

Systematics

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HPS Analysis Workshop

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Sources of Systematic Error

- target position!
- target thickness
- fit systematics (pulls)
- mass resolution
- mass scale
- radiative fraction
- scaling
- beamspot (position and width)
- beam angle (displaced acceptance, maybe radiative fraction)
- acceptance from long lived A' ...relative acceptance
 - uncertainties in SVT opening angle (related to mass resolution & scale as well as acceptance)
- do these cancel?
 - track efficiency
 - prompt acceptance effects
 - lumi (yes, cancels in BH & vertexing)

Target Position

!!! BH and Vertex !!!



- how far off do we think target is off now? uncertainty?
 - +/- ~0.5mm (Omar from Tim)
 - talk to Takashi re: survey —> detector compact?
- generate A' MC at +/- 0.5mm
- (BH) look at difference in mass resolution
- (vertex) go through entire procedure at both positions
- need to generate new MC for this
 - prompt and displaced A' at a few masses
 - only do -ive change?

Target Thickness ! BH (and Vertex) !

- effects mass resolution
 - how much is scattering in target and how much is MS in detector?
 - run MC with and w/o target (putting A' decay randomly in target)
 - are we modeling scattering in the target???
 - someone should do a back of the envelope calculation on if this matters
- what about non-uniformities in the target thickness?

Radiative Fraction

!!! BH and Vertex !!!



- do we have target-converted WABs in the MC?
 - yes, Takashi said, verified by Cameron

Uncertainty in SVT opening

! Vertex !



- effects mass resolution/scale and acceptance (particular for downstream)
- adjust detector by +/- 1 motor step
 - uncertainty in surveyed results?
 - Tim says +/- 0.2 mrad opening angle (very conservative)

MC samples to produce for systematics

- move target position +/- ive 0.5mm (high priority, after samples at bottom of page)
 - 1M A' prompt & displaced (ctau=10mm) at a few masses
 - 50, 75, 100, 125, 150, 175 MeV
- +/- 0.2 mrad SVT opening angle (low priority)
 - use moller mass bias to determine opening?
 - MattS can point to the number in the compact
 - 1M A' prompt & displaced (ctau=10mm) at a few masses
 - 50, 75, 100, 125, 150, 175 MeV

Doesn't look like we have WAB conversions in the target...wabs (or anything) aren't simulated through target...Takashi has done this in past but didn't make it to hps-mc

- 1 M tritrig-beam
- 1 M RAD-beam
- 5 M WAB-beam
- suite of prompt A'

MC to redo for radiative fraction and mass resolution

Takashi verified that tridents, WABs etc are being run through target...A' are NOT, so we will redo those