

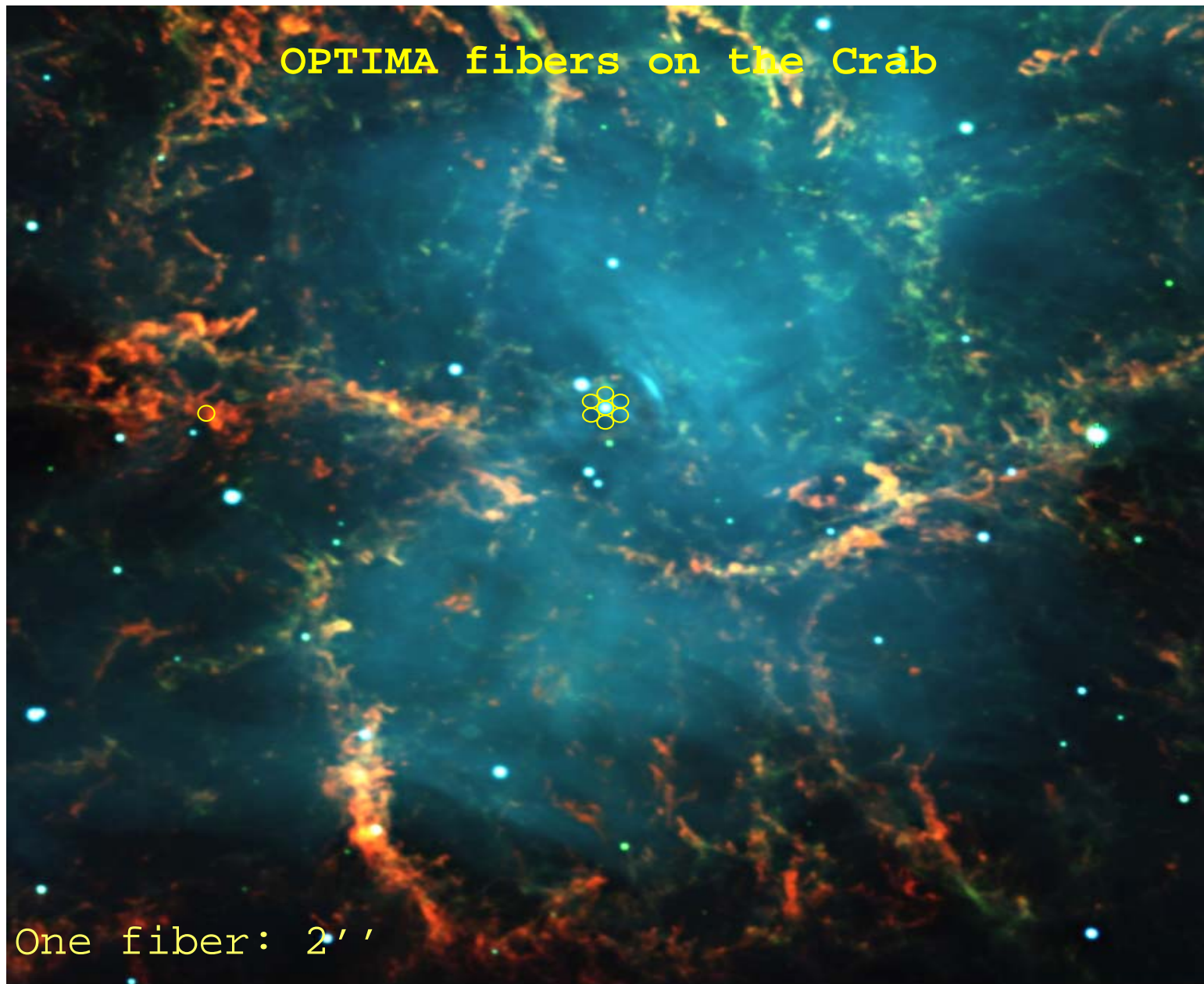
MPI / MPE PULSAR MEETING

MULTIWAVELENGTH APPROACH OF NEUTRON STARS  
AND SUPERNOVA REMNANTS

OPTICAL MEASUREMENTS OF THE CRAB  
SINGLE PULSES

AGNIESZKA WO NA  
MPE Garching, NCAC Toru

24 – 25 April 2003, BONN



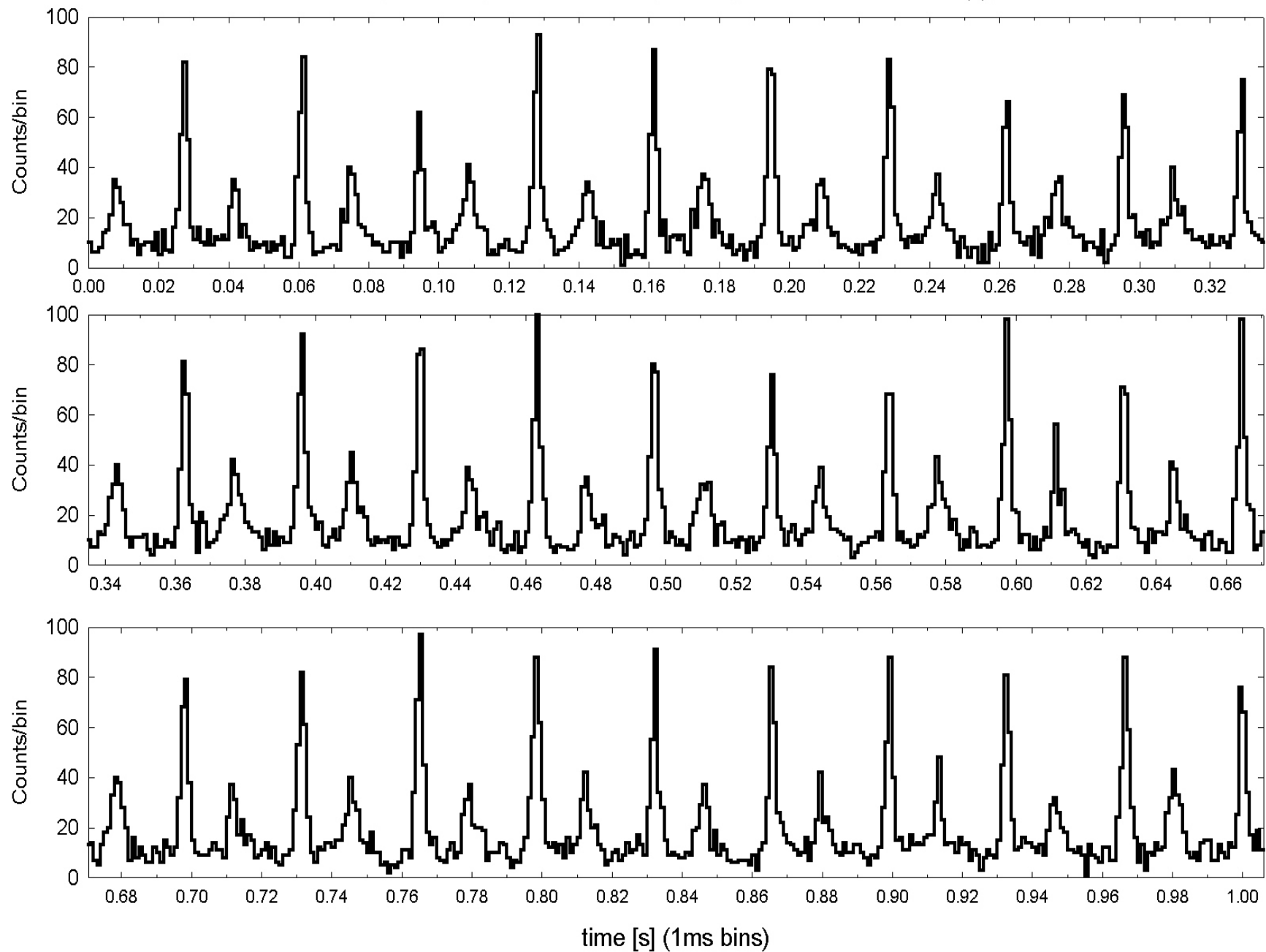
OPTIMA fibers on the Crab

One fiber: 2''

The Crab Nebula in Taurus (centre) (VLT KUEYEN + FORS2)

