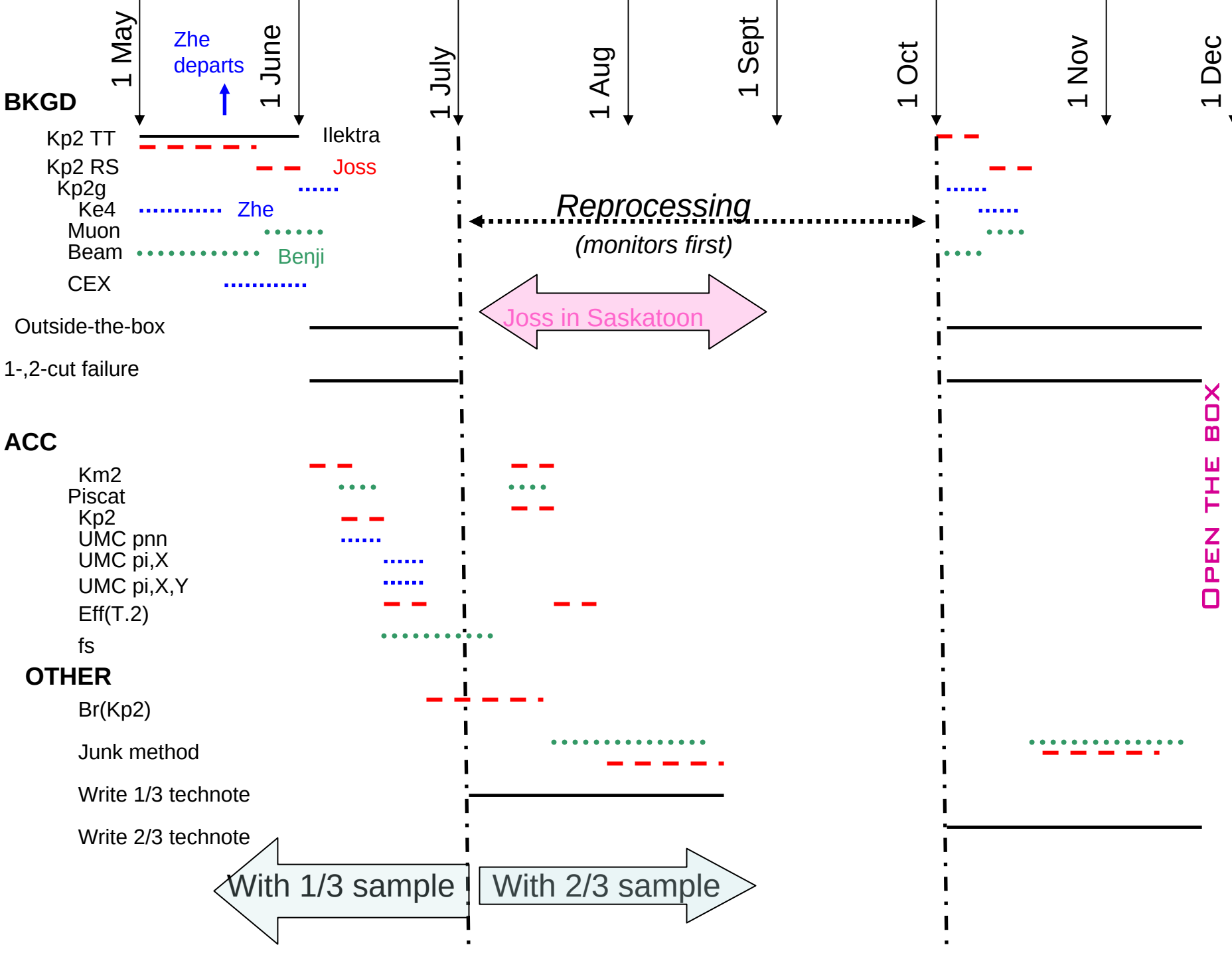
Schedule for pnn2 analysis

- Schedule
- Timeline
- Signal box definition
- Non-pnn results
- First Priorities

Schedule outline

(Proposed timeline on next slide.
Details to be discussed.)

- 8 weeks: fix cuts on 1/3, measure bkg, acceptances,outside-the-box & 1-,2-cut failure studies
- 12 weeks: reprocess (monitors first), measure acc on 2/3, develop Junk method, write 1/3 technote
- 8 weeks: measure bkg on 2/3, outside-the-box & 1-,2-cut failure studies, write 2/3 technote
- Open box


1 May
Zhe departs
1 June
1 July
1 Aug
1 Sept
1 Oct
1 Nov
1 Dec
BKGD
Kp2 TT
Ilektra
Kp2 RS
Joss
Kp2g
Ke4
Zhe
Muon
Beam
Benji
CEX
Reprocessing
(monitors first)
Joss in Saskatoon
Outside-the-box
1-,2-cut failure
ACC
Km2
Piscat
Kp2
UMC pnn
UMC pi,X
UMC pi,X,Y
Eff(T.2)
fs
OTHER
Br(Kp2)
Junk method
Write 1/3 technote
Write 2/3 technote
With 1/3 sample
With 2/3 sample
OPEN THE BOX

Some thoughts on how to achieve schedule

•Use previous, documented analysis techniques as much as possible

•Communication between analyzers **must** increase and improve

• Every study should result in a technote containing a summary and details. Ideally they can be updated and 'stapled' together to make the final technote

•To achieve schedule, analyses need to be "push button" to a large degree
- change cut(s)
- re-measure affected bkgds & acceptances

• If analyzers don't **always** use standard cuts and ntuples in centralized repository, then the possibility of mistakes increases. How do we reconcile this requirement with the current use by some of skim-of-a-standard-skim to speed processing?

