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SKELETAL STRUCTURES IN THE IMAGES OF COSMIC DUST CLOUDS

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1. Introduction

The author's studies of skeletal structures (SSs) have started from analysing the photographic images of plasma with the help of the method of multilevel dynamical contrasting (MMDC), which was developed earlier [1a, b] and is based on the variable computer-made contrasting of an image. The analysis by means of MMDC of the images of various phenomena in various environments and in a wide range of length scales (in laboratory high current electric discharges [1d], Earth atmosphere and space [1c]) has revealed the presence of SS, presumably composed of nano-dust [1e]. Similar structures have been revealed by the author in MMDC analysis of transmission and scanning electron microscopy images of carbonaceous film deposits collected in the vacuum chamber of tokamak T-10 [2]. These structures show the tendency towards self-similarity. Typical SS consist of separate, connected together identical blocks which form a unified network. Two types of such blocks were found: (i) coaxial tubular structures (CTSs), sometimes with internal radial bonds; (ii) cartwheel-like structures (CWSs), which are located either on their own axle or in the butt-end of the CTS. The filaments in SSs consist of a straight ("rigid") and almost identical blocks - CTSs which are connected flexibly as in a joint of a skeleton. It was assumed [1c-1e] that such bonds can exist due to stringing of individual blocks on the common magnetic flux (as beads on a cord), which penetrates a dusty filaments. Thus, the blocks are the interacting magnetic dipoles. Such SSs, composed of nano-dust, may be located both in an ambient plasma or vacuum.

2. Skeletal structures in cosmic dust clouds

The analysis by means of MMDC databases from the project "Dustyfullsky" (namely, the maps of emission of cosmic dust clouds in the 100 micron wavelength range [3]) shows the presence of SSs. Their topology appeared to be identical to that of the formerly found SSs (see Figs. 1-3).

