

NATURAL MODELING OF GALACTIC AND EXTRAGALACTIC STRUCTURES

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ABSTRACT. The Universal Sky Net (USN) is proposed. Its elements correspond to the details of different scale structures. The examples of modeling by means of USN are cited for the system of globular clusters, for the galaxies of Local group and for the galaxies of two superclusters.

Keywords: Galaxies Superclusters: structure.

We submit into consideration the Universal Sky Net (USN). It joins such circles of coordinate systems as the ecliptical, the galactical, the Gould Belt, the supergalactical and other ones, but it have much more functions than it was before. The connections between these systems, which seemed independent before, were discovered in the frames of USN. So, the supergalactic equator Λ is orthogonal to the galactic equator MW and to the ecliptic E. The whole net is obtained by brunching of the initial dimensionless triedr $E\Lambda\Gamma$ in the poles ξ, η and others. ξ -bunch contains 4 circles over every $\pi/4$; η -bunch – 6 circles over every $\pi/6$, etc (Fig. 1).

The circles of USN one can describe by the canonical equations of such type:

$\text{tg } b = \text{tg } b^* \sin(l-l^*)$; where l^*, b^* – the coordinates of the circles knot and its inclination to the celestial equator. The numerical values of the parameters are presented in (Shatsova & Anisimova, 2003).

At present epoch ξ -pole coincides with the point of equinox, and η – with the point of solstice. But the USN is not connected with the precession as its poles are determined independently: η – is the pole of the supercluster of the galaxies. The verified correspondence of USN to the structures of all hierarchical levels of the Universe can be used for the natural modeling. The Fig. 2-5 show the examples of modeling for the similarly disposed structures. Owing to USN, the density waves parallel to E, were discovered in the nucleus of the globular cluster system, according to (Harris & McMaster Univers, 2003). The connection of two Local groups of galaxies with E and Λ is fixed, according to (Vorontsov-Velyaminov, 1972). The main elements in the Vaucouleurs supercluster became more

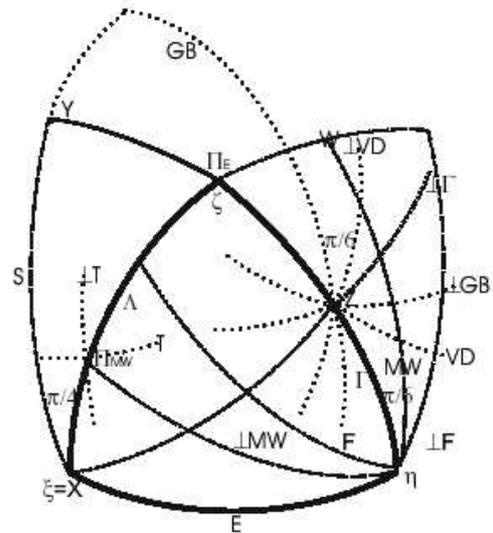


Figure 1: The Universal Sky Net near one of the octants. E- ecliptic, Π_E - ecliptic pole, MW – the Galactic plane, Π_{MW} – the Galactic pole. $\xi = \Upsilon$ (equinox), $\eta =$ (solstice), at least now. $\Gamma \perp \Lambda \perp E$; GB – the Gould belt, VD – the belt of Vaucouleurs – Dolidze. The spherical triangles: (E, Λ , Γ), (S, Γ , $\perp\Gamma$), (MW, Λ , $\perp MW$), etc The bunches of belts: $\xi \equiv X(E, \perp\Gamma, \Lambda, S)$, $\eta(E, \perp MW, \Gamma, MW, F, \perp F, \dots)$, $Z(\Gamma, GB, \perp VD, \perp\Gamma, \perp GB, VD)$, $\Pi_{MW}(\Lambda, \perp MW, T, \perp T)$

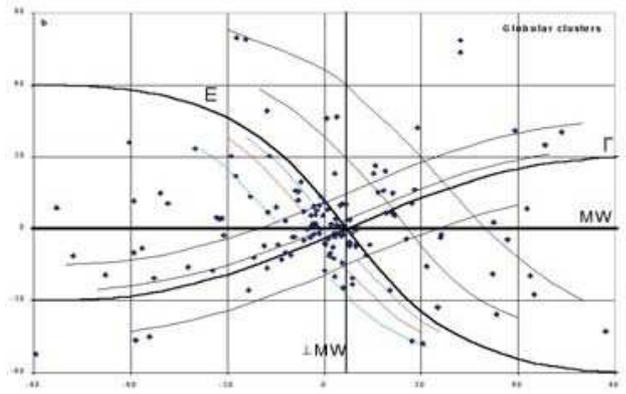


Figure 2: The distribution of the globular clusters over (Harris & McMaster Unvers, 2003)

