Towards Unification of Sciences (ISSN-2584-0444)
Volume-1, No-3
Institute of Philosophy of Nature

TRANSIT OF HALLEY'S COMET AND IDENTIFICATION OF THE SHELL STRUCTURE IN SOLAR SYSTEM

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Abstract

The new finding that the orbital distances of celestial bodies (planets and satellites) follow a definite mathematical pattern[1] has now brought a change in the centuries old concept of continuous nature of orbits in the solar system. The new correlation suggests that, the gravity field surrounding a celestial body is something more than that is known by the inverse square law of gravity as it has to provide conditions for the stable orbits at set locations. Thus, it is suggested in the above reference that there are undulations in the gravity field with humps having energy wells those give rise to the formation of a complex shell structure. In this article, attempt has been made to verify the reality of the anticipated shell-structure in the gravity field through analysis of the record of events of Halley's Comet. It is found that the explosive events in the coma of Halley's Comet correspond to the orbital distances of planets (i.e. the locations of shells and sub-shells) and these events have occurred during the forward journey (towards the sun) as well as the return journey of the comet. Further, the ion-tail of the comet that stretches over long distances in space also reveal the typical interactions at shell, sub-shell locations as noticed from the discontinuity (change of features) at these specific sites. This article supplements the existence of shell structure in the extra nuclear space of a celestial body system as anticipated by the author in article 1 of this volume.

Key words: *Halley's Comet, transit of comets, strong breathing of hydrogen coma, solar system, discrete orbit in solar system.*

Introduction

Bode's Law (1770) gives a unique correlation among the distances of the planets from the sun. This has been verified for the Uranus (1781) and further proved relevant in finding the asteroids (1801). However, when the Neptune (1846) and the Pluto (1930) were discovered, they were found to deviate considerably from the Bode's scheme and further, it does not work for the satellite systems of the planets. Bode's Law may have a far reaching consequence if one considers its significance in the light of discrete orbit

phenomenon in solar system, otherwise it looks to be a mere coincidence without any scientific value. The latter has been the case with Bode's Law till date.

The limitations of Bode's Law have now been removed after the development of a modified model with introduction of shell, sub-shell features which works uniformly for the planets of the sun and the satellites of the planets[1]. Such a generalized correlation of the distances of the orbital bodies cannot be ignored. Rather, a serious investigation in finding the cause would help to establish new scientific basis for the observed orderly placement of planets and satellites. The existing concept of gravity suggests only the feasibility of continuous nature of orbits and therefore it is not enough to justify the newly discovered discrete nature of orbits in solar system. Thus, Newtonian gravity needs to be modified for providing answer to the stable orbit conditions. Alternatively it would require introduction of new force fields operating in different ranges of interaction which along with the existing gravity can give rise to undulations in the inverse square field. The charge related forces (nuclear force, weak force and electromagnetic forces) experience different interactions operating in different distance ranges, whereas the mass related forces are considered to play over all ranges of distance from zero to infinity. As yet there is no sub-classification of gravitons, though forces of kilometric range interaction have been recorded in the lower atmosphere of the earth which makes one to suspect the existence of a 5^{th} force[2]. Thus, due to lack of a clear understanding of gravitational interaction, there exists a room for accepting the formation of humps and valleys in the gravity field which might give rise to the organisation of the anticipated shell structure. Hence, the orderly spacing of the orbital bodies may be due to the formation of shell structure following some definite norm. This article does not go deep into the analysis of the mechanism of formation of the shell structure but only verifies its existence through a typical study of the interaction of Haley's comet with the anticipated shell structure in solar system.

In the light of the newly identified discrete orbit phenomenon, the planets and satellites are thought to have been trapped in the energy wells provided in the shell, sub-shell structure. One would imagine here as if a kind of quantum dynamics were also operating in the solar system. In this new quantum concept for the celestial body systems (solar system), the comet which crosses the shells and sub-shells would be interpreted (with a loud thinking) to have been continuously jumping from shell to shell somewhat like the electrons jumping from one orbit to another in atomic system. For such quantum operations, the comets are expected to release (flare)/receive (absorb) energy equivalent in order to reach equilibrium in respect of energy levels at the concerned shells they approach. The outburst and the formation

of gas-cum-dust jets from the nucleus of the comet can be interpreted as events of quantum energy transfer in the new quantum concept in solar system.