• I recommend that each person doing analysis read Bipul's thesis, E787 TN391, TN386, TN385 and write down a detailed plan of how they would do the analysis. Comparison of such plans would be useful.

• The immediate goal of this analysis is a correct, valid, but not necessarily optimal, measurement of Br(pnn) for the E949 pnn2 data.

Likelihood method and definition of pnn2 signal box

- Likelihood method (aka Junk method) is a tested means to combine all E787/E949 pnn results. It takes into account bkgd and sensitivity of each analysis.
- Previous pnn2 analyses have had no discrimination power inside signal region. In this analysis we have attempted to extend signal box kinematically and in Kdecay time. This can be viewed as dividing the signal region into four ‘cells’ (next page) for evaluation with the Junk method.
- The decision of whether to use an extended signal box should be based on the expected impact on Br(pnn). The impact can be readily assessed with the Junk method.

E949 pnn2 signal box

	DELCO6	DELCO2
97 R,P,E BOX	A = 1 B = 1	A~1.19 **B ~1.28 x1.29**
Extended R,P,E BOX	A = 1.22 **B > 1**	A = 1.46 **B > 1**

- A = relative total acceptance, B = relative total background
- Estimate of A,B from Bipul's TN391,p.111,p.85 and ignores possible improvements from E949 PV. B comprises estimates for Kp2-scat and CEX bkgds only.
- ***It is difficult to assess this proposal without a realistic idea of the background***
- Fallback position is simply to return to 1997 analysis positions
- With either scheme (or other variant), we need to prepare code to use the Junk method to assess the impact on Br(pnn) and allow combination of E787/E949 results. But can we rely on UMC-estimate for CEX bkgd in Junk method?

Ancillary results (K->πX & πX,Y)

- Previous pnn2 papers have included limits on K->πX & πX,Y

- K->πX: Need UMC acceptance as function of M(X).

- K->πX,Y: Need UMC acceptance for scalar, tensor int. with massless X,Y

For both, we can use same methods as E787

PRD70:037102,2004.

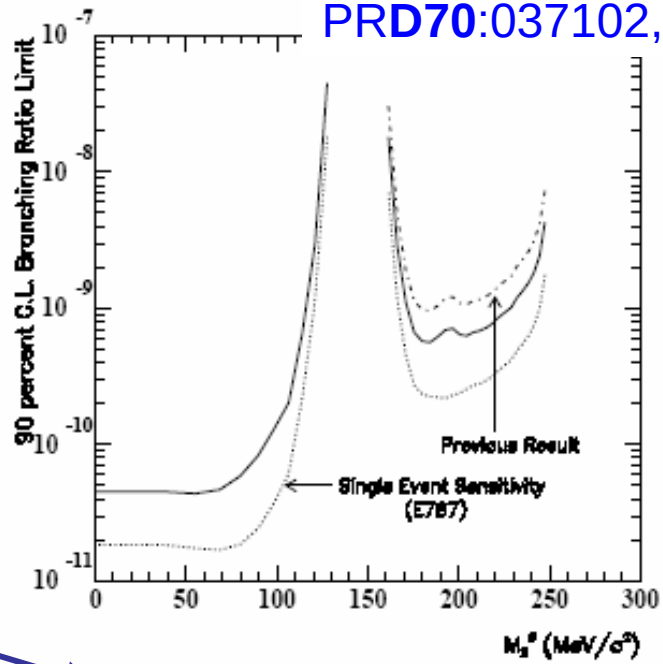


FIG. 3: The 90% C.L. upper limit for $B(K^+ \to \pi^+ X^0)$ as a function of M_{X^0}, where M_{X^0} is the mass of the recoiling system. The solid line is from this analysis. "Previous Result" is from [15]. The limit for $M_{X^0} < 140$ MeV/c^2 is derived from the result for Region 1 [3]. The single event sensitivity as a function of M_{X^0} is shown by the dotted line.

For non-standard scalar and tensor interactions in the process of $K^+ \to \pi^+ X^1 X^2$, where X^1 and X^2 are hypothetical, massless, long-lived neutral particles, we set upper limits on their branching ratios at 2.7×10^{-9} and 1.8×10^{-9}, respectively (90% C.L.) [19, 20].

First priorities to achieve schedule

- Measure Kp2-scatter (TT) and beam backgrounds in 1/3 sample.
- Measure muon,Kp2g,Ke4,CEX, Kp2-scatter(RS) backgrounds.
- Fix cuts.
- Measure acceptances and perform outside-the-box and 1-,2-cut failure studies
- Begin reprocessing by July 1.