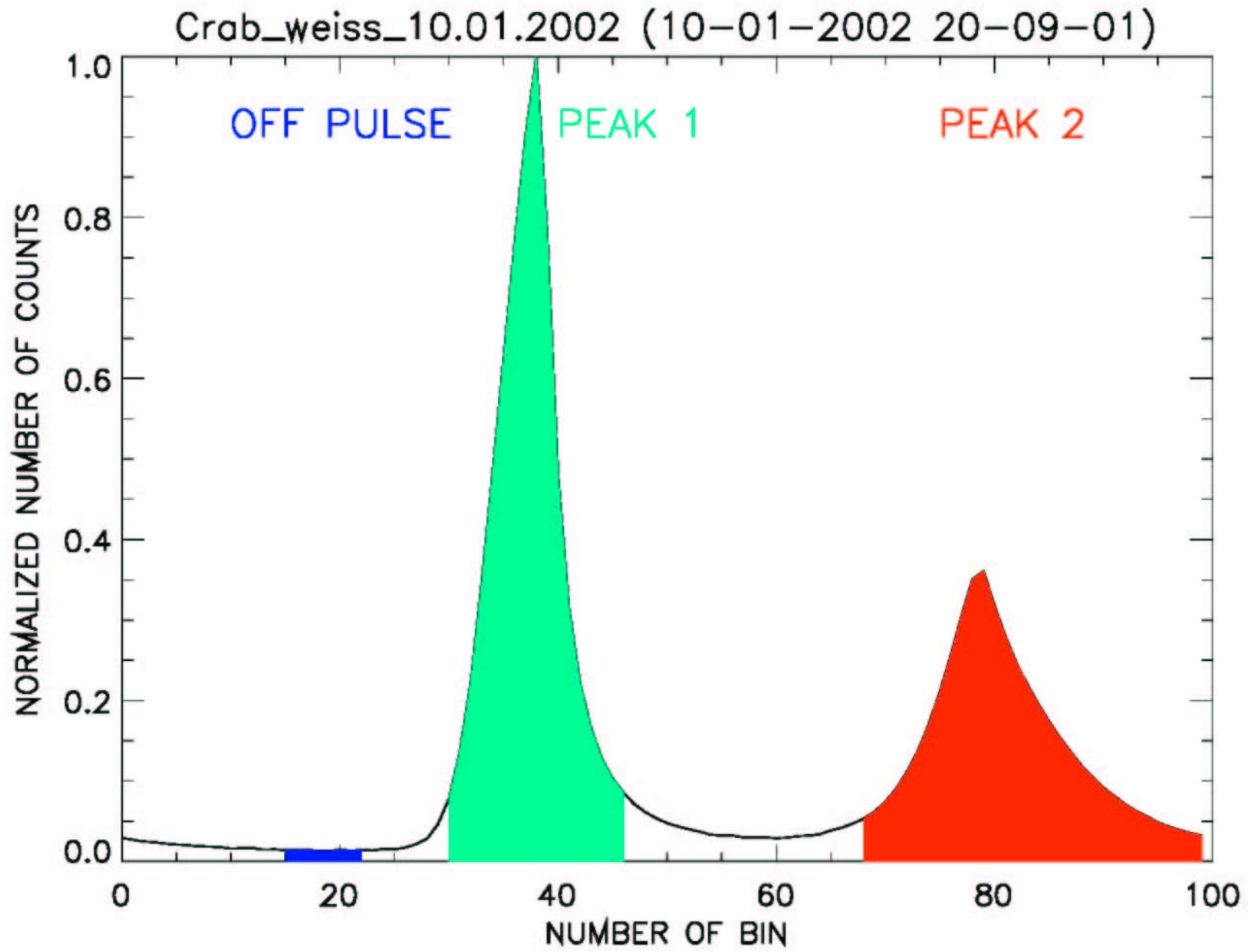
# CRAB SINGLE ROTATION

Crab Pulsar, OPTIMA, Calar Alto 3.5m, Jan 10, 2002 20:09:01 UT + t(s), no Filter

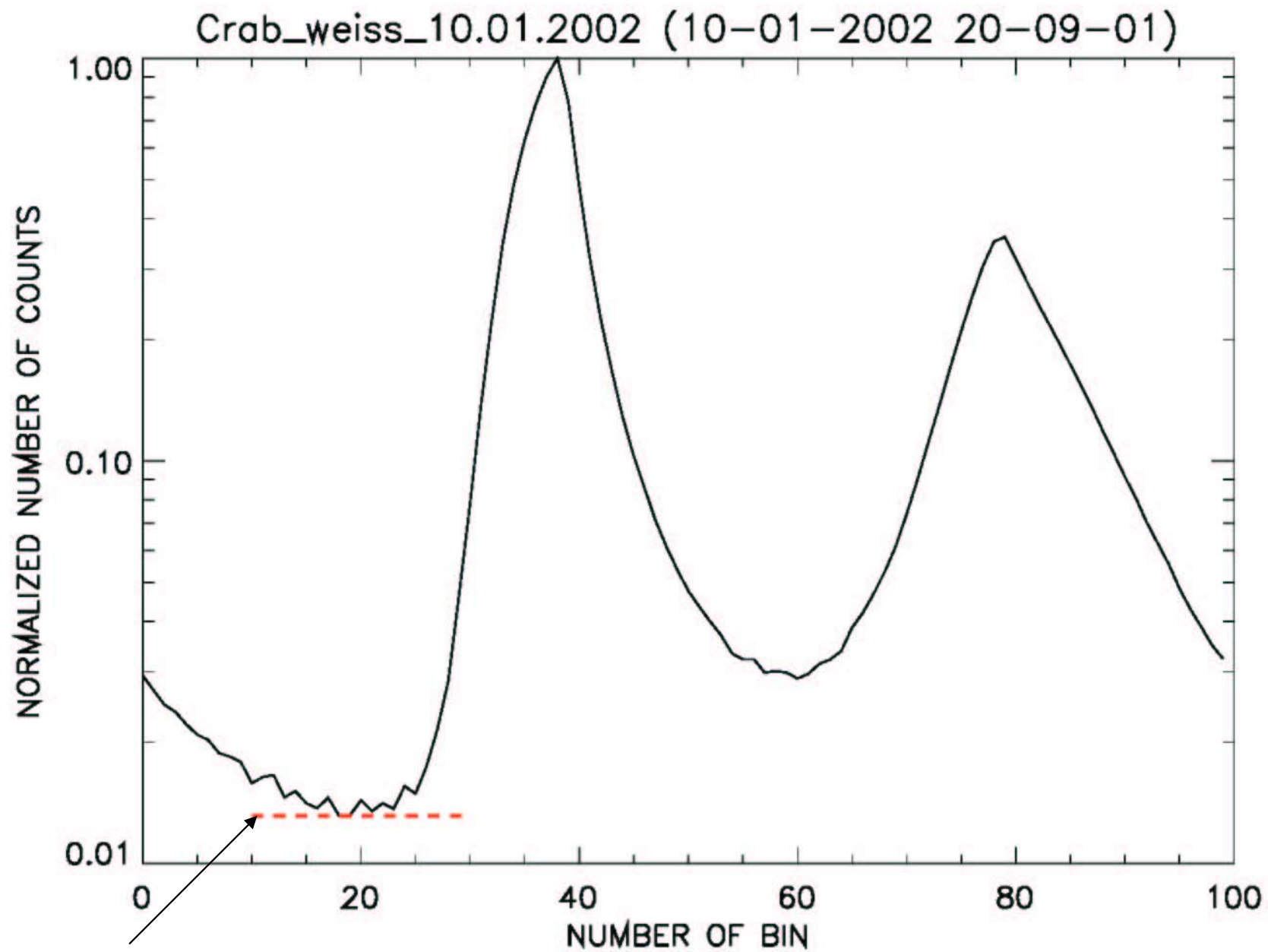


# DATA REDUCTION

- barycentred events
- Jodrell Bank Crab Pulsar Monthly Ephemeris
- flat field correction
- number of counts per bin per period (off pulse phase interval, 5 fibers)
- background subtraction from source channel (channel 00)
- template for single data acquisition (~ 10 min)