Sudden changes in coma of halley's comet

The brightness of comets primarily depends on three factors, viz. i) the heliocentric distance of the comet (r), ii) the nature of the comet, and iii) the geocentric distance (Δ). The total brightness (I) is given by:

$$I = I_0 / r^2\Delta^2 \qquad (2.1)$$

Where, I_0 is the constant of proportionality and refers to the brightness of the comet for $r = \Delta = 1$ AU

Over and above the total brightness (I), there are sudden fluctuations in the brightness of comets noticed at definite intervals. These are, at present attributed to some phenomena of the surface feature of the nucleus occurring due to the preferential orientation of the comet's surface towards the sun. However, the sequential appearance of strong breathing (increase of cometary activities) of coma and the suspected outburst on the surface of the nucleus as the cause as well as the many features of the tail can otherwise be better interpreted through the characteristic energy level interactions of the comet when it crosses the shells and sub-shells of the solar system.

A survey of cometary outburst and subsequent formation of jets of gases and dusts in Halley's Comet clearly reveals that, the outburst phenomenon is closely interlinked with the shell distances from the sun (i.e. the orbital distances of planets) as shown in Fig.2.1. The evidences supporting this fact are as follows.

i) Strong breathing of hydrogen coma of Halley's comet was observed by Japanese inter-planetary spacecraft, Suisei at pre-perihelion distance of 1.5 AU[3] and again at post perihelion heliocentric distance of 1.5 AU (i.e, on 23rd April 1986) the existence of three jets were recorded[4]. This heliocentric distance corresponds to a definite extra nuclear shell of the solar system that houses the planet, mars (i.e, the orbit of mars).

ii) A cometary outburst was observed at a pre-perihelion heliocentric distance of 1 AU i.e, on 24th December 1985 and again at a similar post perihelion heliocentric distance the outburst was recorded by the NASA Kuiper Airborne Observatory[5]. This heliocentric distance relates to the shell of the solar system where the earth is located (i.e, the orbit of the earth).

iii) When the comet touched the orbital radius of the Venus at a heliocentric distance of 0.717 AU, the breathing of hydrogen coma was activated[6].

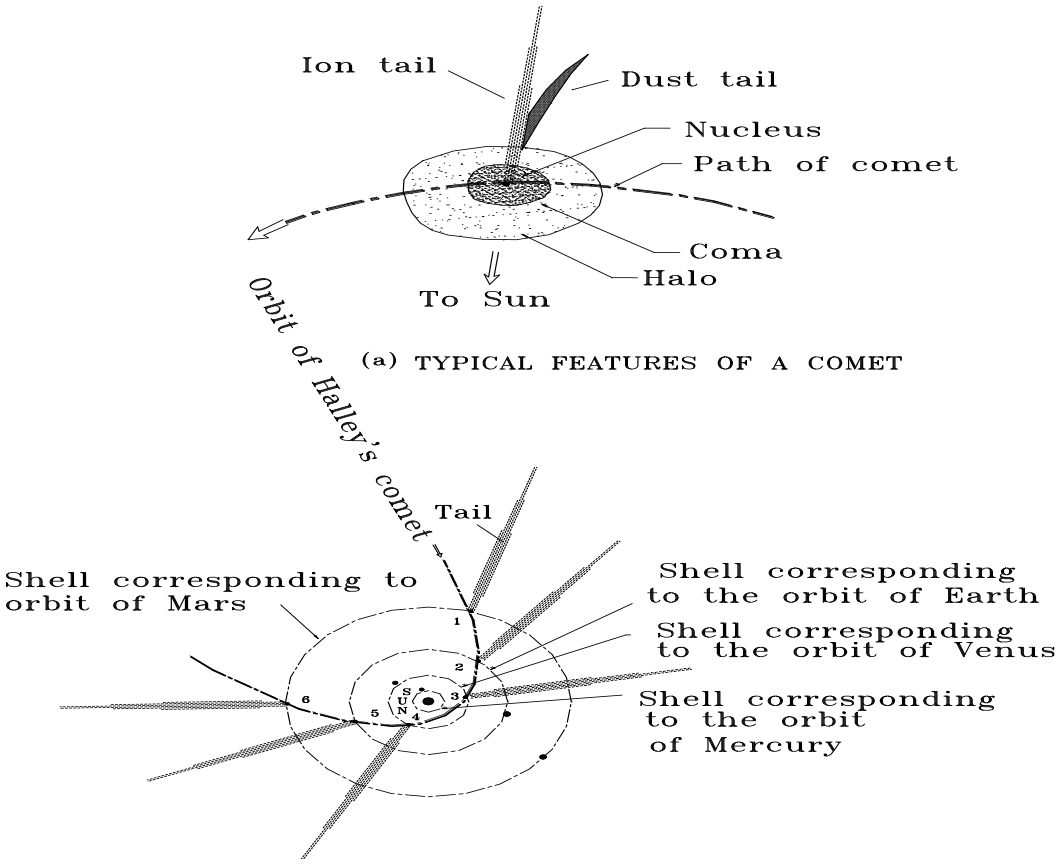
iv) Outbursts were recorded by Vega and Giotto spacecrafts[7] at the heliocentric distance of 4.6 AU which approximately corresponds to the orbit of the jupiter.