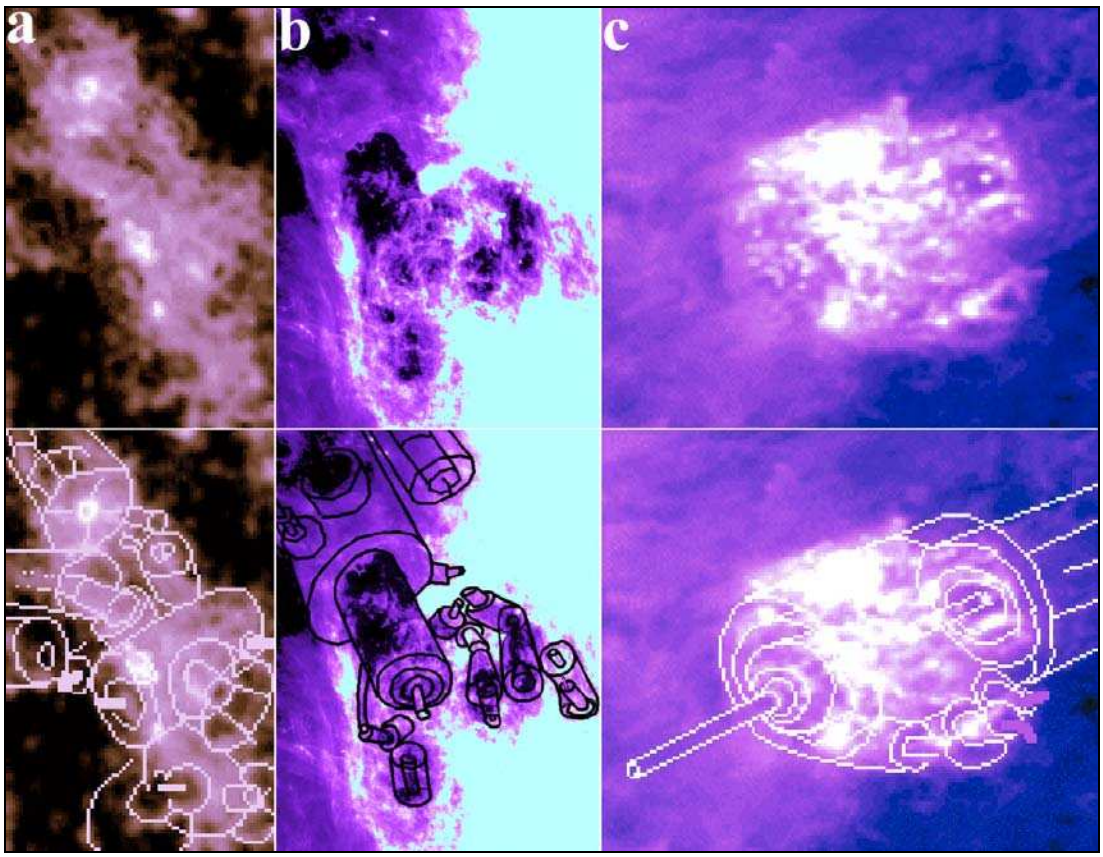

Fig.1. The fragments of the MMDC-processed images (also the schematic drawings of the structuring, found in the image via more intricate, "mosaic MMDC" processing, see [2(b)], is shown in the bottom pictures; the original images are taken from [3]). **a**) The CTS may be seen, with CWS in the top butt-end of CTS and telescopic nested tubes in the bottom. **b)** The CTS with a dark central cylindrical rod is located nearly diagonally in the picture. The butt-end of this rod reveals its complex internal structure of telescopic tube type. The amorphous bright mass around the rod has no distinct structure. The smaller dark CTSs, which are connected to the main rod, may be also seen. **c)** A multi-layered CTSs are directed diagonally. On the right, the joint of the bright block with similar coaxially directed, but darker one and of smaller diameter, may be seen.

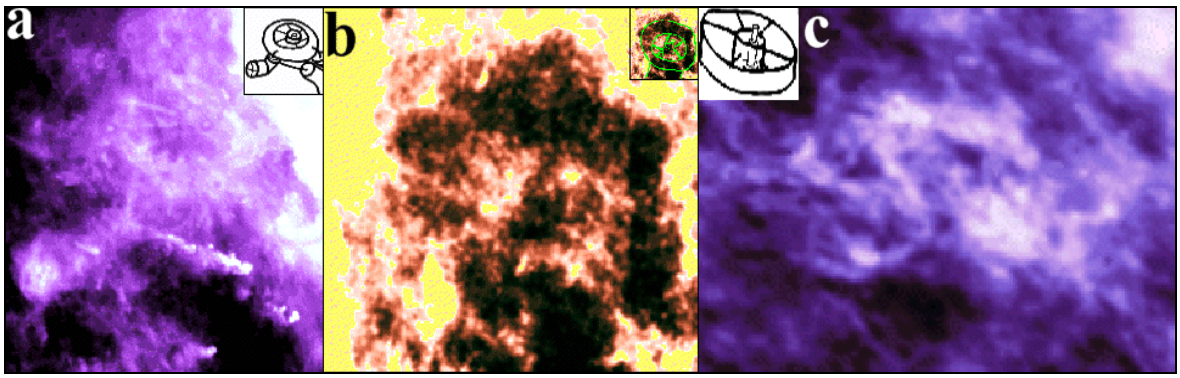

Fig.2. The fragments of the MMDC-processed images (in the windows, schematic drawings are given; the original images are taken from [3]). **a)** In the left lower corner, the CTS is seen, located nearly diagonally and connected with a rim of CWS. Both these CTS and CWS are composed of similar structures of smaller size that indicates on the tendency to self-

similarity i.e., the presence of a fractal. The butt-end of the CTS exhibits a sandwich-like structuring. Radial spokes, which serve as connections between the axis and an external shell structure, indicate that the butt-end has a CWS. To the right from the center of the picture, a large CWS, placed diagonally, may be seen. Its rim is composed of separate CTSs, which are basic blocks of the entire structure. The radial spokes and the axle of this structure seem to be the similar CTS. **b)** The CWS on its own axle is seen. The outer rim, the spokes and the axle of this structure are composed of CTSs of smaller size. **c)** The CWS and a number of various possible connections between the individual CTSs, tubular and CWSs with the thin cords which pass through the centers of CTSs, may be seen.

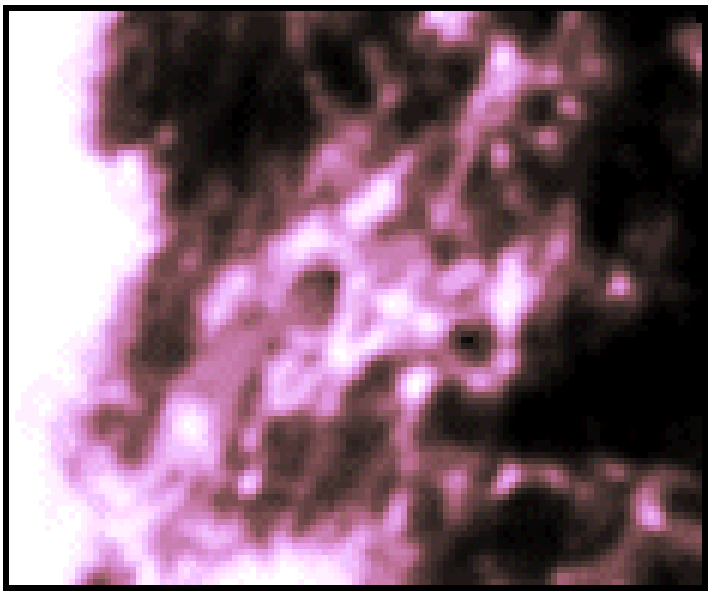

Fig.3. The fragments of the MMDC-processed images from [3]. Here the complex joints of CTSs are shown, which are uniting them into a common network. Often the identical CTSs are linked together by means of stringing on the central cord (as the beads on a thread), taking place through the entire structure.