$$P2/P1 = 0.64$$



**Continuous emission**

# WHAT DO WE WANT TO INVESTIGATE ?

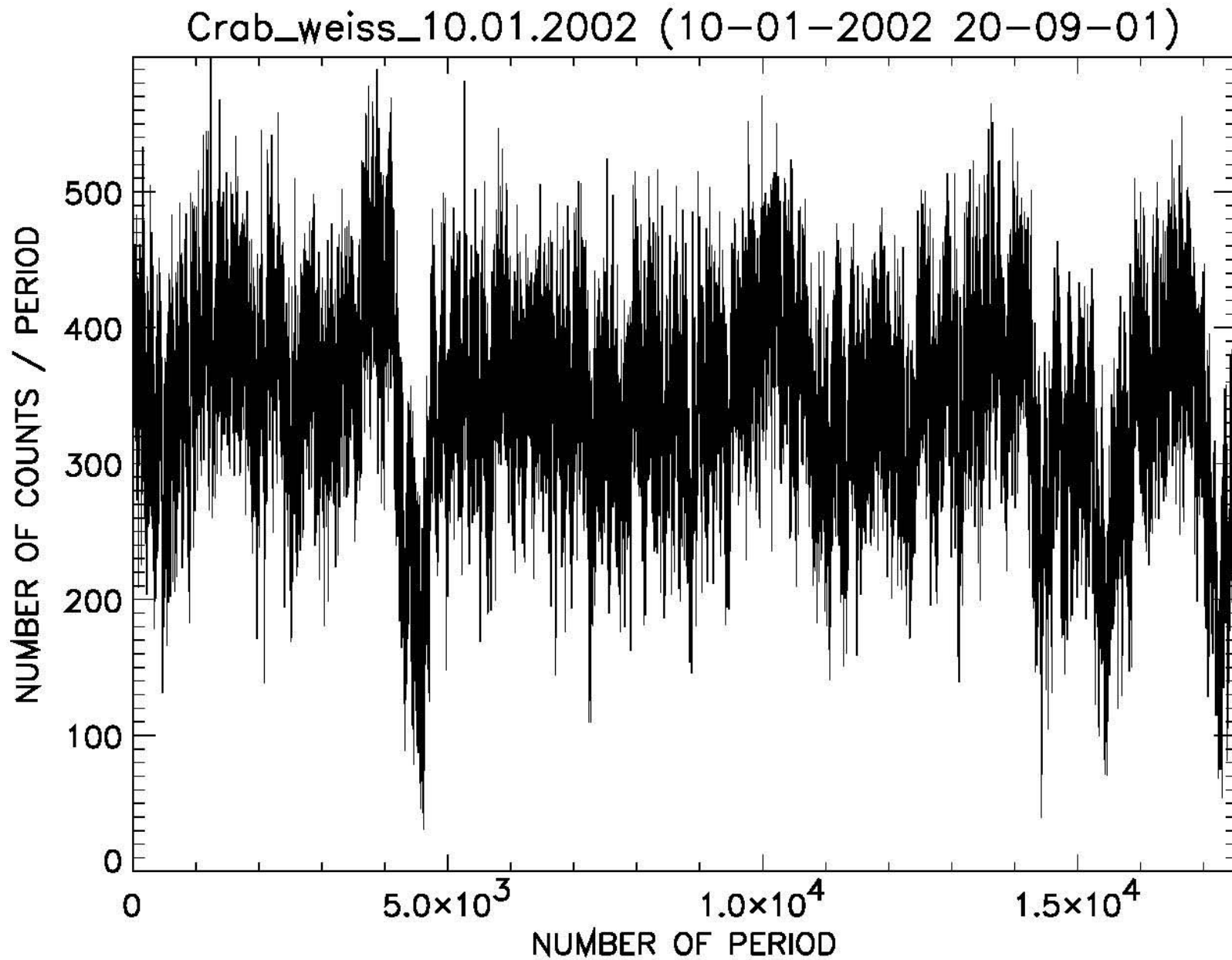
- P2 / P1 RATIO

- CHANGES IN THE SINGLE PULSE SHAPE

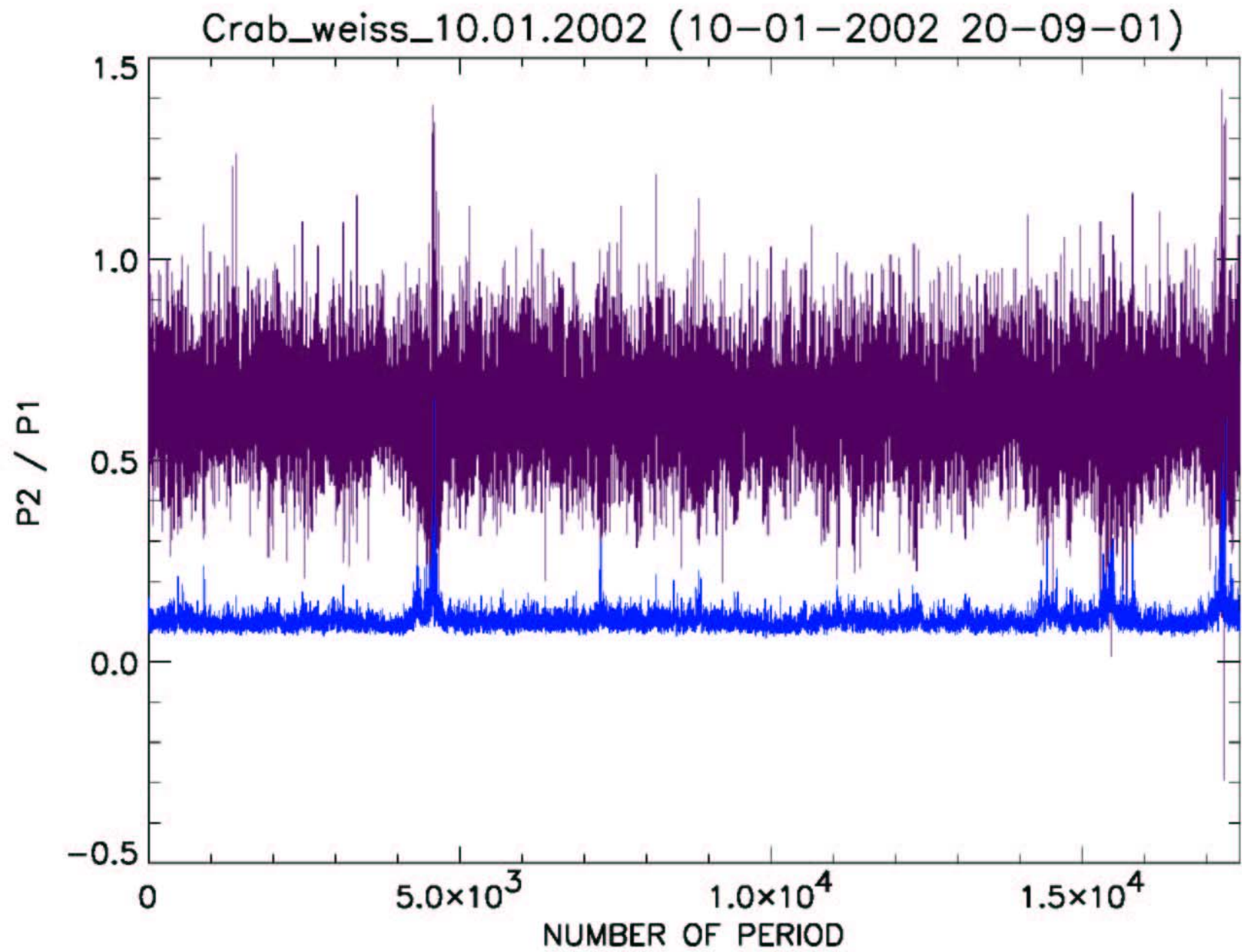
# WHAT KIND OF SYSTEMATICS EFFECTS DO WE HAVE ?

- GUIDING (10 sec)
- SEEING (short timescale)
- ATMOSPHERIC TRANSPARENCY



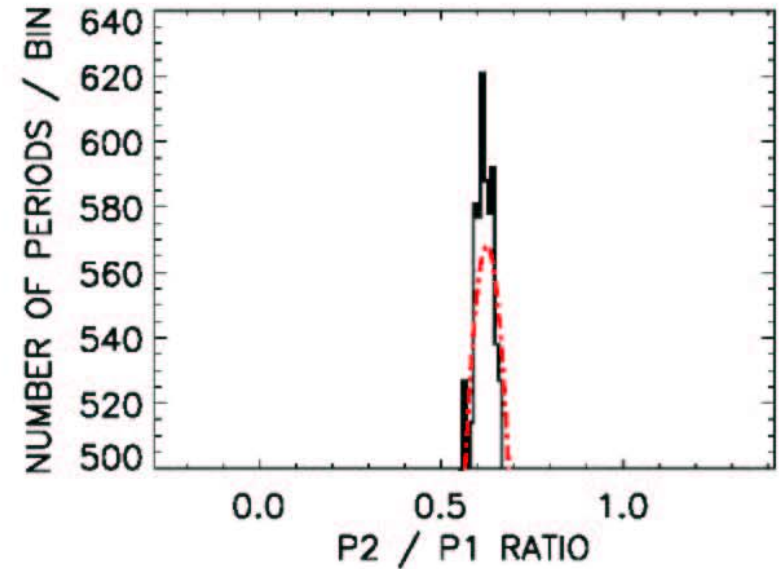
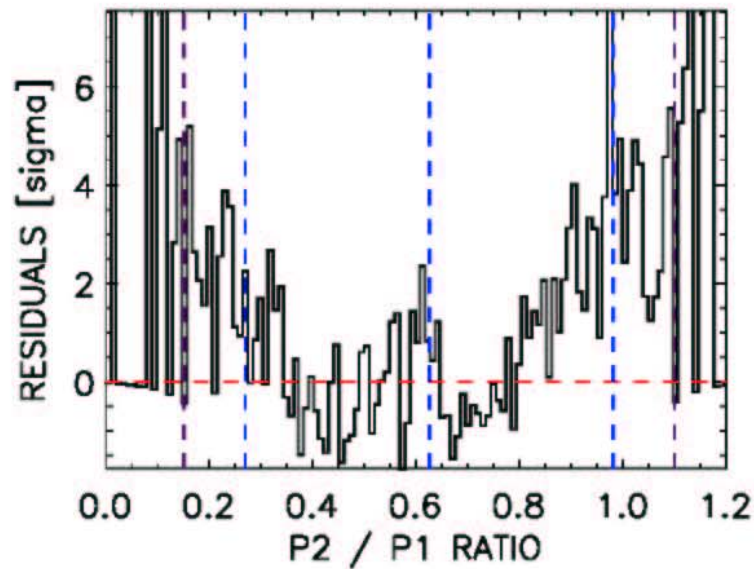
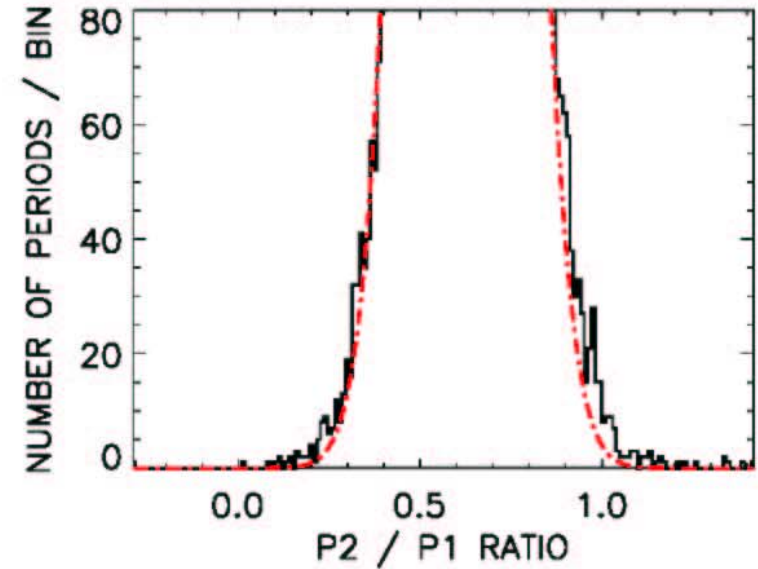
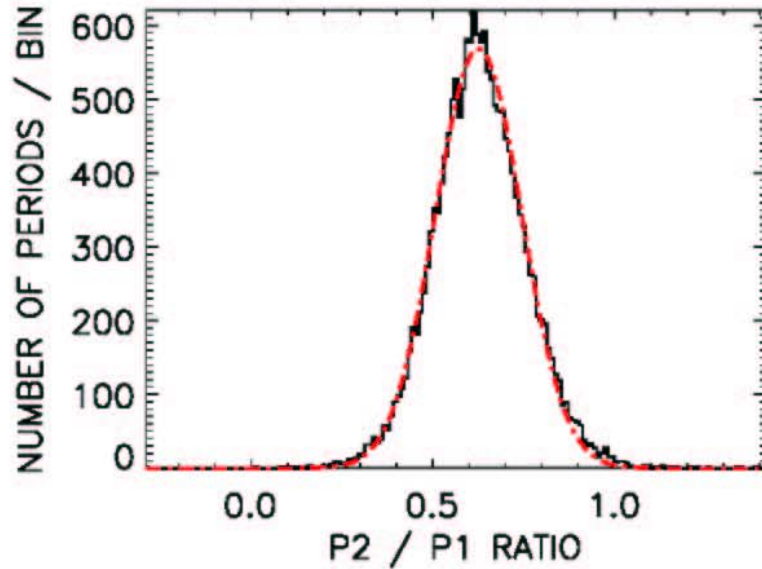