v) The comet was first seen (this time) at a distance of 11AU[8] which was probably due to sudden increase of brightness when it interacted with the shell of the solar system corresponding to the orbit of the saturn.

As long as, the quantum event occurring in the comet has a strong bearing with the features of the shell structure, this one to one correspondence cannot be ignored.

Changes in the features of the ion-tail of comets

Once again the ion-tail of Halley's comet which stretches over long distances through the shell structure of the solar system, exhibits conspicuous events at these shell locations. The extra nuclear shells might have different definite potentials, temperatures, and pressures etc. which give rise to favourable energy level interactions at these shells. Besides the physical properties of the shells, many reactive species (carried in the solar wind or escaped from the upper-atmospheres of the planets) trapped in the shells give rise to the abrupt formation of the new products. Some of the events taking place in the ion-tail are mentioned below without going into the details of the chemistry which may be used in the interpretation of the shell structure.



(a) TYPICAL FEATURES OF A COMET

(b) STRONG BREATHING AND OUTBRUST INTERACTION SITES IN THE ORBITAL PATH OF COMET HALLEY

(Points 1, 2, 3, 4, 5 and 6 relates to outburst locations where the comet interacts with the shell structure of the solar system.

Fig. 2.1 TRANSIT OF HALLEY'S COMET IN THE EXTRANUCLEAR STRUCTURE OF THE SUN

The photograph of the tail of Halley's Comet at Kiso Astronomical observatory, University of Tokyo on 11th March, 1986 at 19:35 UT clearly reveals bright bands around the middle of the tail of 0.3 AU long9. The distance of bright band is estimated to be 0.15 AU from the nucleus of the comet. On the same day i.e. 11th March, the comet was roughly at a distance of 0.85 AU[10]. From the above data the approximate distance of bright band from the sun is computed as 1 AU (i.e, 0.85 AU + 0.15 AU). There are further bright bands of less prominence on either side of the main band with increasing order of spacings. This heliocentric distance corresponds to the orbit of the earth. Thus, the bright band features (Fig.2.2) corresponds well with the newly anticipated shell structure in the solar system.

The band structure in the tail is also seen from the photograph of the comet Kohoutek taken on 13th January, 1974, when the comet was at a distance of 0.58 AU.

The wavy tail structure had an extension of about 3.6x 10^8 km and the distance of the centre of the wave band was 0.16 x 10^8 km[11]. Thus, the centre of the wave structure was at a distance of (0.58 x 1.49599) 10^8 km + 0.16 x 10^8 km which is equal to 1.03 x 10^8 km from the sun. This distance corresponds to the orbit of the venus. Hence, when the comet was at a heliocentric distance of 0.58 AU, the tail had interactions with the shell structure corresponding to the orbit of the venus. The kilometric wavelength radiations[12] obtained from the plasma tail of Halley's Comet may be better understood from the new energy level interactions in the shell structure. The concept of solar magnetic neutral sheet would not be required to have plasma wave interactions in the new concept of shell structure in the solar system.

