fraction	$11.4 \pm 0.2\%$	± 0.21
$B\bar{B}$ comb. fraction	$30.0 \pm 0.9\%$	± 0.03
τ_{B^+} (effective)	1.51 ± 0.05	∓ 0.50
continuum *pdf*		± 0.29
$B\bar{B}$ comb. *pdf*		± 0.26
use of m^{++} sample		± 0.02
τ_{bk}	± 0.022 ps	∓ 0.61
f_{bk}	$\pm 3.6\%$	± 1.78
f_n	$5 \div 20\%$	± 0.20
b_w	$0.00 \div 1.00$ ps	± 0.13
D^0 bias (MC stat.)	$\pm 0.78\%$	± 0.78
D^0 bias (MC model)	see text	± 1.16
tag D bias(MC model)	see text	± 0.19
Total Preliminary		± 2.53

Fraction of living Combinatorial:

$f_{bk}(m+-) = f_{bk}(s+-) * f_{bk}(m++) / f_{bk}(s++)$

Systematics from MC (calculated vs true)

Should be improved using more MC or cutting harder against Background (i.e. $M^2\nu > -1$)

5% variation of the fraction of events with no D tracks in the Btag vertex

(Probably pessimistic)

$\tau\ B^0 = 1.424 +- 0.010 +- 0.035$ ps (Blind)

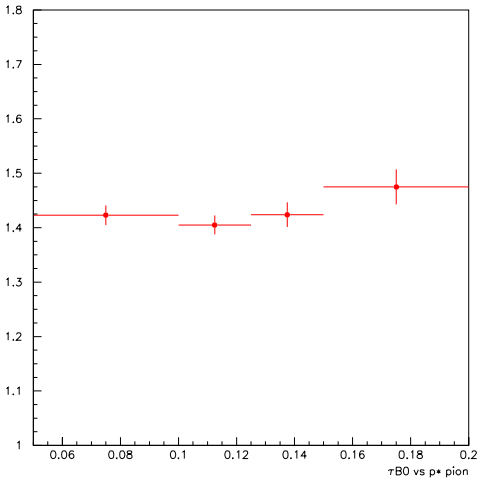
Stability checks

Fit in bins of P**pion*, θ *lepton*, ϕ *lepton*:

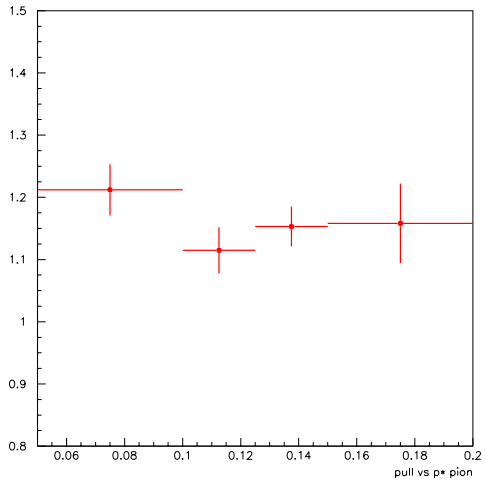
➔ For each subsample recomputed:
OffPeak, Combinatorial Contributions
Background Fraction vs $M^2\nu$