Figures 1c and 2a contain the evidences for a phenomenon, which was formerly found in the analysis of the images of laboratory plasmas and cosmic object, namely "electric torch-like structures" [1c]. Such are seen as a rectilinear dark filament with a shining butt-end, similarly to the open end of an optical fiber.

3. May the planet be located on a dusty filament?

Similar analysis, with the help of MMDC, of the images of the Earth, Venus and Saturn, which were taken in the visible light by Voyager 1 outside the Solar system [4], shows that these planets may be located on a dusty filaments directed perpendicularly to the ecliptic plane (Fig. 4). It is seen that these filaments are formed of CTS of the identical size and are directed almost perpendicularly to the axis of the filament. The planets are located at butt-ends of such tubular blocks, which lie in the ecliptic plane. According to hypothesis [1e, 1c] for the probable role of nano-dust in space, the revealed structuring may have a nano-dusty origin as well.

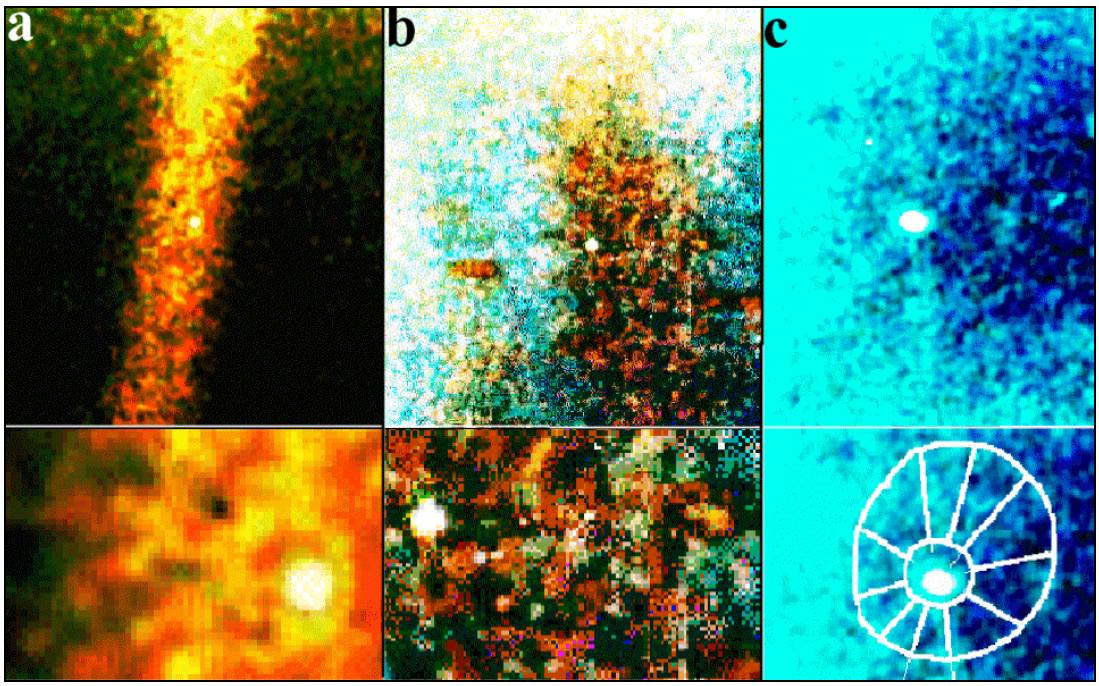

Fig.4. Earth (**a**)**,** Venus (**b**) and Saturn (**c**) are seen as the bright spots in the centres of pictures (the magnified images of Earth and Venus, and schematic drawing of structuring for Saturn's environment, are given in the bottom): the planets are located in the butt-ends of a straight cylindrical block which is a constituent block of the filament and lies in the ecliptic plane. For Venus, the dark side of such a cylinder is seen, while for Saturn the similar block is of a conic form, with the complicated filamentary weaving and radial connections.

4. Conclusion

The data presented suggest that cosmic dust clouds may possess fractal skeletal structures of topology similarly to that of skeletons found in carbonaceous submicron dust particles in the dust deposits in the laboratory electric discharges [2] and in the hailstones [1c]. These structures may be composed of nano-tubular condensed matter [1e, 1c], similarly to skeletons found in [2].

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