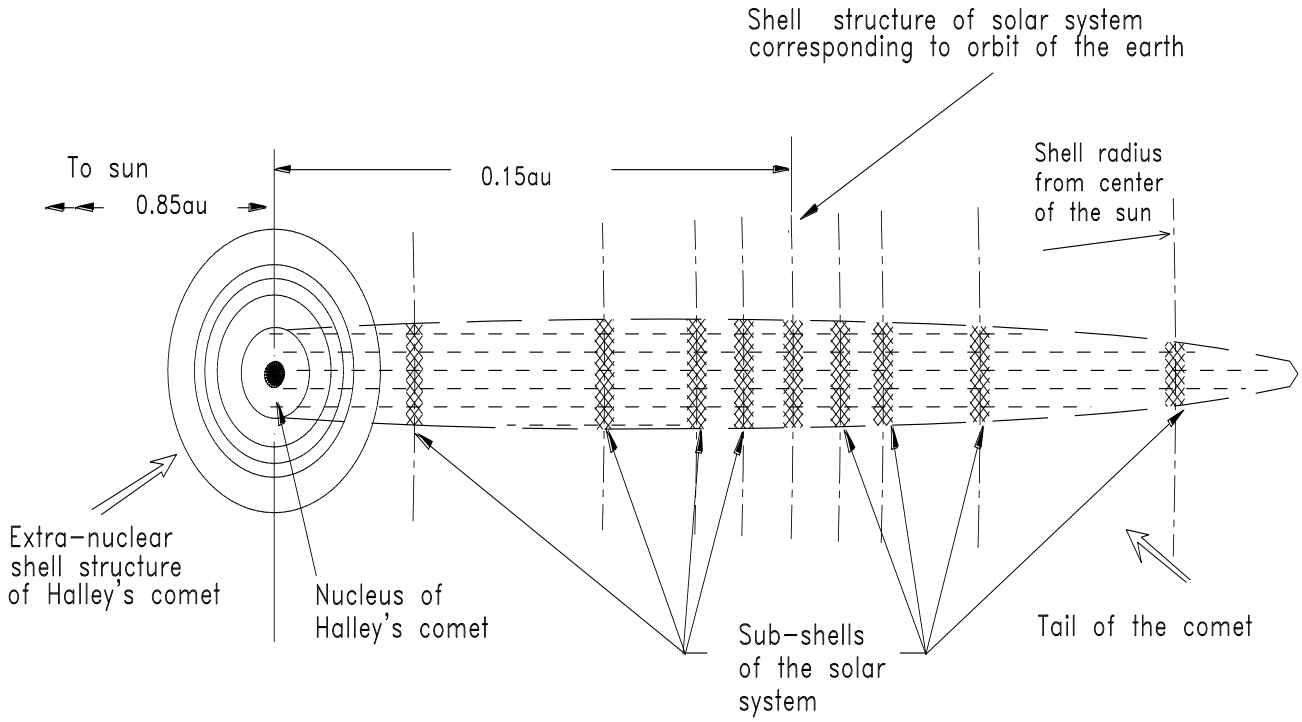


Fig. 2.2 BRIGHT BAND STRUCTURE REVEALED FROM PHOTOGRAPH OF HALLEY'S COMET TAKEN AT THE KISO ASTRONOMICAL OBSERVATORY,University of Tokyo,at 1939 UT on 11-3-'86 (Ref. Saito, Takao, et al, Nature 321,303-307,(1986)

Conclusion

The force derived from the charge property of matter experience different ranges of interaction. Whereas the force derived from the mass property of matter has only one range of interaction, though forces of kilometric range interaction have been recorded in the lower atmosphere of the earth which makes one to suspect for the existence of a 5th force. Thus, due to lack of a clear understanding of gravitational interaction, there exists a room for accepting the formation of humps and valleys in the gravity field which might give rise to the organization of the anticipated shell structure. Hence, the

orderly spacing of the orbital bodies may be due to the formation of shell structure following some definite norm.

This article is a part of the original work published in the book “Planetary electrodynamics-1”, Volume-1 of the series “Dynamics of universe; interplay of matter, space and charge”, 1998 by the same author.

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