Average number of counts in single rotation 345.18 in channel 00 (source channel).  
Number of Crab rotations during data acquisition: 17529

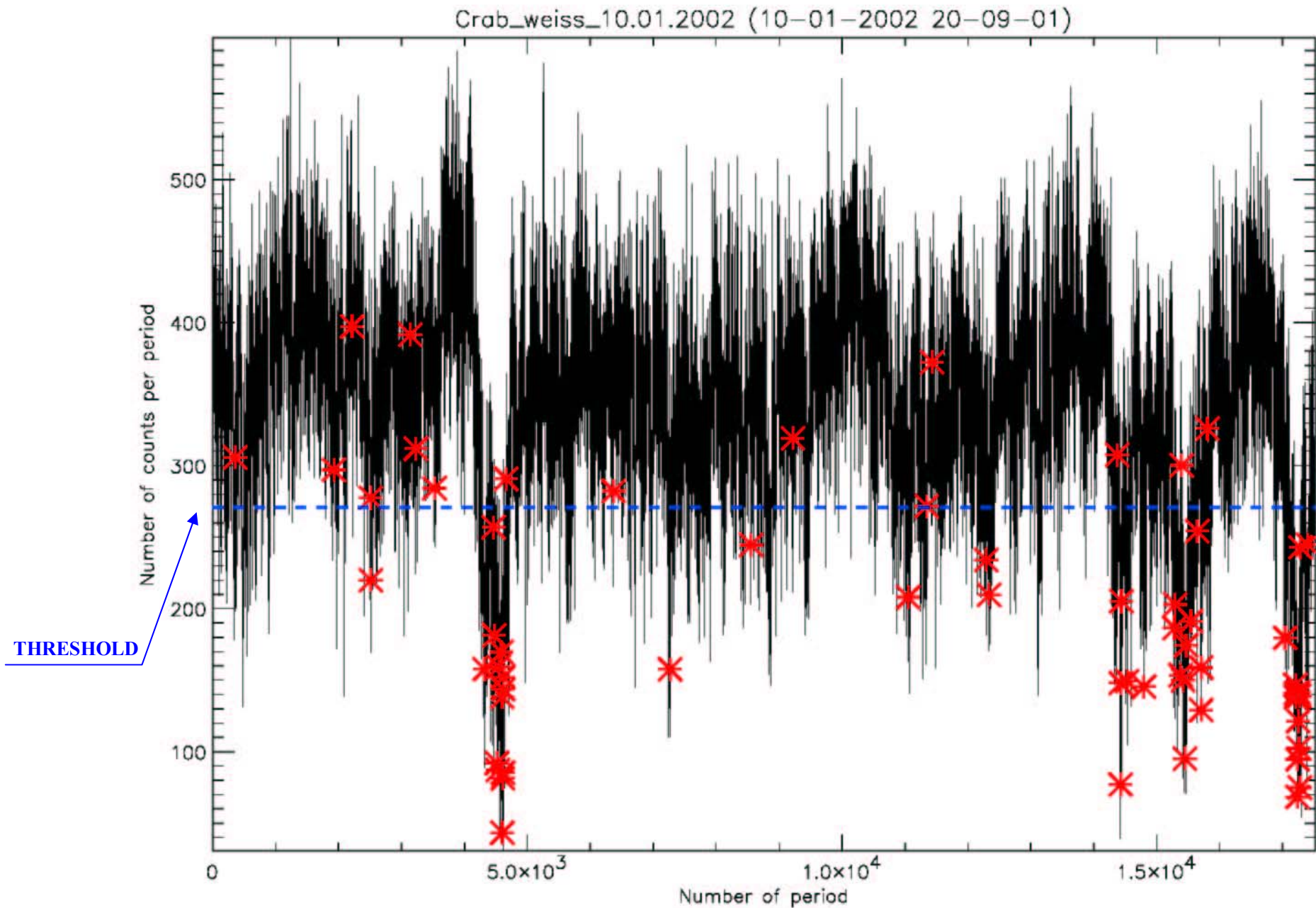


Average of P2 to P1 ratio: 0.63

# GAUSS DISTRIBUTION OF P2/P1 RATIO



High= 568.57, P2 / P1= 0.626,  $\sigma$ = 0.119,  $\chi^2 / d$ = 3.36

