

# Movement principles of the fast-spinning bodies

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**Abstract.** *In this article are the 5 tables for calculating the average translational velocities of all millisecond pulsars and others fast spinning bodies and shift the center of gravity due to the rotation. Corrections theory ideal spinning circle for real bodies. Extreme values for neutron stars. Summary values for neutron stars. A new perspective on neutronization and nuclear fusion. Consent theory with the real Universe.*

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## 1.Introduction

The origin of millisecond pulsars is still unknown. The leading theory is that they begin life as longer period pulsars but are spun up or "recycled" through accretion. For this reason, millisecond pulsars are sometimes called recycled pulsars. The standard evolutionary model fails to explain the evolution of all millisecond pulsars, especially young millisecond pulsars with relatively high magnetic fields . Different millisecond pulsars must form by at least two distinct processes.<sup>[30]</sup>But the nature of the other process remains a mystery.<sup>[31]</sup> The proposed views are in the end of this manuscript.

In article:

Hobbs G., Lorimer D.R., Lyne A.G., Kramer M. : A statistical study of 233 pulsar proper motions, *MNRAS July 1, 2005 vol. 360 no. 3 974-992*

they write <sup>[9]</sup>:

„Neutron stars are high-velocity objects....Many of the one-dimensional (1D) and two-dimensional (2D) speeds (referring to speeds measured in one coordinate only and the magnitudes of the transverse velocities, respectively) derived from these measurements are somewhat lower than earlier estimates because of the use of the most recent electron density model in determining pulsar distances. The mean 1D speeds for the normal and recycled pulsars are 152(10) and 54(6) km s<sup>-1</sup>, respectively. The corresponding mean 2D speeds are 246(22) and 87(13) km s<sup>-1</sup>. PSRs B2011+38 and B2224+64 have the highest inferred 2D speeds of ~1600 km s<sup>-1</sup>. We study the mean speeds for different subsamples and find that, in general, they agree with previous results. Applying a novel deconvolution technique to the sample of 73 pulsars with characteristic ages less than 3 Myr, we find the mean three-dimensional (3D) pulsar birth velocity to be 400(40) km s<sup>-1</sup>. The distribution of velocities is well described by a Maxwellian distribution with 1D rms  $\sigma = 265$  km s<sup>-1</sup>. There is no evidence for a bimodal velocity distribution. The proper motions for PSRs B1830-08 and B2334+61 are consistent with their proposed associations with the supernova remnants W41 and G114.3+0.3, respectively.

Using the Taylor & Cordes (1993; hereafter TC93) model, Lyne & Lorimer (1994) found the mean pulsar birth velocity<sup>2</sup> to be 450(90) km s<sup>-1</sup>. Recently, Cordes & Lazio (2002; hereafter CL02) provided an updated model which, on average, predicts somewhat smaller distances than TC93 which will clearly have an impact on the calculated velocities. Hereafter, we designate the velocities derived from the two models as  $V^{TC}$  and  $V^{CL}$ .

1. The fastest moving pulsar with a well-defined distance is PSR B1133+16 which has a 2D speed of 640 km s<sup>-1</sup>. However, according to the CL02 (and TC03) distance model PSRs B2011+38 and B2224+65 both have 2D speeds greater than 1500 km s<sup>-1</sup>.
2. (iv) The CL02 distance model generally predicts smaller distances, and hence 2D speeds, than the TC03 model. The mean 1D and 2D speeds for pulsars with characteristic ages less than 3 Myr are 192(20) and 307(47) km s<sup>-1</sup>. The observed 1D and 2D speeds clearly demonstrate that the 3D velocity vector is isotropic.
3. (v) Based on a deconvolution analysis of the new samples of 1D and 2D speeds of young pulsars, we find the mean 3D birth speed to be 400(40) km s<sup>-1</sup>. The 3D speeds are well fit by a Maxwellian distribution with 1D rms  $\sigma = 265$  km s<sup>-1</sup>. We find no evidence for a bimodal velocity distribution.

The implications of these results for ‘kick’ mechanisms may be summarized by stating that the true space velocities of young pulsars range from a few tens to well over 1000 km s<sup>-1</sup> with a mean velocity of 400(40) km s<sup>-1</sup>. According to [Lai et al. \(2001\)](#): (1) local convective instabilities in the collapsed stellar core can account for velocities up to ~100 km s<sup>-1</sup>; (2) global asymmetric perturbations can create velocities over 1000 km s<sup>-1</sup>; (3) asymmetric neutrino emission can provide kick velocities up to ~1000 km s<sup>-1</sup>; (4) the electromagnetic rocket effect can accelerate pulsars up to similarly high velocities<sup>[9]</sup>.”