➔ P* *pion* dependence ~OK

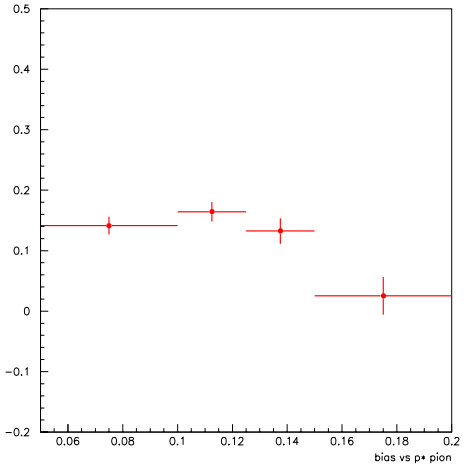
τ B^0 vs P*



Pull vs P*



Offset (ps) vs P*

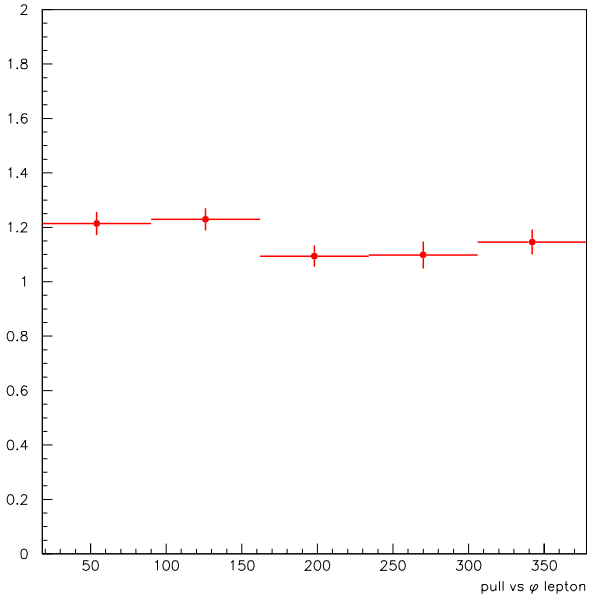


Stability checks

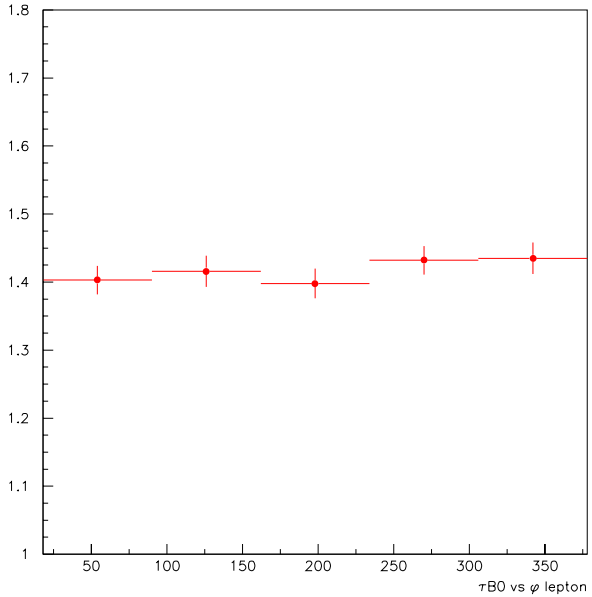
➔ ϕ *lepton* dependence ~OK

➔ Selected 5 zones according to SVT geometry.

Pull vs ϕ

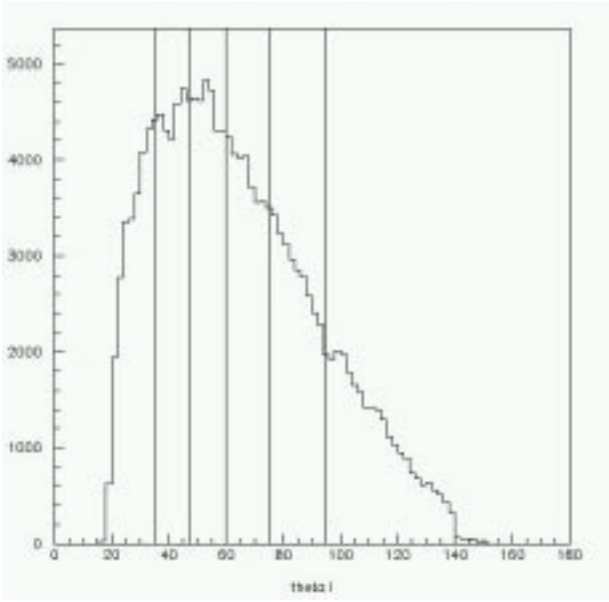


τ B^0 vs ϕ



Stability checks

➔θ *lepton* dependence, defined 6 regions:



