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Revelation of the Sun Self-Similarity Skeletal Structures

V.A. Rantsev-Kartinov

NFI RRC "Kurchatov Institute", Moscow, Russia

1. Introduction.

The studies of a dusty skeletal structures have started from analyzing a photographic images of a plasma with the help of a method of multilevel dynamical contrasting (MMDC), which was developed earlier [1a,b] and it is based on the variability of the computer-made maps of contrasting the image. An analysis of databases of photographic images of the Sun surface, its atmosphere and the nearest cosmic surrounding, taken from various magnifications; and for various types of the Sun surface radiation by means of this method revealed the presence of the Sun skeletal structures (SSS) as on itself the Sun such in its surrounding. The SSS exhibit a tendency toward self-similarity of structuring at various length scales (i.e., within various "generations"). The SSS topology appears to be identical to that which have been formerly found in a wide range of length scales (as much as about 30 orders of magnitude), media and for various phenomena in laboratory, Earth atmosphere and space [1,2]. The typical SSS consists of separate identical blocks which are linked together to form a network. Two types of such blocks are found: (i) coaxial tubular structures (CTS) with internal radial bonds, and (ii) cartwheel-like structures, located either on an axle or in the edge of CTS block. The revealed SSS have a whole series of remarkable properties which have been described before [1c-1f]. Such, a long filaments consist of straight ("rigid") nearly identical the CTS blocks which joined flexibly similarly to joints in a skeleton. It is assumed such joints may be realized due to stringing of the individual CTS blocks on common the magnetic field flow which penetrates the whole of such filament, and itself the CTS blocks are interacting magnetic dipoles with micro-dust skeletons, which immersed into plasma.

2 Coaxially-Tubular and Cartwheel-Like Structures of the Sun.

The SSS revealed in the images received in any range of lengths of waves. A very large CTS are sometimes observed (see Fig. 1-4).

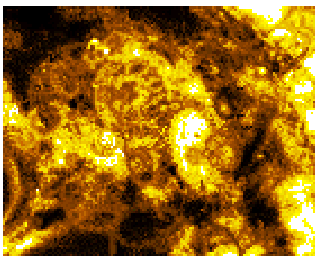

Fig. 1. A fragment of the image of the Sun, received in a radio range. Width of the image **~ 10^{10} cm**. The border of solar disk is visible on the right, overhead. In the center the disk-shaped the CT structure with diameter **of ~3 10^9 cm** and with an axis oriented to the right and resting again in another the CTS (d **~ 10^9 cm** and L **~ 3 10^9 cm**), which is located to it orthogonal is visible. Hardly is higher then the center and downwards along a figure diagonal it is

revealed the CLS with diameter ~ **$4\ 10^{9}$ cm** and **~ $1.8\ 10^{9}$ cm** and with the well defined radial spokes which are showing their CTS near a rim of the CLS. Diameter of the spokes **~ $1.7\ 10^{8}$ cm**. They are observed also and a dark CTS of identical topology . The CTS leaving abroad of a solar disk is visible in a right top corner orthogonal to bordure.

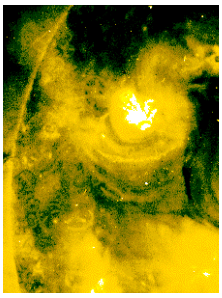

Fig. 1. A fragment of the Sun image, received in a X-ray range, λ **= 284 Å** (SOHO) is resulted. Width of the image **~ $3.6\ 10^{10}$ cm**. The light border of solar disk is visible at the left. The multi-layer, vertically oriented CTS of a telescopic type, with maximal diameter **~ $1.8\ 10^{10}$ cm** is visible in the center. The bright coaxial tube with diameter **~ $2\ 10^{9}$ cm** which is located inside of putted forward part of the CTS with diameter **~ $3.6\ 10^{9}$ cm** is seen very well. The diameters of two neighbor tubes which are fixed in each other have relation **~ 1.6-1.8**. Others the CTS leaving abroad of a solar disk are visible also.