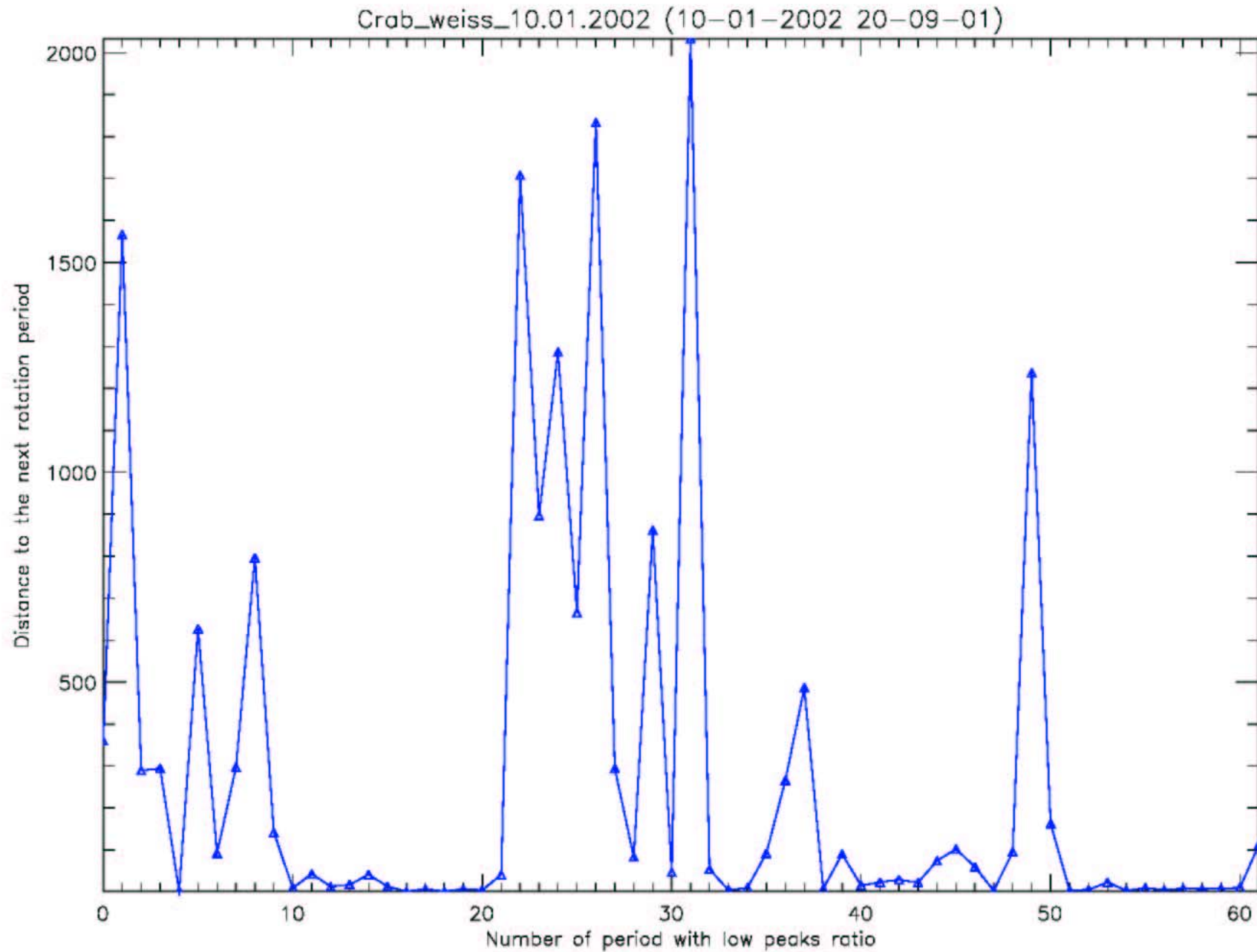


Number of rotations with low P2/P1 ratio: 63

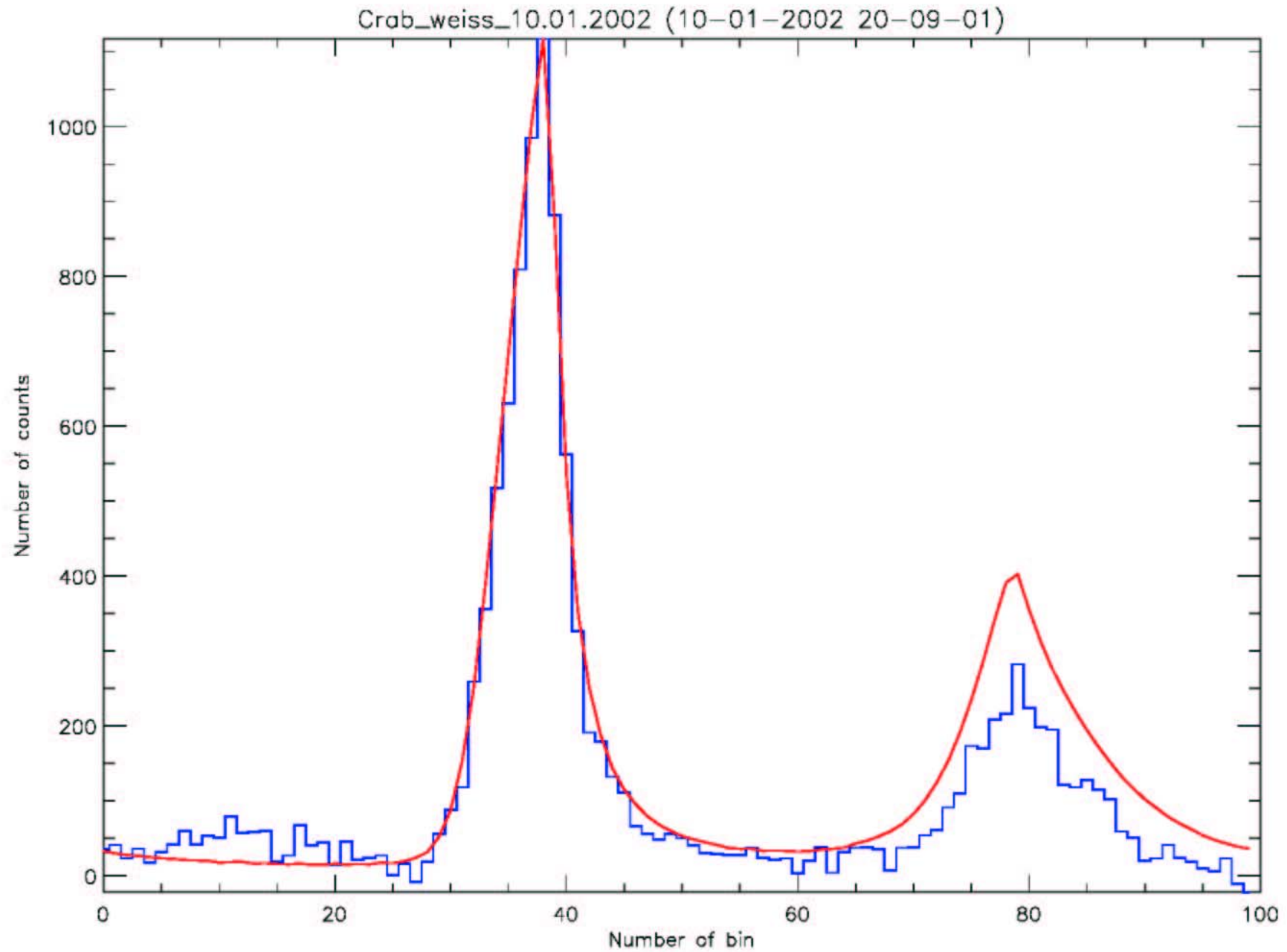
Threshold = average number of counts per period  $- 4 * (\text{average number of counts per period})^{1/2}$



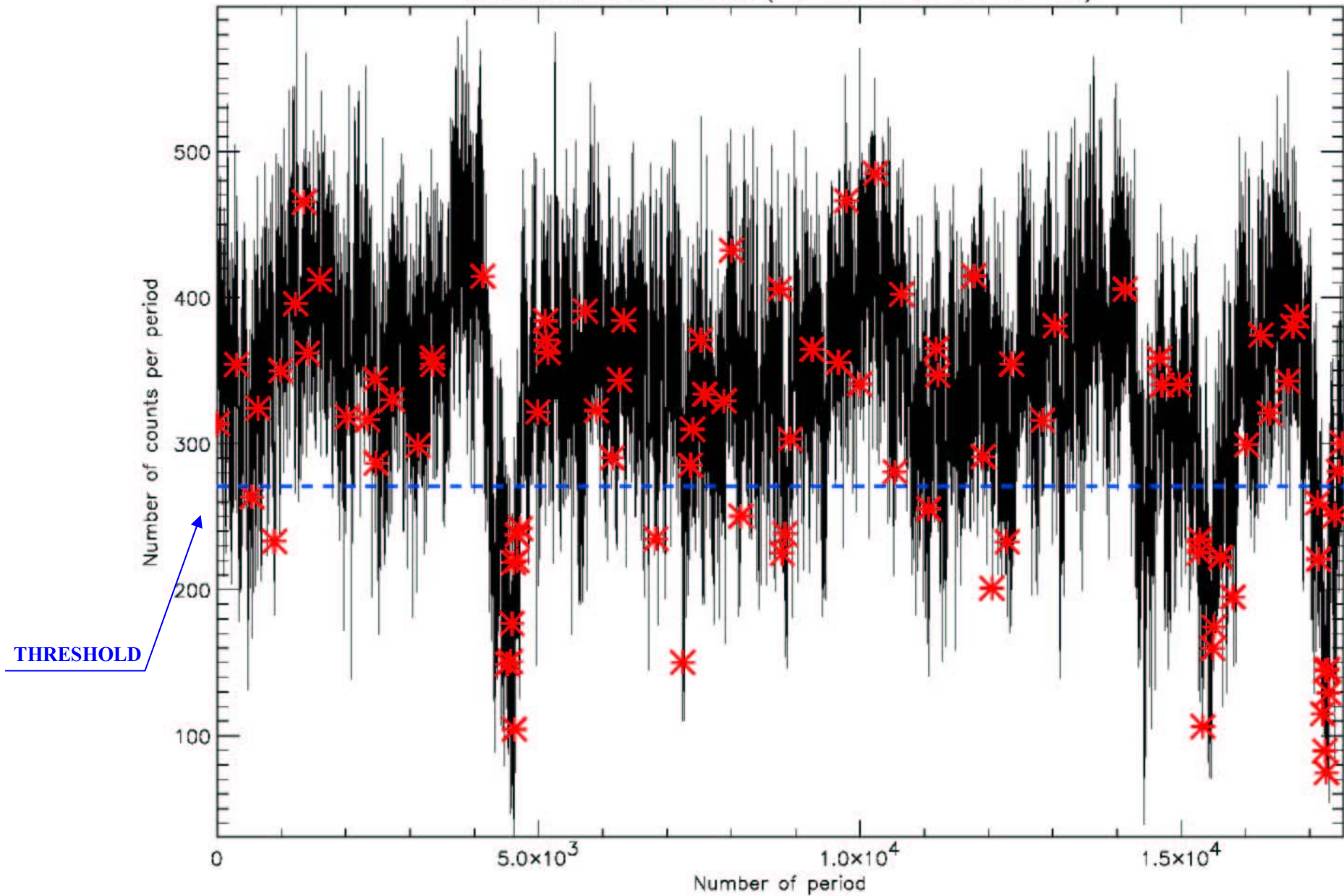
# LOW PEAKS RATIO FREQUENCY (BELOW 3 SIGMA)