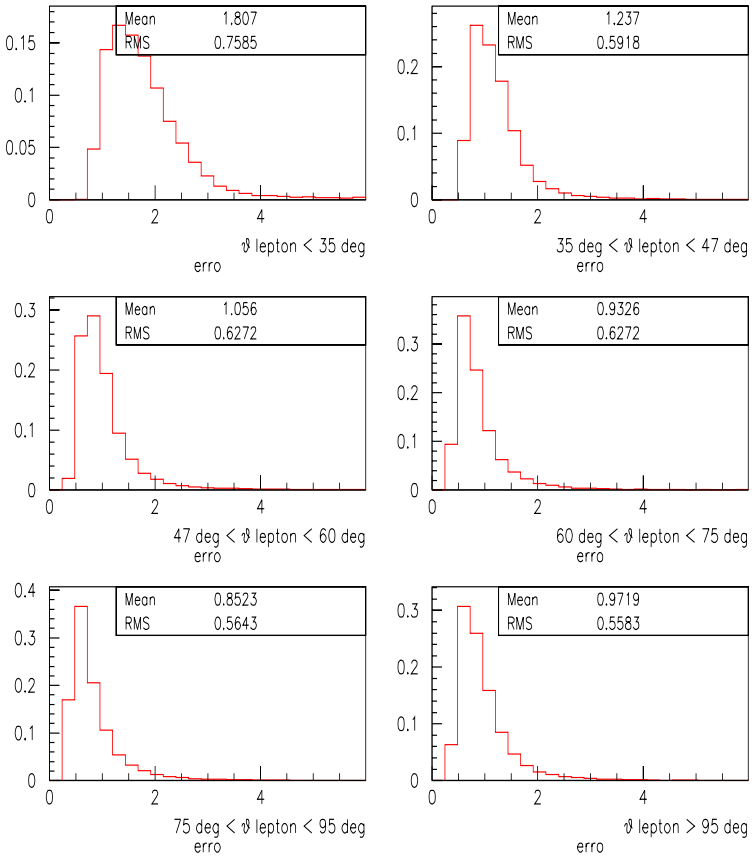
➔σ(Δt) depends on θ *lepton:*

Smaller Error for θ~90°

(more precise vertexing)

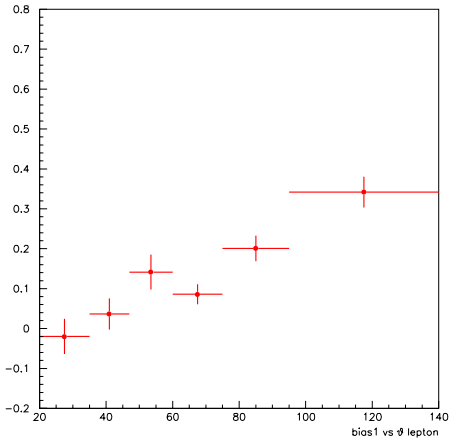
σ(Δt) in ps

σ(Δt) in θ bands

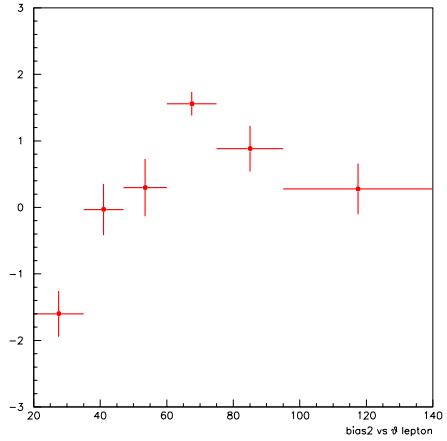


Stability checks

The offsets (ps) depend on θ *lepton*



narrow gaussian



wide gaussian

➔Does the offset dependence on error (see BAD 137, D*l*ν* Exclusive Analysis) reflect the θ dependence?