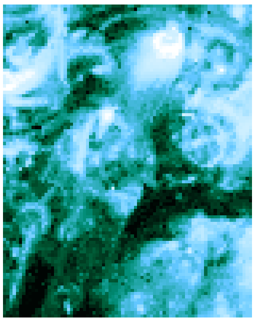

Fig. 3. A fragment of the image of the Sun in x-ray area **λ = 171 Å**. Width of figure **~ $1.25\ 10^{10}$ cm**. They are visible the CTS blocks in various positions and their joints by means of same CTS blocks, but the smaller sizes. In the center it is seen inclined to the right from a vertical on a corner in 30° the CTS in diameter **~ $5\ 10^{9}$ cm** from center of which the telescopic the CTS with length **~ $7\ 10^{9}$ cm** comes forward. At a butt-end of this structure the diameters of telescopic tubes are visible. Ratio of diameters near by enclosed tubes it is equal ~2. It is visible, that butt-end of these tubes represents the CTS.

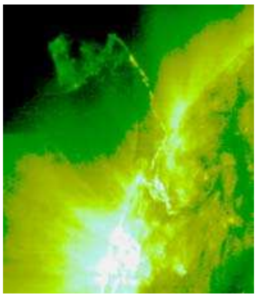

Fig. 4. Fragment of the image of the Sun in x-ray area **λ = 195 Å**. The edge of a solar disk is seen on the right. Diameter towering above a surface of the Sun CTS has diameter **~ $2\ 10^{10}$ cm** and it towers above a surface of our star on height up to **~3-4 10^{10} cm**. It is traced its complex the CTS.

The everything individual block of observing structures on every scale of observations has typical structural peculiarities (inherent only to itself), and therefore it easy identify among similar to many others. At time observing of such structures this fact permit us without particular efforts to estimate direction and velocity of a relative motion such blocks in structure and estimate of its absolute value, if it is known the observing object scale. Such example is resulted in a Fig. 5.

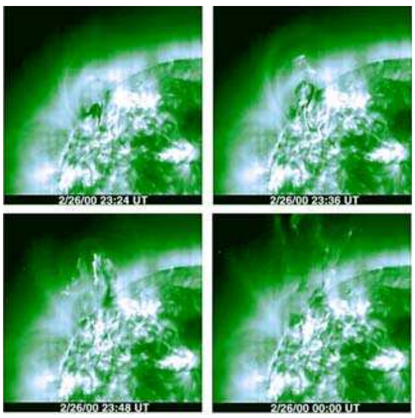

Fig. 5. A four consecutive fragments of active area of the Sun, **λ = 195 Å** (SOHO). Explosion on a surface - result of penetration deep into chromo-sphere of a large CTS (of filament) from the outside. In 2-nd picture the central part of a penetrating filament and further sequence of development of the script of the given event is precisely visible. Here velocities of penetration filament and its movements after explosion are easily estimated , which is **~ 10^{7}-10^{8} cm/s**. During all this process any block on the Sun surface has not changed neither it's own an outlines, nor the locations. Therefore, it is possible to tell, that the given indignation

has not led to deep processes inside a star, i.e., there was no nuclear explosion inside of the Sun.

Skeletal Structures in Coronal Mass Ejections of the Sun.

The analysis of dynamics of images of large-scale corona mass ejections(CME) of the Sun has led the author to a hypothesis, that explosions on the Sun, basically, are provoked by introduction into its atmosphere of a transparent or dark large-scale filaments (DF) from entrails of the nearest space environment. The star reacts to such intrusions by powerful mass ejection of corona plasma, which, interacting with it filament (flowing around it), illuminates from beneath of its structures. In the given work the problem of definition of the nature observable DF and the mechanisms of their interactions with the Sun and its atmosphere are not put, and only the revealed examples of confirming, in the author opinion, of this hypothesis are given.

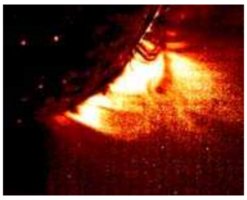

Fig. 6. A fragment of the image of the Sun **$\lambda = 304$ Å** (SOHO). Width of a picture **$\sim 8\ 10^{10}$ cm**. It is seen the DF with CTS, which is penetrating in body of the Sun by its a left edge and vertically oriented from below. The radial connections at a butt-end of this DF are traced. Diameter of this DF **$\sim 6.5\ 10^{10}$ cm**, i.e., it is hardly more than radius of the star.