# LIGHTCURVE BASED ON THE ROTATIONS WITH LOW P2/P1



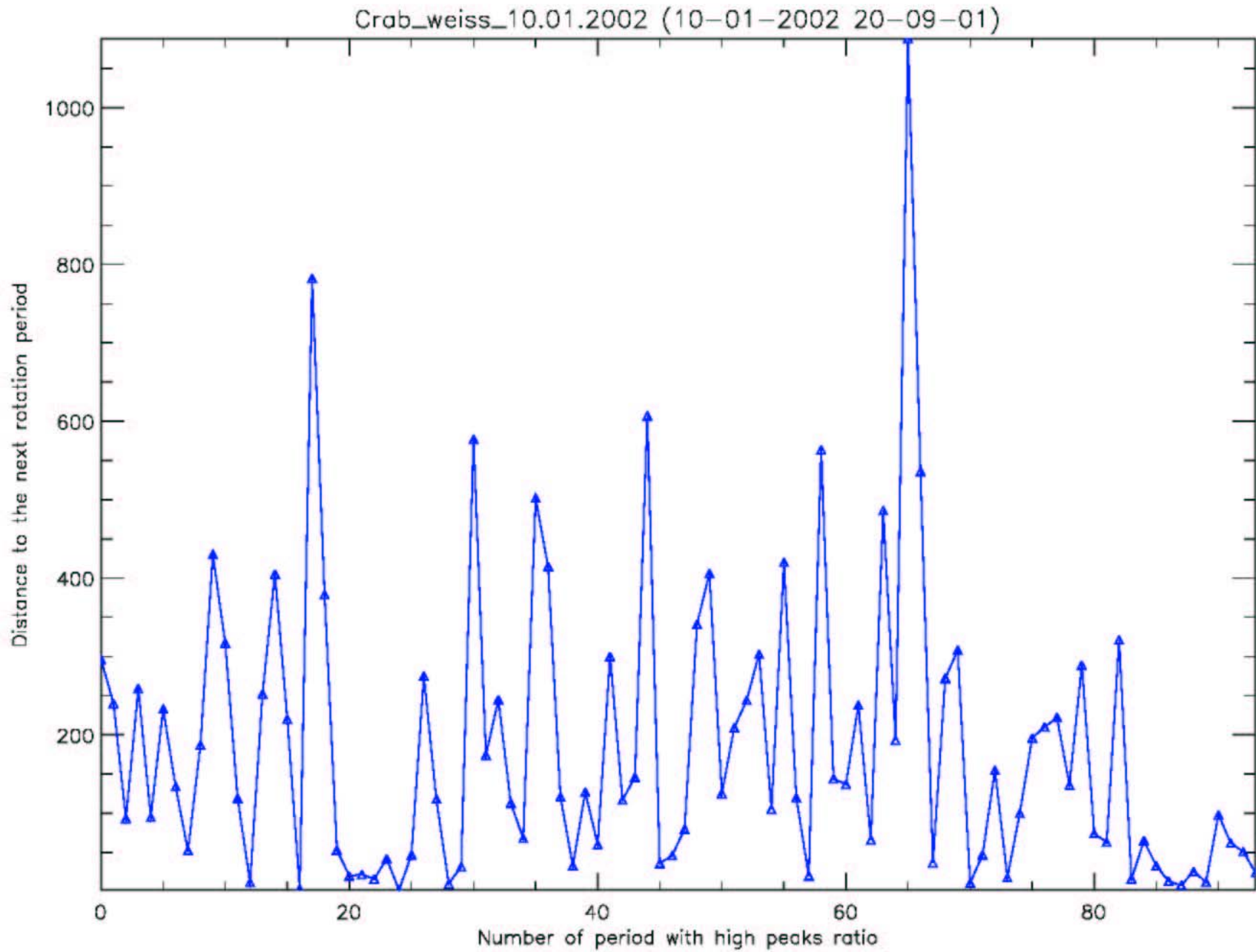
Crab\_weiss\_10.01.2002 (10-01-2002 20-09-01)



Number of rotations with high P2/P1 ratio: 95

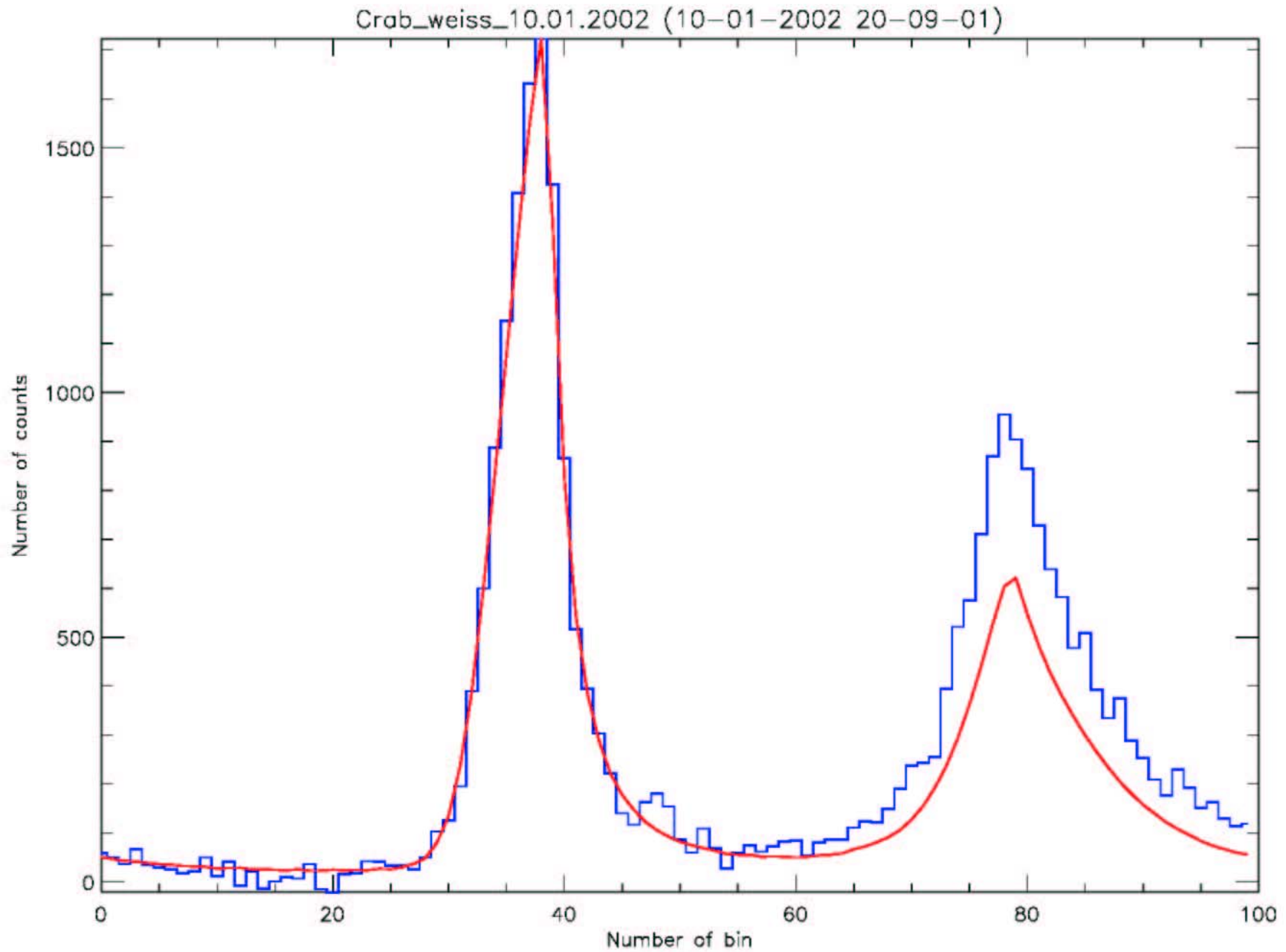
Threshold = average number of counts per period - 4\*(average number of counts per period)<sup>1/2</sup>

# HIGH PEAKS RATIO FREQUENCY (ABOVE 3 SIGMA)

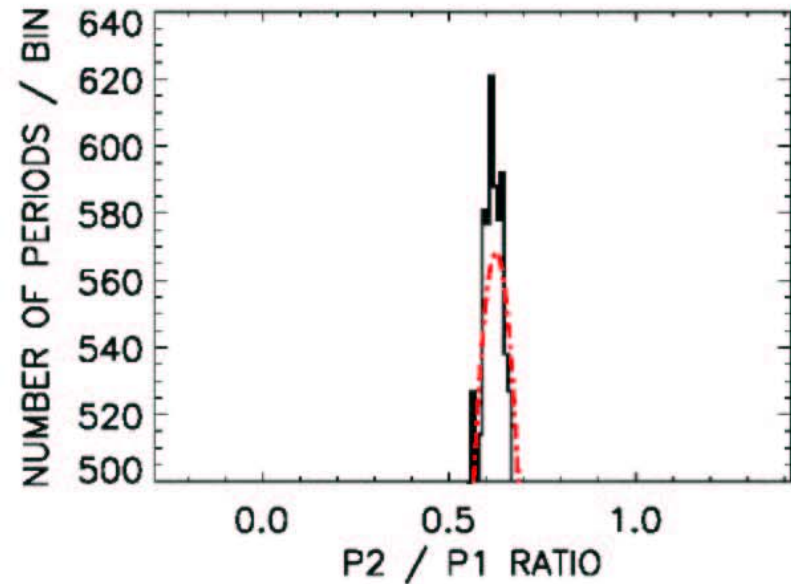
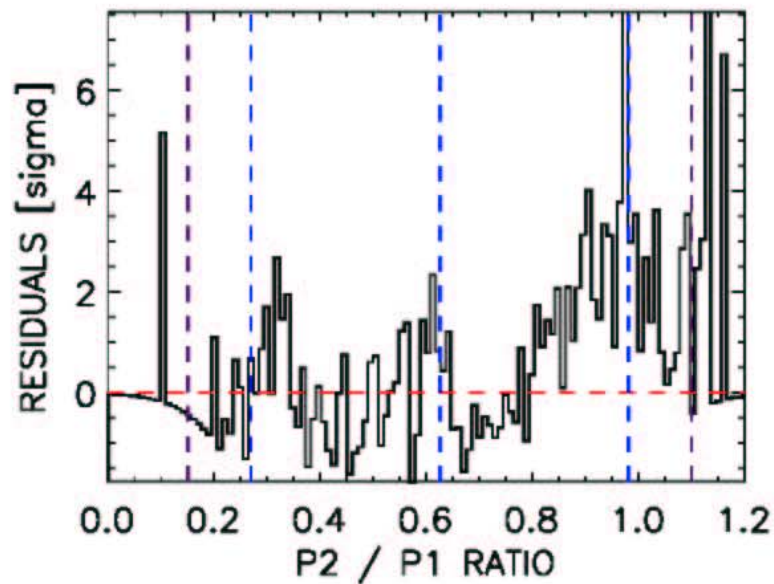
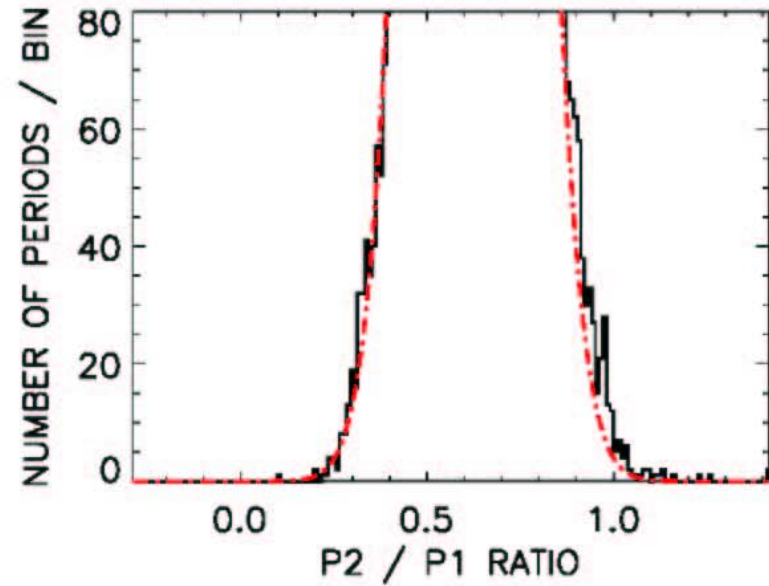
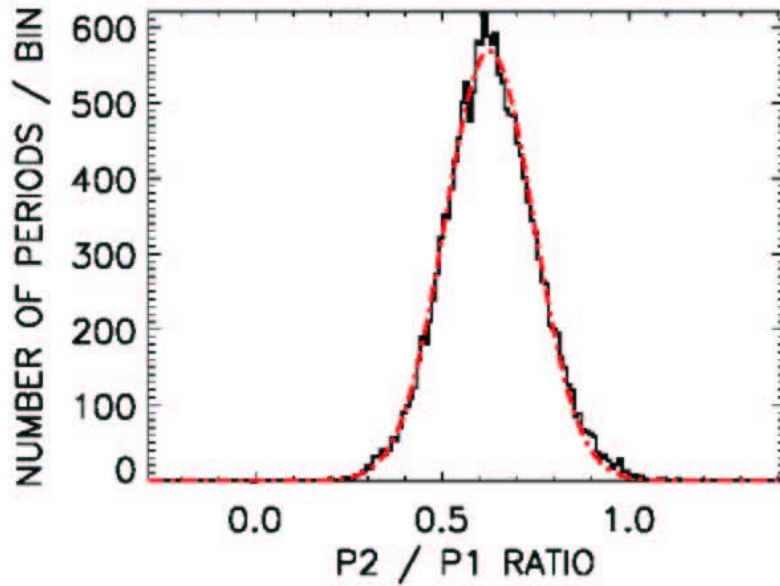