In this manuscript the theoretical values calculated average speeds millisecond pulsar according to a new theory<sup>[1]</sup>

## 2. Theory

$$E_{\text{mov}} = E_{\text{still}} \left( 1 - \frac{v}{c} \cos \vartheta \right)^2 \quad (2.20)$$

where  $\vartheta$  is the angle between the direction of the charge motion (the speed  $v$ ) and the direction of propagation of intensity<sup>[1]</sup>.

### **3. Possible generalization of the theory for gravitational field, where the speed of propagation is finite and equals $c$ .**

For the sake of simplicity let us consider for instance the gravitational field of the Earth. Analogically to (2.20), for the intensity of the gravitational field one could write:

$$g_{\text{mov}} = g_{\text{still}} \left( 1 - \frac{v}{c} \cos \vartheta \right)^2 \quad (3.1)$$

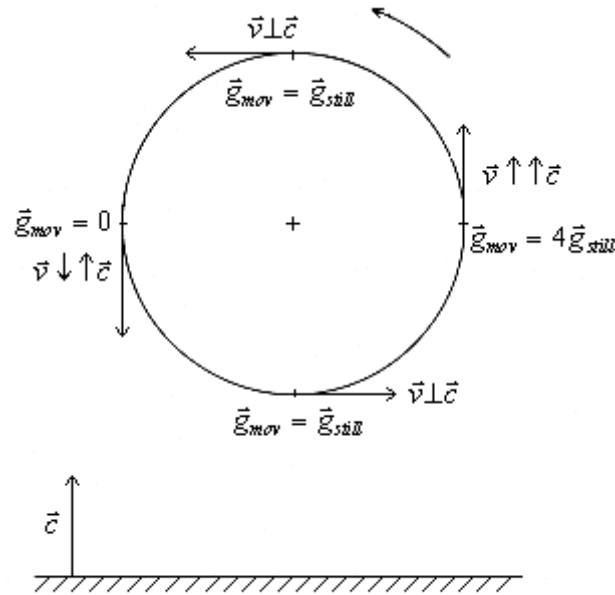


Fig. 3.1. The body is rotating at vertical level

Should we want to withdraw from the gravitational field of the Earth, it will be necessary to aim at  $\vec{g}_{m\sigma} \rightarrow 0$ .

Then the weight of bodies will be falling down  $G = m\vec{g}_{m\sigma} \rightarrow 0$ .

However, the mass of bodies remains unchanged. Individual material particles of the body will move in a prevailing measure in direction to the Earth at the highest possible speed (in ideal case  $v \cos \vartheta \rightarrow (-c)$ ), but the center of gravity should at the same time move away from the Earth. This is possible only with the special rotation of body around the axis passing trough the center of gravity, while the body rotates at vertical level (see fig.3.1).

$c$  - the speed and direction of propagation of the gravitational waves of the Earth. The points moving at speed of  $c$  towards the Earth ( $v \cos \vartheta = -c$ ) are of no weight. The points moving at the speed of  $c$  away from the Earth weight 4x more than is standstill (see fig.3.2).

In consequence of rotation, the center of gravity will be shifted to the part departing from the Earth. This means that the body should depart from the Earth as a consequence of rotation (since the shifted center of gravity is situated in the half emerging during the rotation, i. e. departing from the Earth).

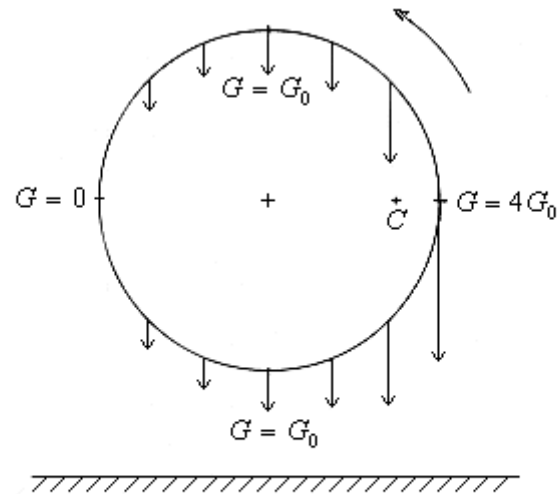


Fig. 3.2. The point moving at speed  $c$  away from the Earth  
weight 4x more than standstill

For the sake of simplicity, let us consider the rotating body whose mass is evenly distributed on the circle with radius  $r$ .