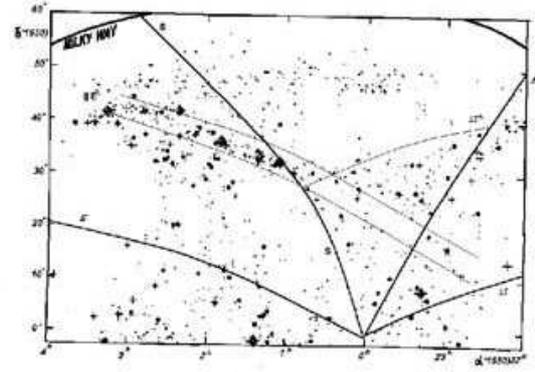


Figure 5: The supercluster in Perseus (Joeveer et al., 1977)

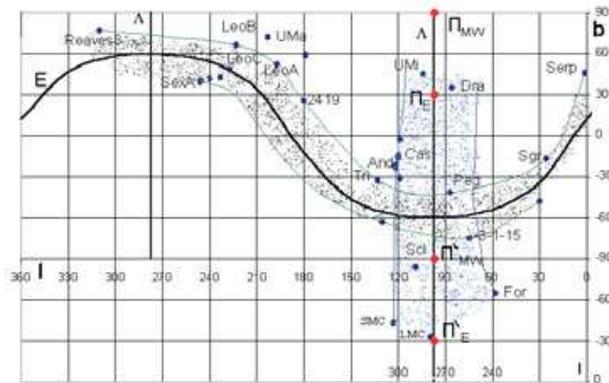


Figure 3: The Local group of the galaxies (over Vorontsov-Velyaminov, 1972)

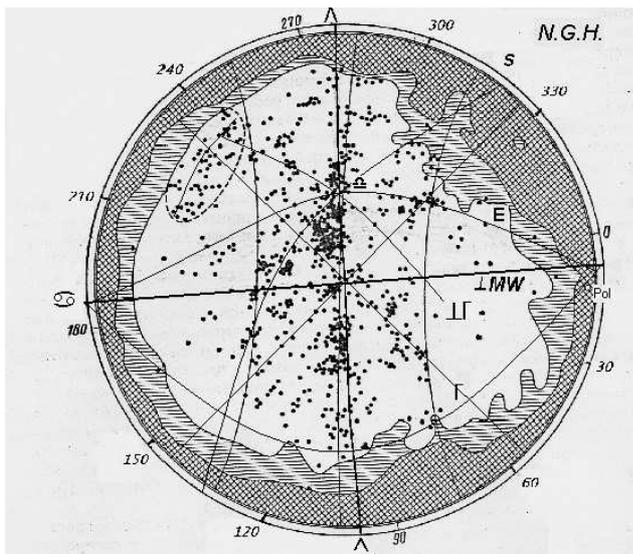


Figure 4: The supercluster of galaxies of Vaucouleurs. The galactic longitude l is along the map's border. The Vaucouleurs' net is kept for the comparison.

precisely: its equator coincides with the Λ -plane ($l=97^\circ - 277^\circ$), and the filaments – with η -bunch of meridians and with ξ -bunch of the circles. Along the filaments of supercluster of the galaxies in Perseus, according to (Joeveer et al., 1977), pass the circles of ξ -bunch and the parallel ones in the form of density waves. Unexpectedly the density of the objects in the knots of the net is observed either equal to zero or sharply overfalls from max on one side to min – on another, instead of the expected high density there (Fig. 2-5). So, the phenomenon of knots is one more dynamical indication of USN.

References

Shatsova R.B., Anisimova G.B.: 2003, *Astrofizica*, **46**, 319.
 Harris W., McMaster Unvers: 2003.
 Vorontsov-Velyaminov B.A.: 1972, *Extragalactic astronomy*, M.
 Joeveer M., Einasto J., Tago E.: 1977, Tartu.