# LIGHTCURVE BASED ON THE ROTATIONS WITH HIGH P2/P1

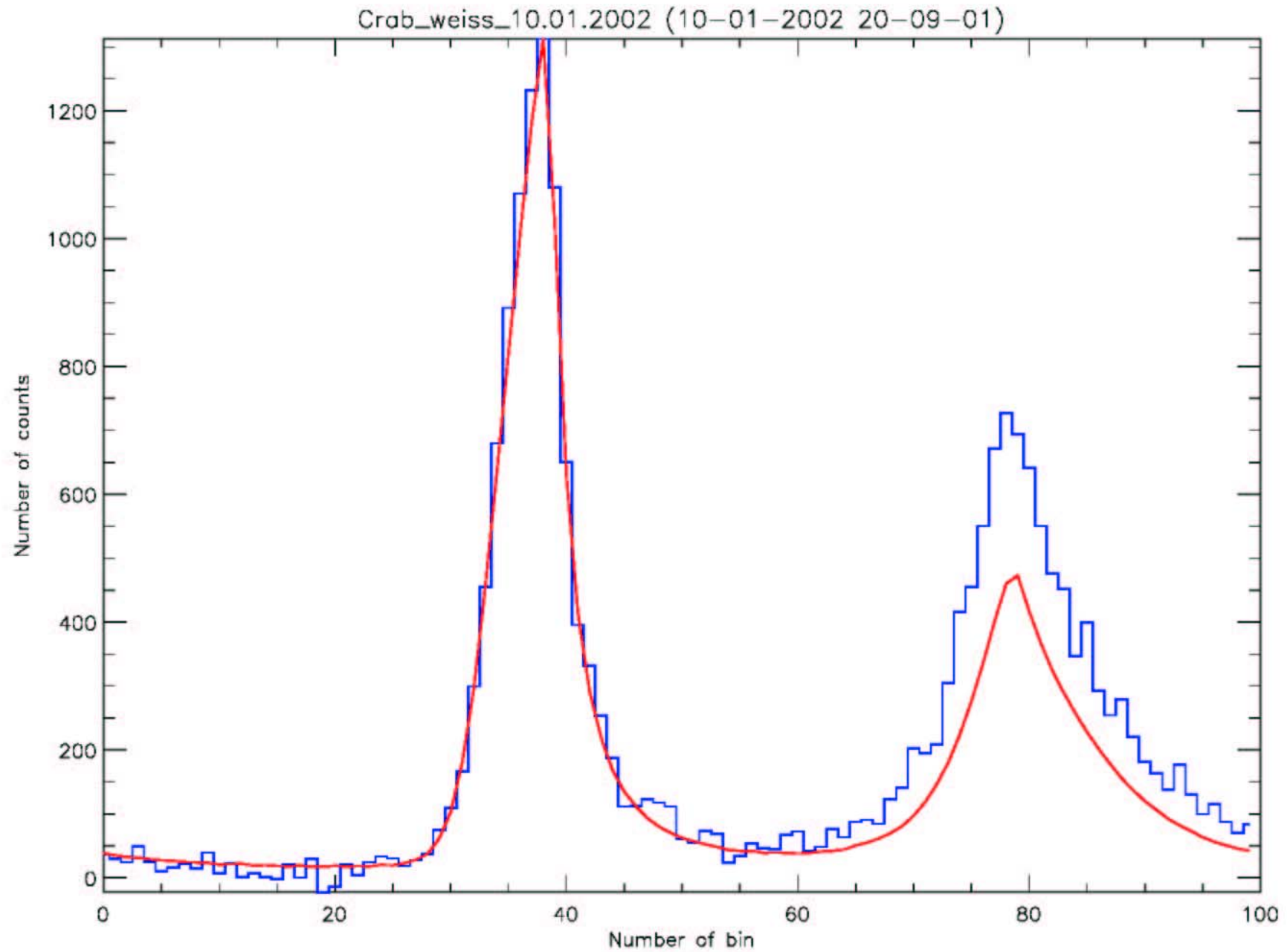


# NEW GAUSS DISTRIBUTION OF P2/P1 RATIO

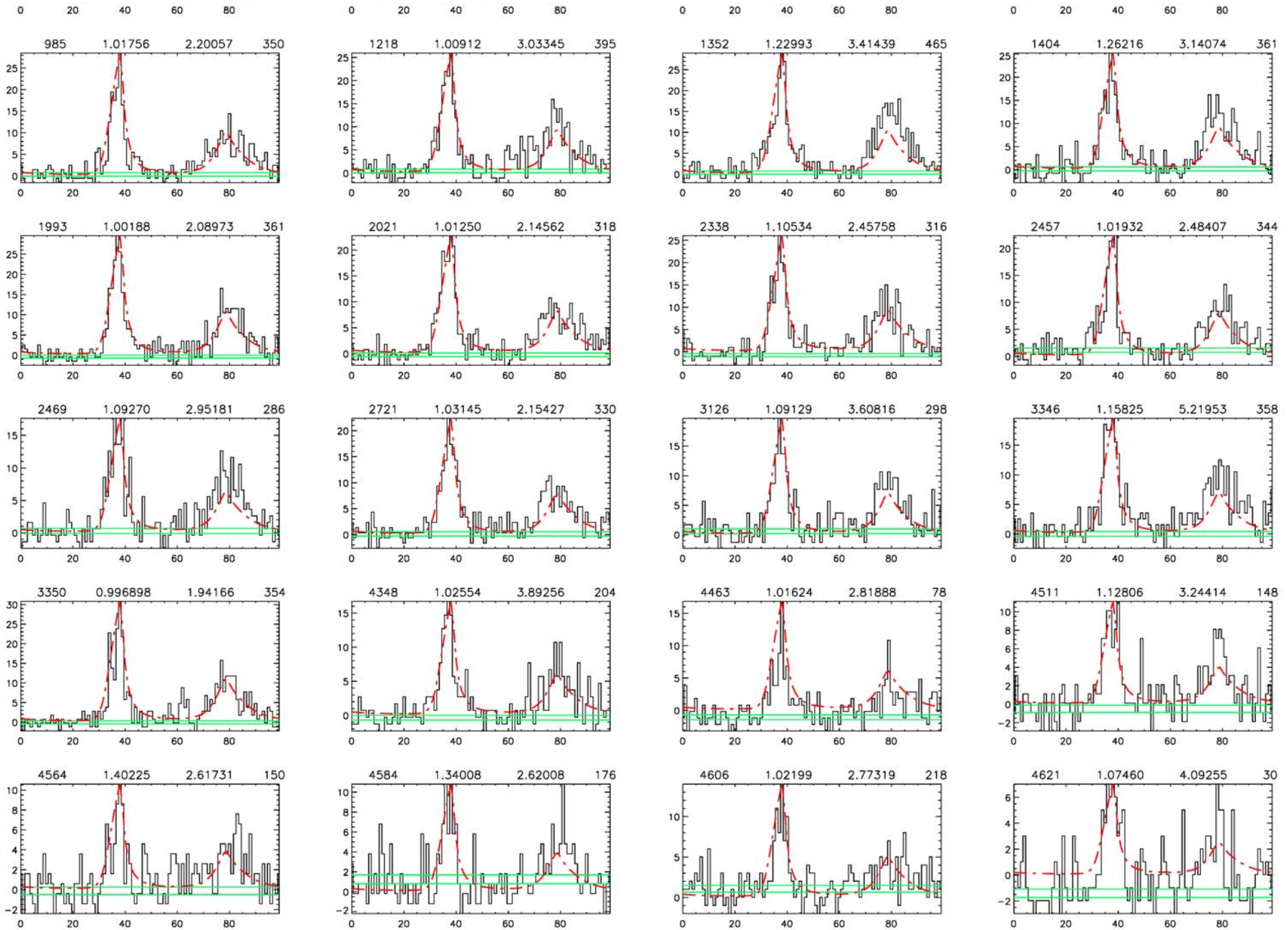


High= 568.67, P2 / P1= 0.626,  $\sigma= 0.119$ ,  $\chi^2 / d= 1.65$

# NEW LIGHTCURVE BASED ON THE ROTATIONS WITH