Chapter-18
Decrement of secondary radiation flux during Planets Pared in month June, 2022 at Udaipur (Rajasthan), India

Devendra Pareek
HOD, Department of Physics,
Bhupal Nobles' University, Udaipur,
Email- deven.pareek69@gmail.com

Abstract

Planets pared astronomical event at Udaipur (270 43' 12.00" N, 750 28' 48.01" E), India was experimentally observed in month of June, 2022 using scintillation detector (Sodium Iodide material). In month of June, 2022 five planets Saturn, Jupiter, Mars, Venus and Mercury came almost straight line in sky and this astronomical event is known as Planets Pared. Between time around 5 IST to 5.30 IST at same place, with same detector angle and in same direction (Towards East - South) data files of secondary radiation flux were stored. Detector was always towards in direction of Planets. Results showed about 5.7 % decrement in SRF (Secondary radiation flux) on dates 26, 27, 28 June 2022 (Maximum alignment period of all Planets) on comparison to average counts of other dates of observations. Such finding interprets on the basis of alignment of Planets (Almost in straight line), combine magnetic fields of Planets, combine gravitational pull of all align Planets. Dates of observations were June 21, 22, 23, 24, 25, 26, 27, 28 (2022) and July 13, 14, 15, 16, 17 (2022) in morning for half an hour between time around 5.00 IST to 5.30 IST

Keywords: Planets pared, combine magnetic fields of align planets, gravitational pull of Planets, primary cosmic radiation, solar radiation, secondary radiation flux.

Introduction

Many research studies were conducted during Solar eclipses, Lunar eclipses, comets in sky, Moon phases, Planet Venus transit, with help of efficient counter systems. Solar eclipses experimental studies gave information of variation and intensity dropped of secondary cosmic and solar radiation flux [1], [2].During the celestial event solar eclipse several other research groups reported variation of radiation flux. Ananda Rao [3] in the year 1967 observed decrease in secondary radiations flux at the time of solar eclipse. The celestial event of solar eclipse on 24th October 1995 was studied by Bhattcharya A. et al. [4]. He coined decrease in secondary radiation flux during eclipse of 1995 due to cooling of atmosphere. Chintalapudi et al. [5] observed variation of radiation of gamma and X-ray during solar eclipse. Drop of 11% of low energy secondary radiation flux observed during solar eclipse in the year of 1999 by Kandemir G. et al. [6]. Nayak et al [7] conducted experimental study of solar eclipse using scintillation detectors. Analyzed data showed decrease in secondary gamma radiation flux. Bhattacharya R. et al [8] reported variation in cosmic ray intensity during the eclipse on 22 July 2009.

At Rameswaram in the year 15 January 2010 using the instrument Geiger-Muller (GM) counter during annular solar eclipse Bhaskar et al [9] and reported variations of secondary radiation flux.

Lunar eclipses studies showed variation of secondary cosmic and solar gamma radiation flux at some energy [10], [11], [12]. For the total lunar eclipse 10 Dec 2011 Raghav A. et al [13] observed temporal variation of secondary cosmic ray flux (SCRF).

Moon Phases study in the month of September 2000 was carried out [14] and observed variation of secondary flux.

Variation of secondary radiation flux during celestial event Planet Venus transit on June 6, 2012at Udaipur was observed [15]. Analyzed data showed the decrease in secondary radiation flux on June 6, 2012 during the Venus transit of about 2 % due to blocking of solar energetic particle (SEP) on the Earth.

Teams of U.S. and German astrophysicists first detected of X-rays and extreme ultraviolet (EUV) emission coming from comet Hyakutake [16]. With help satellite, from this comet Glanz also observed X – ray [17]. Mumma, M.J. et al. [18], Peterson, K. [19] reported from Comet Hyakutake large quantities of the gas ethane and methane, Co and water in icy form.

Therefore, during different celestial events happening in sky these events have modulated secondary flux. After motivated from all above experimental studies this experimental study was conducted for Planets Pared in month June 2022 to observe secondary radiation flux.

