Outriggers: Calibration, Recon, Crab & Moon

Outline:

- Review major points of timing calibrations & updates
- Review improvements to sampling and curvature
- Review changes to angle reconstruction & Gaussian core fitter
- Present update on fitting raw moon data
- Present update on fitting raw crab data
- What's left to do?
Outriggers: Calibration, Recon, Crab & Moon

Review major points of timing calibrations & updates

- Timing calibrations:
  - Slewing – used in-situ fibers, all filter wheel positions
  - Recall only use low tstart vs low tot.

- Tped – Used dual above ground fibers

3/6/04

Shoup - 2
Outriggers: Calibration, Recon, Crab & Moon

- Review major points of timing calibrations & updates
  - Pulse height calibrations
    - Andy's spectrum PE calibrations: match MC pe distribution
  - Updates:
    - Matt W. took more tped data to cover uncal'ed tanks (1/04)
      - Also took complete new slewing data set
    - Processed this data into new outrigger calibration set
    - Now have timing cals for 172 out of 175 outriggers (but missing pe cals for ~15)
    - Obtained timing residual peaks relative to AS fits
      - nfit>50, θ<10, R < 50 m
      - Adjusted tpeds so that residual peaks were centered on zero.
Outriggers: Calibration, Recon, Crab & Moon

- Review improvements to sampling and curvature

![Sampling Plot](image)
Outriggers: Calibration, Recon, Crab & Moon

- Review changes to angle reconstruction &
  Gaussian core fitter

  - Angle fitting
    - Optimized $T_\chi$ cuts
    - PE cuts
    - Introduced relative weights between layers
    - Changed RELAX parameter from 450 to 1000
  - Gaussian fitter
    - Decides whether to start fitter with core on/off pond
      - If off pond computes pulse-height weighted average
        $(x,y)$ for each “quadrant”
        - Chooses quadrant with greatest nHitOut as starting $(x,y)$
          for chi-squared fit
        - Minimizes $(x,y)$, width (only one), “strength”
Outriggers: Calibration, Recon, Crab & Moon

**Update on fitting raw moon data**

- Fitting choices to make:
  - Fit with all hits (AS,MU,OUT), or some combination
  - Fit with/without zenith align corrections

- In memo of 1/15/04 I presented results of fitting ~ 3 months of raw moon data (runs 4855-5004, MJD 2706-2808).

- I have now refit that data using the more complete outrigger calibrations and some of the choices above.
Outriggers: Calibration, Recon, Crab & Moon

- Update on fitting raw moon data

No energy cut

Online, no Zenith Align  AS+Out, no Zenith Align
Outriggers: Calibration, Recon, Crab & Moon

- Update on fitting raw moon data
  - $E > 10$ TeV cuts, (MC says 50% of sample is $> 10$ TeV) :

    
    Online, no Zenith Align

    ![Online, no Zenith Align](image1)

    AS+Out, no Zenith Align

    ![AS+Out, no Zenith Align](image2)

3/6/04
Outriggers: Calibration, Recon, Crab & Moon

- Update on fitting raw crab data
  - AS+OUT, with Zenith Align, 244 days, MJD 2622-2886

\[ N_{signal} = 2230 \pm 626 \quad \sigma = 6.40^\circ \pm 0.10^\circ \]

0.63 radius bin!
Outriggers: Calibration, Recon, Crab & Moon

- **Update on fitting raw crab data**
  - AS+OUT, with Zenith Align (from Andy) (244 days):

![Crab data graph](image)

---

3/6/04
Outriggers: Calibration, Recon, Crab & Moon

- Update on fitting raw crab data
  - AS+MU+OUT, with Zenith Align (from Andy) (179 days):

![Graph showing crab data](image-url)

Crab: Outrigger+AS vers 407, square 1.3 deg bin, Runs 4702-5138

3/6/04

Shoup - 11
Outriggers: Calibration, Recon, Crab & Moon

What's left to do?

- Decisions to make:
  - Use (AS+MU+OUT) or (AS+OUT) in fits?
  - Finish reconstruction of all available crab data that has outriggers.
  - Use zenith align? If so, in calibrations?
  - If crab strong enough signal fit its offset to determine pointing error.