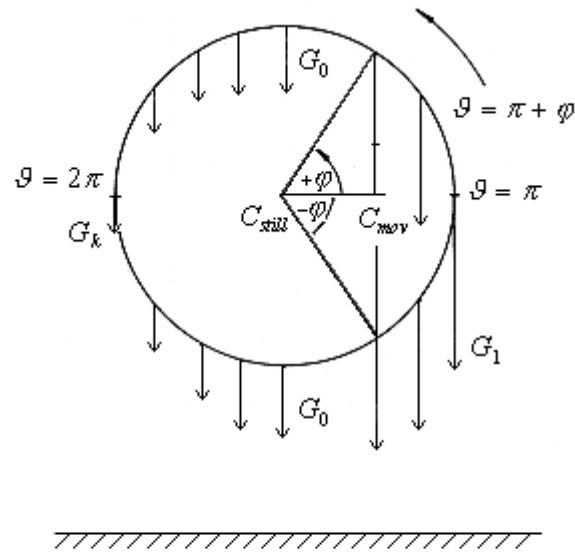


Fig. 3.3. Once it starts rotating at the circumference speed  $v$  the center of gravity will be shifted in the distance  $r_c$

In case such a body does not rotate, its center of gravity is in the center. Once it starts rotating at the circumference speed of  $v$ , the center of gravity will be shifted in the distance of  $r_c$ , which will be calculated as in fig.3.3. Each point of weight  $G_0$  will, in result of rotation, weight

$$G_i = G_0 \left( 1 - \frac{v}{c} \cos \vartheta \right)^2$$

There is a certain angle  $\varphi$  for which

$$\cos \varphi = \frac{r_c}{r} \tag{3.2}$$

The weight of points to the right from  $C_{\text{mov}}$  must be equal to the weight of points to the left from  $C_{\text{mov}}$  which will be written as follows:

$$\int_{\pi-\varphi}^{\pi} G_0 \left(1 - \frac{v}{c} \cos \vartheta\right)^2 d\vartheta + \int_{\pi}^{\pi+\varphi} G_0 \left(1 - \frac{v}{c} \cos \vartheta\right)^2 d\vartheta =$$

$$= \int_{\pi+\varphi}^{2\pi} G_0 \left(1 - \frac{v}{c} \cos \vartheta\right)^2 d\vartheta + \int_0^{\pi-\varphi} G_0 \left(1 - \frac{v}{c} \cos \vartheta\right)^2 d\vartheta$$
(3.3)

Where from

$$\frac{v}{c} = \frac{-8 \sin \varphi + \sqrt{(64 \sin^2 \varphi + 8(\pi - 2\varphi)[\sin 2\varphi - (\pi - 2\varphi)])}}{2[\sin 2\varphi - (\pi - 2\varphi)]}$$
(3.4)

Substituting for  $\varphi$  we get the Table 1 which represents the dependency of  $\frac{r_c}{r}$  on  $\frac{v}{c}$ , see fig. 3.4.

Table 1

$\varphi^\circ$	$\cos = \frac{r_c}{r}$	$v/c$
89.9999999	0	0.0000000000
80	0.1736	0.0886197118
60	0.5	0.30472815857

40	0.7660	0.765471182633
37	0.7986	0.927252176745
36	0.8090	1.00053925635
32.123	0.847	1.89550406058