Experimental Set-up and Observations

In this experimental study efficient Scintillation counter system was used of Nucleonix make (SD 152 F) flat type (Figure 1).

Fig. 1. (Scintillation Counter System)

Size of detector [NaI (Tl) crystal] is 2” x 2” and optically coupled with photo multiplier tube. This gives excellent stability, superior performance as well as good resolution in the range of 8% - 9.5% using standard source Cs-137. The detector type is SD152F.

Data were collected for half an hour on dates June 21, 22, 23, 24, 25, 26, 27, 28 and July 13, 14, 15, 16, 17 in the morning in time interval around 5 IST to 5.30 IST. On dates

June 26, 27, 28 (2022) there was maximum alignment of Planets. The ecliptic geocentric at time of maximum alignment of planets for Saturn --> 324°51'57'', Jupiter --> 7°06'58'', Mars --> 24°09'23.0'', Venus --> 64°43'29'' and Mercury --> 75°26'16''. Observations were taken same place and with same detector angle. Detector was always towards Planets.

Results and discussion

For this experimental study data were collected for half an hour duration on dates June 21, 22, 23, 24, 25, 26, 27, 28 and July 13,14,15,16,17 in the morning. As depicted in figures 2, 3 and 4 the panels of secondary radiation flux data files for months June and July 2022 for half an hour duration.

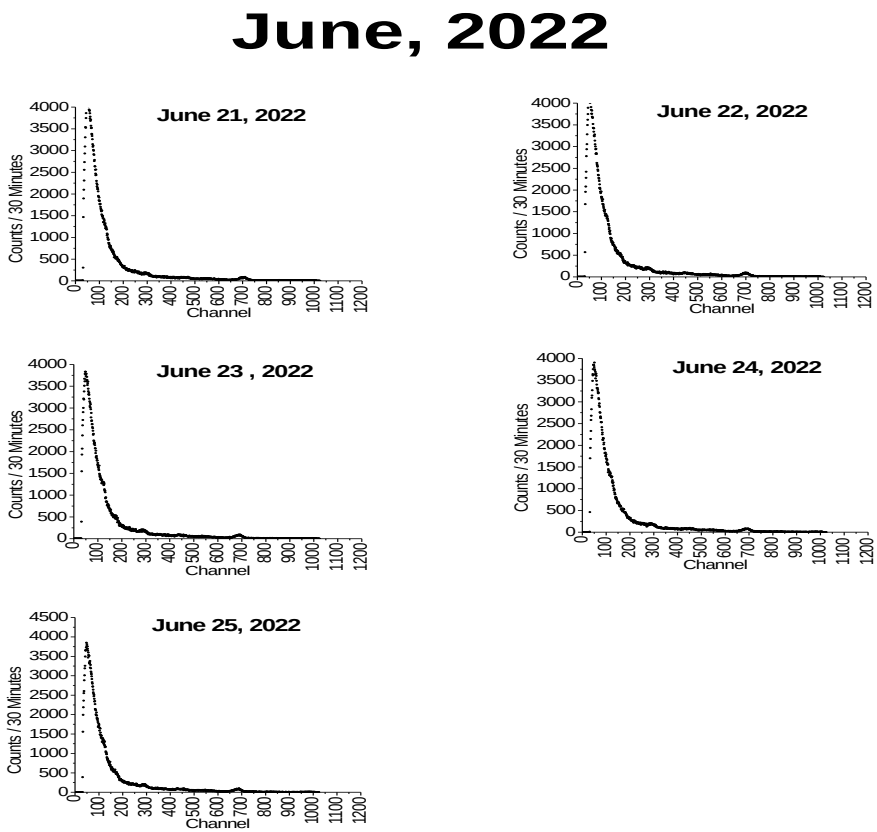

Fig.2. (Panels of secondary radiation flux data files)