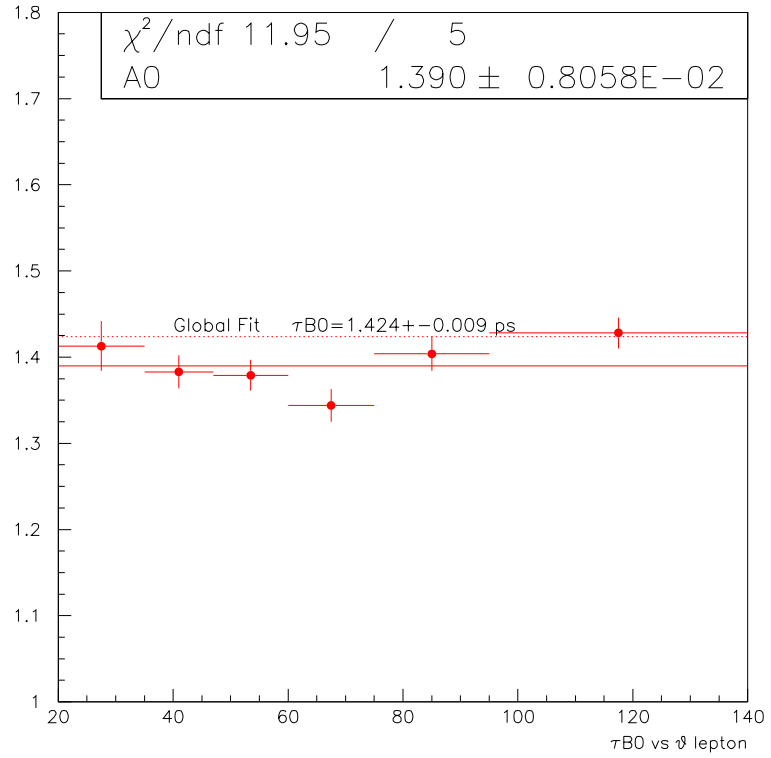
➔Cross Checks from other analyses?
Mis−alignment problem?

Stability checks

Problems:

- The result is not stable
- The average is different from the global fit result

τ B^0 vs θ



Stability checks

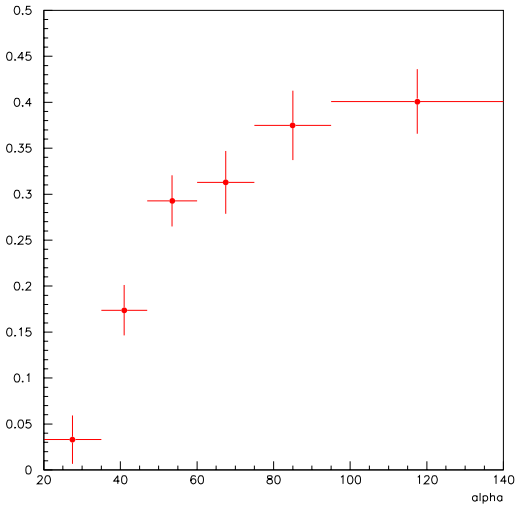
➔Use offset = $\alpha * \sigma(\Delta t)$ in the fit

(according to BAD 173, D*lν Exclusive Analysis):

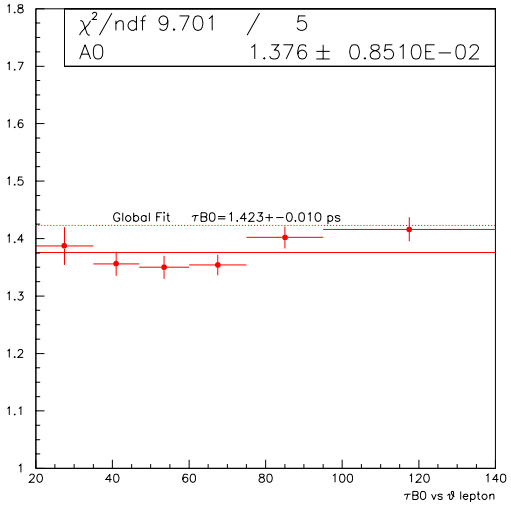
Good New: The average result does not change

Bad New: Stability does not improve, α depends on θ

α vs θ



τB^0 vs θ



Conclusions and Next Steps

- New version of BAD 182 available today

- Next Steps:

  Fit in bins of $\sigma(\Delta t)$

  Fit using offset depending on θ

  Use of a different Resolution Function ~ $G \otimes (\delta + \mathrm{Exp})$

- Systematics to be evaluated:

  Beam Spot distortions

  Outliers description

  Detector Geometry and Alignment