# KINEMATIC DISTORTIONS OF THE SHAPE OF SPACE OBJECTS AND METHODS OF ITS RECOVERY

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The shapes and spectra of a number of space objects are distorted. As a rule, the differences in the shape of stars from spherical, and galaxies from elliptical and disc-shaped are interpreted as a result of their rotation and tidal interaction with other objects. But some distortions are illusory [1, 2], for example, the spectra of white dwarfs and the shapes of galaxies and quasars observed through gravitational lenses.

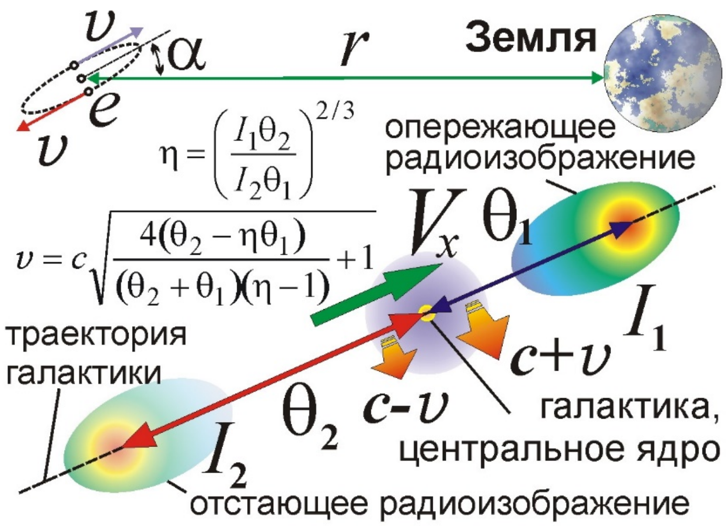
Imaginary distortions are associated with a change in the speed of light in a gravitational field (Shapiro effect) and in interstellar gas (light dispersion). It is not excluded [3, 4] that the speed of light $c$ can also change from the vector addition of the source speed **v**, as $\mathbf{c}' = \mathbf{c} + \mathbf{v}$ (Ritz ballistic theory - BTR). Hence follows the Ritz effect - variations in the frequency $f$, brightness $I$ of light signals in proportion to $\eta = (1 + ra_r/c^2)^{-1}$, where $r$ is the distance of the source, $a_r$ is its radial acceleration. The effect explains the distortion of the radial velocity graphs of stars (the Barr effect) [4]: from sinusoidal ones they become sawtooth, corresponding to an elliptical orbit, which explains the abundance of exoplanets with high eccentricities ($e \sim 0.5$). The Ritz effect also explains the redshift $z$ in the spectra of quasars and galaxies, the stretching of supernova explosions in them is proportional to $(1 + z) = \eta^{-1}$ and the variations in ar caused by variations in the period $T' = T/\eta$ of flares and oscillations (QPO) of pulsars, including GX -1 + 4 and T5X2.

The red shift of the spectrum of white dwarfs by $\Delta f/f \sim 10\%$ can be interpreted by the Ritz effect $f' = f\eta$ ($\eta \sim 0.9$) from the acceleration $a$ of free fall of atoms on the stellar surface. This explains their broad $\delta f/f \sim 5\%$ lines by a change in $a_r$ atoms from the limb to the center of the disk of the star $0 \leq a_r \leq a$ (Ritz-broadening of lines). For elliptical galaxies $\eta \sim 10^{-6}$: the light of the stars of the spectral maximum $f$ is transferred to the radio range $f' \sim 1$ GHz. This explains the radio emission of quasars, radio galaxies and the growth of their number with an increase in $r$ and $\eta^{-1} \approx ra/c^2$, and at $z > 2.5$, the decline [5] after $f'$ leaves the receiving range of radio telescopes. The Barr effect makes the profile of radio waves sawtooth, formed from harmonics of multiple frequencies $f' = Hf$ power $\sim 1/H$ ($H \in N$). At high $H$, this explains the X-ray and $\gamma$-radiation and the radio spectrum of the $F \sim f'^{-1}$ type, which is characteristic of quasars and radio galaxies of the Cygnus A, Virgo A type.

The rotation of a star of radius $R$ with an angular velocity $\omega$ directed along the polar axis $y$ normal to the line of sight $r$ leads to a difference in the speed of light from the approaching ($c_1 = c + \omega R$) and receding ($c_2 = c - \omega R$) edges of the star and the delay between arrival of their rays $\Delta t = r/c_2 - r/c_1$. When a star moves with a velocity $V_x$ along the equatorial $x$ axis, the observer registers the extreme points of the disk synchronously from the points of the trajectory spaced $S = -\Delta\, tV_x \approx -2rR\omega_y V_x/c^2$ - so much along $x$ will it stretch or contract (for $S < 0$, $\omega_y V_x > 0$) the disk of the star. The effect allows one to interpret stars that are anomalously elongated or compressed along the **V** vector, including Achernar, Regulus, Altair, and variations in the shape of stars depending on the orbital phase (β Lyrae, θ Orion, δ Scorpio). In stars with differential rotation, the equatorial segments are additionally stretched, for example, in the α Altar. If the dependence of $\omega$ on latitude $\varphi$, as for the Sun, $\omega(\varphi) = \omega_0 - \omega_1 \sin^2\varphi$, then the apparent shape of the star has the form $x(y) = (R^2 - y^2)^{1/2}(1 - [\omega_0 - \omega_1 y^2/R^2]rV_x/c^2)$. For solid rotation ($\omega_1 = 0$), the $x(y)$ graph corresponds to an ellipse, and for $\omega_1 \neq 0$, the shape becomes more complicated.