June, 2022

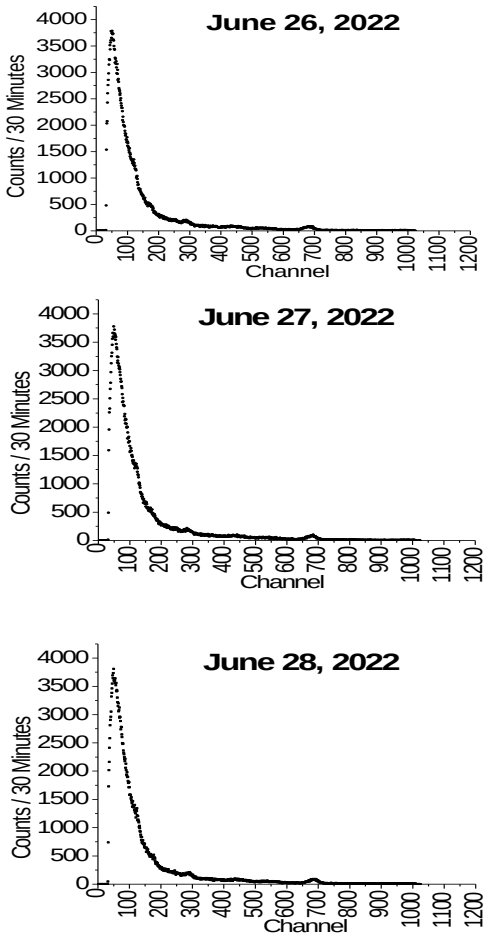

Fig. 3. (Panels of secondary radiation flux data files)

July, 2022

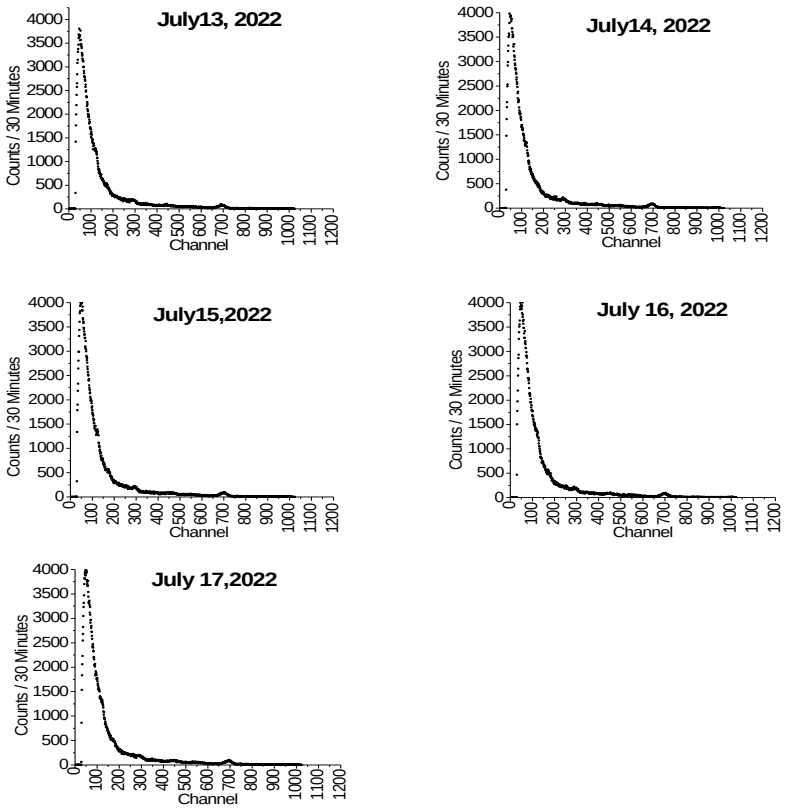

Fig. 4. (Panels of secondary radiation flux data files)

Using above panels of SR flux counts data files, Table 1, was made which represents secondary radiation flux integrated counts in month of June and July 2022 for half an hour.