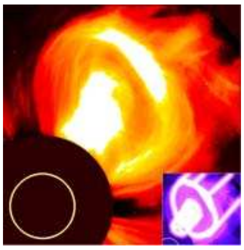

Fig. 7. The x-ray's image of corona mass ejection at explosion on the Sun (LASCO). A schematic representation of the image is given in a window below. On the right along a diagonal the CTS with diameter **$\sim 5\ 10^{11}$ cm** is visible. The light circle below in the left corner gives scale of the Sun. The schematic image given CTS of the DF is given below on the right in a window .

The most powerful corona mass ejections of the Sun at times reveal very big diameter of the DF structures being their original causes. Diameter of such DF can reach size up to 10 diameters of the Sun, and their structures thus are traced on distances up to 30 its diameters.

Fig. 8. Emission of weight from the Sun (LASCO). Width of figure **$\sim 2.5\ 10^{12}$ cm**. On a diagonal downwards from the Sun (a light circle) the conic butt-end of a large filament, cooperating with the Sun is seen. It is well traced the multi-layered CTS of it. They are well visible filaments with the CTS on a lateral surface of this DF. Here, the light circle – the Sun.

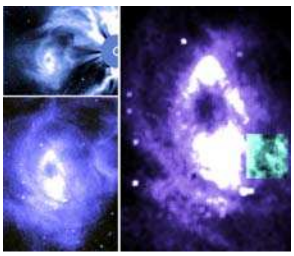

Fig. 9. Revealed at the CME of the Sun (LASCO) a design of the DF, which has provoked explosion. Here radial connections in the form of filaments with the CTS which passing through a rim of construction of the CLS are precisely revealed and show the self-similar structure (see a window in right figure). Here, the light circle in upper window – the Sun.

Skeletal Structures of Protuberances and Sun-Spots.

So, the DF, cooperating (taking root into a body) with a surface of the Sun causes its activity in this area. As a result of such activity there can be the CME, chromo-spherical flashes, protuberances, and also sometimes appear sun-spots (SS). Here it will be pertinent to put forward a hypothesis, that the SS can be also consequence of presence of the DF structures inside the Sun which elements during its activity can stick out outside. The analysis of topology of these structures has shown identity of its what was already observed in the various phenomena connected to presence of a dust in a wide range of the phenomena, scales and in various environments [1e].

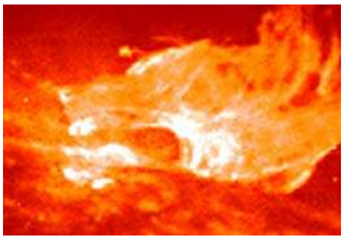

Fig. 11. Dark filament, cooperating (taking root into a body) with a surface of the Sun causes its activity in this area. Here it is shown the CTS of one protuberances. Width of figure **~ 3.8 10^9 cm.** Diameters of the CTS **~ 7 10^8 cm**.

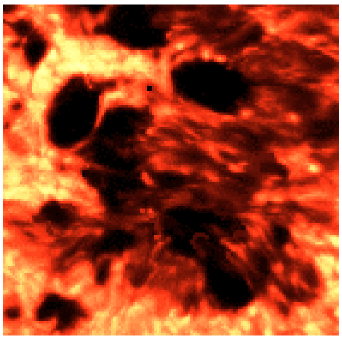

Fig. 12. The active zone of the Sun is shown. It is visible, that the SS represent CTS of the DF push out from bowels of a star on its surface. The topology of this DF is the same, as well as in observable before in dust deposit of T-10 tokamak Tridimentionality of these DF, their inter-lacings and connection is precisely traced. Diameter SS **~ 2 10^9 cm**. The SS, which is situated on the left diagonal of figure, is butt-end of a cylindrical tube by length **~ 8 10^9 cm**, located along this diagonal.

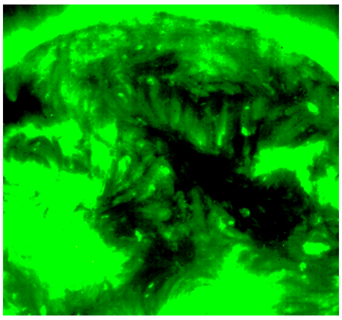

Fig. 13. Fragment of the image of the Sun, λ **= 195 Å** (SOHO). The edge of a solar disk is seen overhead. Complexly weaved structure of the DF, which has CTS collected of similar blocks but of the smaller size is visible. Diameter of the CTS **~ 3.3 10^{10} cm**, diameter of blocks of which it is collected **~ 10^9 cm**, diameter of the DF going out from the center of its butt-end **~ 8 10^9 cm**.

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