Distortions of the form of quasars and radio galaxies can explain their lateral radio-emitting regions (ears) corresponding to the "lagging" and "leading" (along **V**) image [1, 2]. Electrons rotate in the magnetic field of stars with velocities $v \sim c$, when approaching they emit radio waves of an advanced image with a speed $c + v$, and when farther away - a lagging image $c - v$. Such images were discovered by N.A. Kozyrev also in individual stars in the IR range [2].

For electrons in orbits with an inclination of α to **r**, when approaching, the radiation reaches the Earth earlier by a time $\Delta t_1 = r/c - r/(c + v\cos\alpha)$ than the light of the galaxy, and when moving away - later by $\Delta t_2 = r/(c - v\cos\alpha) - r/c$.. In the first case, the radio image is ahead of the central one by the angle $\theta_1 = \Delta t_1 V_x/r$ (along the **V** of the galaxy), in the second - by $\theta_2 = \Delta t_2 V_x/r$ it lags behind: $\theta_1 \approx \theta_2$ at $v << c$, and at $v \sim c$ already $\theta_1 < \theta_2$. Hence, the velocities of the galaxy $V_x = c2\theta_1\theta_2/(\theta_2 - \theta_1)$ and electrons $v\cos\alpha = c(\theta_2 - \theta_1)/(\theta_2 + \theta_1)$. The intensity $I_1 \approx I_0(1 + v\cos\alpha/c)^2 \approx I_0 4\theta_2^2/(\theta_2 + \theta_1)^2$ of the leading image is higher than the intensity of the lagging image $I_2 \approx I_0(1 - v\cos\alpha/c)^2 \approx I_0 4\theta_1^2/(\theta_2 + \theta_1)^2$, i.e. ... $I_2/I_1 \approx (\theta_1/\theta_2)^2$ in agreement with observations [5, p. 56], see the table. An electron in its frame of reference radiated towards **r** within the solid angle $d\Omega = ds/(ct)^2$ power $dW = I_0 d\Omega r^2$, and in the laboratory system, where $\mathbf{c'} = \mathbf{c} + \mathbf{v}$, the same power enters the angle $d\Omega_1 \approx ds/c'^2t^2 \approx ds/(c + v\cos\alpha)^2t^2$, whence $I_1 = dW/d\Omega_1 r^2 \approx I_0(1 + v\cos\alpha/c)^2$. More precisely, $d\Omega_1 \approx ds(c + v\cos\alpha)/c'^3t^2$, whence from $I_2/I_1$, $\theta_1$, $\theta_2$ we find $v$, α, $V$. And from $v_r(x)$ we will restore the true image of the galaxy by inverse displacement of the image points by $\theta = V_x v_r/c^2$ and correcting their brightness.




| Источник | 3C 33 | 3C 47 | 3C 109 | 3C 390.3 |
|---|---|---|---|---|
| $\theta_1$, сек. дуги (″) | 109 | 24 | 37,5 | 101 |
| $\theta_2$, сек. дуги (″) | 135 | 38 | 44 | 167 |
| $I_1$, $10^{-26}$ Вт/м$^2$/Гц | 9,7 | 2,4 | 2,3 | 7,8 |
| $I_2$, $10^{-26}$ Вт/м$^2$/Гц | 3,3 | 1,3 | 1,9 | 3,0 |
| $(I_1/I_2)$ | 2,94 | 1,84 | 1,21 | 2,6 |
| $(I_1/I_2)_{теор}=(\theta_2/\theta_1)^2$ | 1,53 | 2,5 | 1,37 | 2,73 |
| $(v_r)_{теор}=v\cos\alpha$, км/с | 32000 | 67700 | 24000 | 73800 |
| $v_{теор}$, км/с | – | 168600 | 182300 | 90650 |
| $\alpha$, градус дуги (°) | – | 66,3 | 82,5 | 35,4 |
| $V_{теор}$, км/с | 1645 | 189 | 738 | 743 |

If the distortions are caused by the motion of the stars $v_r(x)$ [6, 7], then approximating the rotation curve of the galaxy by the law $v_r(x) \approx kx\cdot\exp(-|x/a|)$, where $k$ is the coefficient, $a$ and $b$ are the semiaxes of the galaxy, find the displacement $S(x) = -rV_xv_r(x)/c^2$ of the galaxy points along the $a$ axis parallel to $x$ and the galaxy velocity $V_x$. The distorted shape of the elliptical galaxy will take the form: $x(y) = \pm[a(1 - y^2/b^2)^{1/2} - rV_xv_r/c^2]$, corresponding to deviations from the ellipse of the "disky" or "boxy" type [8, p. 227], for example, in the galaxy LEDA 074886 [7, 9]. In the general case, the velocity **V** is oriented arbitrarily, and the unequal displacement of the galaxy stars leads to an additional distortion of the brightness distribution, and the galaxy isophotes will acquire a more complex character [1, 2, 9], for example, in NGC 660 and galaxies with polar rings [10, 11]. From the velocities of galaxies $V_x \sim 10^3$ km/s, stars and electrons $v\cos\alpha \sim 10^3..10^4$ km/s, one can estimate the characteristic angular sizes of quasars and radio galaxies $\theta_1 + \theta_2 \approx 2V_xv\cos\alpha/c^2 \approx 5''..50''$ coinciding with the measured [5, p. 118].

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