Sr. No.	Date	Integrated Counts
	June	
1	21	347172
2	22	351921
3	23	321280
4	24	324487
5	25	319107
6	**26**	**314035**
7	**27**	**314028**
8	**28**	**314279**
	July	
9	13	316294
10	14	332807
11	15	342893
12	16	339034
13	17	336153

Table 1. (Secondary radiation flux integrated counts)

Using Table 1, figure 5 made between date and integrated counts for months June and July (2022):

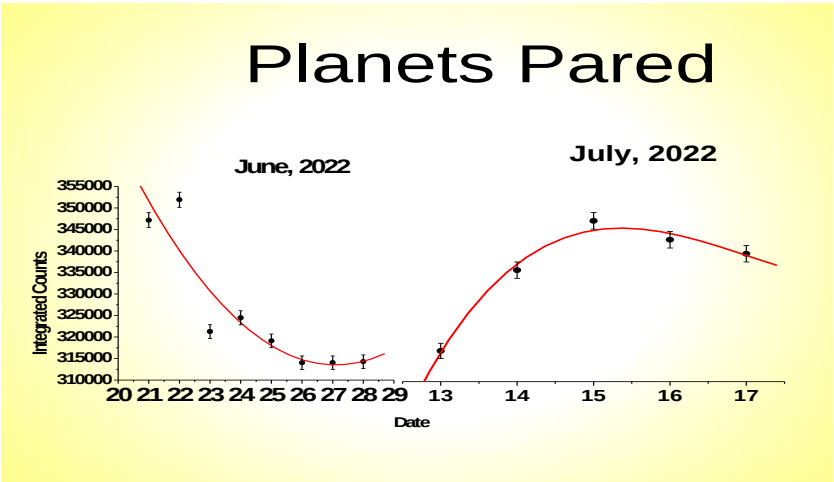

Fig. 5. (Integrated counts with date for months June and July)

Above figure 5, represents that in Month of June, 2022 integrated counts of secondary radiation flux were start to decrease and became minimum on dates June 26, 27, 28 on comparison to integrated counts in month of June 2022. In month July 2022 integrated counts start to increase.

Conclusions

Figure 5 and Table 1, illustrated that on dates June 26, 27, 28 there were minimum integrated counts on comparisons to other dates of observations in month of June, July 2022.There were significant decrement of secondary radiation flux counts about 5.7 % during Planets Pared. Average integrated counts on dates June 26, 27, 28 were 314114. When we average of integrated counts of secondary radiation flux of other date of months June and July 2022 then it is equal to 333114

To see the decrement in secondary radiation flux on the June 26, 27, 28 (2022), following formula used:

$$\% \text{ of decrement in counts} = \frac{\text{Average of June and July dates of observations counts} - \text{Average counts on 26, 27, 28 June 2022}}{\text{Average of June and July dates of observations}} \times 100$$

Using above formula about 5.70 % decrement was observed in secondary radiation flux on June 26, 27, 28 (2022) i.e. on maximum period of Planets Pared which was significant.

The reasons for this decrement in radiation flux are as follows:

(A) At the time of maximum alignment of Planets all Planets produced shielding effect due to combine magnetic field of Planets on incoming primary radiation towards Earth. Each Planet has its own magnetic field; therefore, incoming primary radiation deflected and move away from Earth.

(B) Alignment of all Planets is not towards Earth. Therefore, combine gravitational pull due to all Planets during Planets Pared on primary radiation not towards direction of Earth. Hence during this astronomical event less primary radiation reached into atmosphere of Earth.

Due to above two reasons formation of secondary radiation flux is less in atmosphere of Earth during maximum alignment of Planets. Therefore, less secondary particles reached on surface of Earth and decrement of radiation flux about 5.70 % on June 26, 27, 28 on comparisons to other observations dates observed.

This experimental study is unique and first time reported the significant decrement of secondary radiation flux during Planets Pared astronomical event.

Results of this experimental study showed that during Planet Pared combine magnetic field of Planets became significant and it reduces the secondary radiation flux on surface of Earth. Also, alignment of Planets direction was not towards Earth therefore combine gravitational pull effect on primary radiation is away from the Earth. Hence less formation of secondary radiation flux in the atmosphere of Earth. Therefore, decrement in secondary radiation flux during this astronomical event observed.

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