HIGH P2/P1

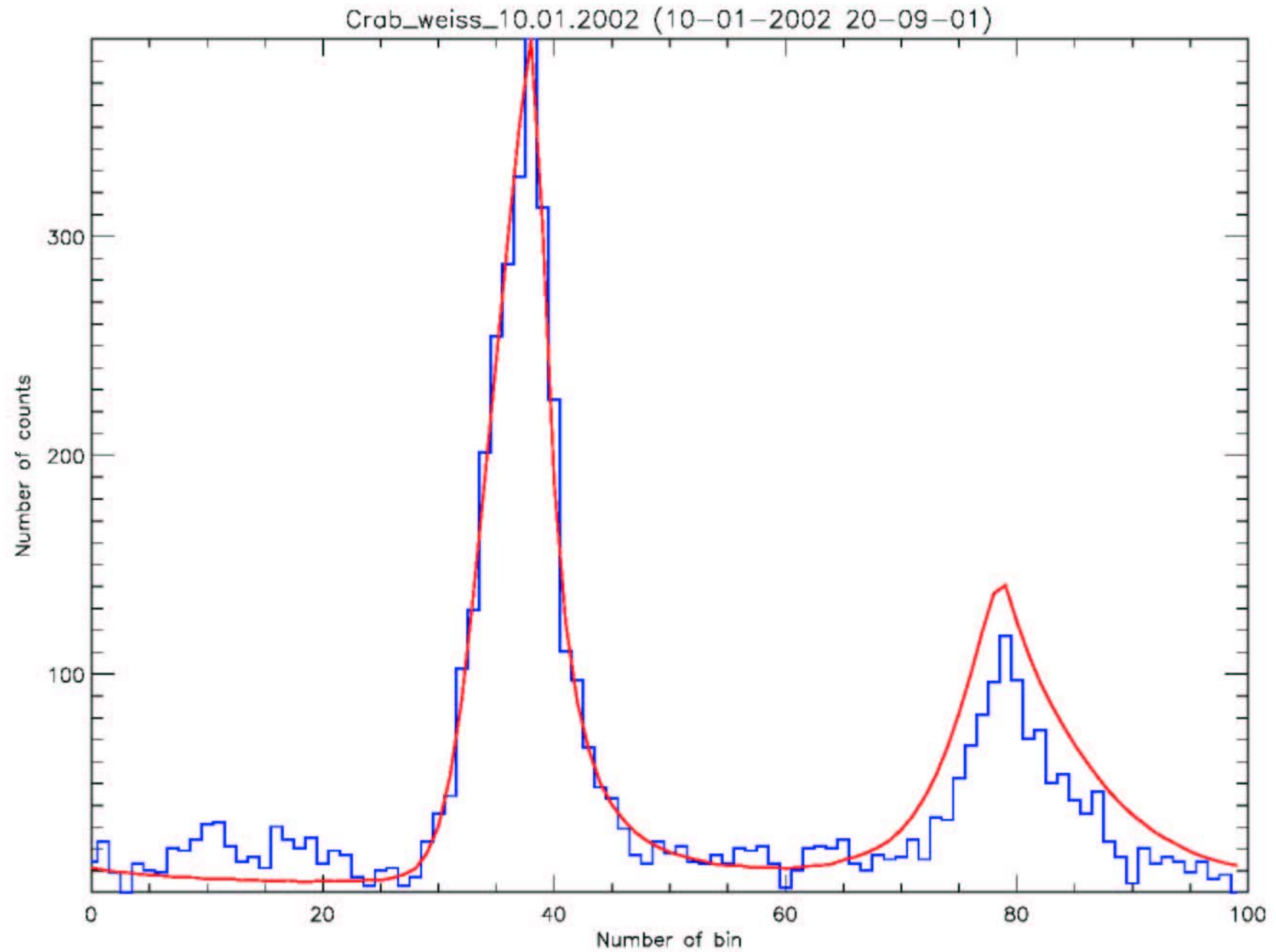


# SOME EXAMPLES WITH HIGH PEAKS RATIO

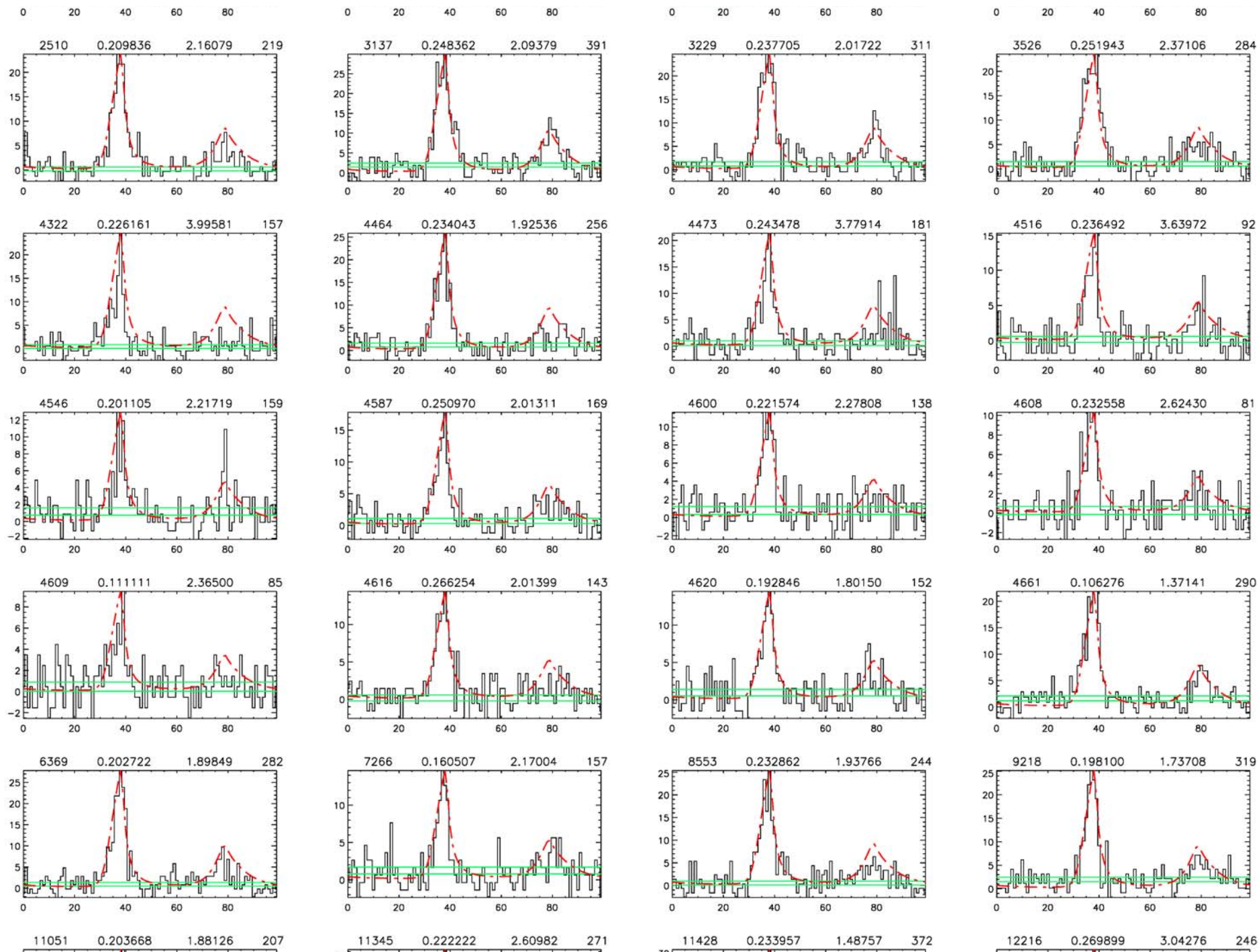




# NEW LIGHTCURVE BASED ON THE ROTATIONS WITH LOW P2/P1



# SOME EXAMPLES WITH LOW PEAKS RATIO



**1. CONCLUSIONS**

**2. FUTURE PLANS**

**3. DISCUSSION**