SECONDARY PERIODICITIES OF MICROBURSTS OF TeV GAMMA RAYS FROM THE CRAB PULSAR

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Observations were made during the past several years on the Crab pulsar using the Ooty atmospheric Cerenkov array with the aim of detecting possible emission of ultra high energy gamma rays by the pulsar; for a description of the array, see Bhat et al[1]. During the course of these observations, we found that the Crab pulsar emits TeV gamma rays in bursts of short duration; see Vishwanath et al[2]. The microbursts of TeV gamma rays from the Crab pulsar, which were seen in the data of at least three years, also reveal interesting secondary periodicities.

It had been noticed at first that some bursts could be connected with the others that occurred during the same night or during the next two nights with integral number of cycles of period 43 $\pm$ 1 minutes. Ten possible periods in the vicinity of 43 minutes were determined for all the combinations of bursts for each year. The best values of periods thus obtained were different from year to year. But when, instead of the real time, the number of Crab cycles elapsed between the bursts was used as the unit of time, two values of burst periods - 77460 and 77770 Crab cycles - were found to be significant in the data of at least two years. A Monte Carlo simulation using 1500 trial periods chosen randomly within $\pm$ 5 minutes of the original burst period did not reveal any value of the period as significant.

At shorter interburst separations, there seems to be a periodicity of 11 Crab cycles. The reduced χ^2 (NDF = 9) when plotted as a function of trial period (in units of Crab cycles) peaks at a value of 2.2 at 11 cycles when a burst period range of 4 to 15 cycles is considered. Further, there is no such peaking observed when real time instead of Crab cycles is used to define the period.

References
1. P. N. Bhat et al, paper OG 2.3-10, this volume
2. P. R. Vishwanath et al, paper OG 2.3-4, this volume