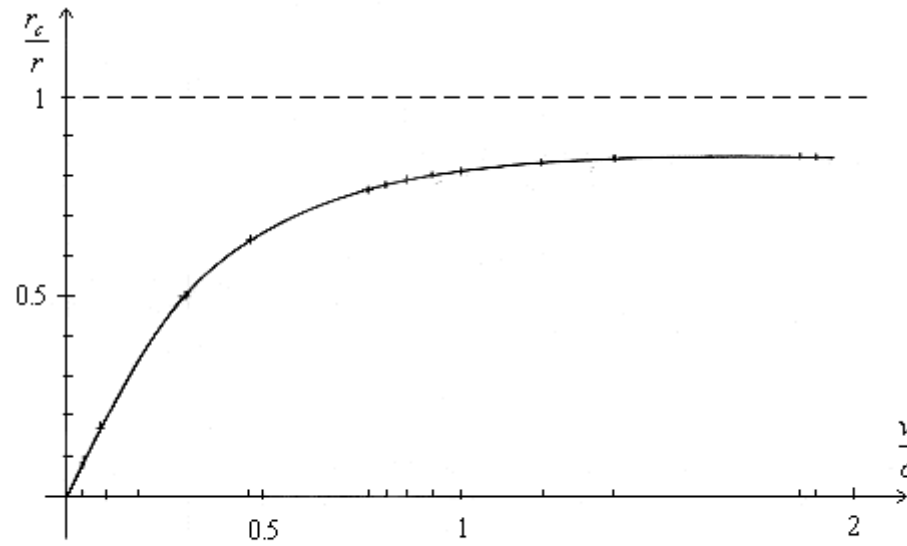


Fig. 3.4. The dependence of  $\frac{r_c}{r}$  on  $\frac{v}{c}$



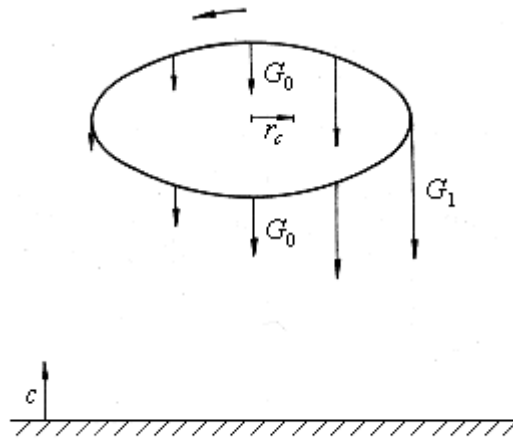


Fig. 3. 7. The rotating "circle" may be getting off the Earth

Any inclination of the circle from the horizontal level when projected at the vertical level results in ellipse. The shift of center of gravity increases in line with the inclination of the „circle" from the horizontal to vertical level. It means that the more the rotating "circle" may be getting off the Earth (see fig. 3.7) . Conversely, if we want to stop the getting off the Earth, it is enough to level the "circle" into the horizontal level. It is evident that the highest speed of getting away from the Earth will be achieved in the rotation in vertical level. If the rotation level of the "circle" forms with the horizontal level an angle of  $\varepsilon^\circ = 45^\circ$ , the "circle" acquires the average speed of getting off the Earth i. e. by deceleration of the rotating "circle" needs straightening more in the horizontal level. During acceleration it is necessary to swing out the rotating "circle" so that it rotates closer to the vertical level. The real rotating body will qualitatively behave in a way similar to our "circle".

### Corrections for real bodies

$I = mr^2$  This is the calculation for an ideal circle **and** for an **thin ring**.

$I = 0.4 mr^2$  This is the calculation for an **solid ball**.

$$I_{\text{circle}} = mr^2, \quad I_{\text{ball}} = 0,4 mr^2$$

$$0,5 I_{\text{circle}} \omega^2_{\text{circle}} = 0,5 I_{\text{ball}} \omega^2_{\text{ball}}$$

$$mr^2 \omega^2_{\text{circle}} = 0,4 mr^2 \omega^2_{\text{ball}} \quad r \omega_{\text{circle}} = v_{\text{rot}}, \quad r \omega_{\text{ball}} = v_{\text{real}}$$

$$v^2_{\text{rot circl}} = 0,4 v^2_{\text{rot real ball}}$$

$$2,5^{0,5} v_{\text{rot circl}} = v_{\text{rot real ball}}$$

$$1,5811388300841896659994467722164 v_{\text{rot circl}} = v_{\text{rot real ball}}, \quad v_{\text{rot circl}} = 0,63245553203367586639977870888654 v_{\text{rot real ball}} \dots \text{for neutron star}$$

$$v_{\text{rot}} / c, \quad v_{\text{rot}} \dots (\text{as a surface feet speed per seconde}), \quad v_{\text{climb}}, \quad v_{\text{transl}} = v_{\text{climb}} \sin \varepsilon^\circ$$

$$v_{\text{climb}} = v_{\text{rot}} (\cos \varphi) / (2 \pi)$$

$$v_{\text{real}} = \text{average } v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 0,70710678118654752440084436210485 v_{\text{climb}} = 0,70710678118654752440084436210485 v_{\text{rot}} (\cos \varphi) / (2 \pi)$$

$$v_{\text{real}} = 0,11253953951963825869439989887584 (\cos \varphi) v_{\text{rot}}$$

If the rotation level of the "circle" forms with the horizontal level an angle of  $\varepsilon^\circ$ ,  $v_{\text{transl}} = v_{\text{climb}} \sin \varepsilon^\circ$ .

$$\text{For } \varepsilon^\circ = 90^\circ \quad v_{\text{transl}} = v_{\text{climb}}.$$

$$\text{For } \varepsilon^\circ = 0^\circ \quad v_{\text{transl}} = 0 \text{ m/s}.$$

$$\text{For } \varepsilon^\circ = 45^\circ \quad \text{average } v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ$$

$$\text{average } v_{\text{transl}} = 0,70710678118654752440084436210485 v_{\text{climb}}.$$

$$\text{For } \varepsilon^\circ = 10^\circ \quad \text{minimal } v_{\text{transl}} = 0,17364817766693034885171662676931 v_{\text{climb}}.$$

$$\text{For } \varepsilon^\circ = 30^\circ \quad v_{\text{transl}} = 0,5 v_{\text{climb}}.$$

For  $\varepsilon^\circ = 80^\circ$  maximal  $v_{\text{transl}} = 0,98480775301220805936674302458952 v_{\text{climb}}$ .

At each revolution, the center of gravity moves on:

For  $r = 0,5\text{m}$  shift the center of gravity

**Wheel of bicycle**  $r_c = 0,5\text{m} * 1,7453292519943294883140751983588\text{e-}8 = 1,5207211500780928877615655880281\text{e-}10 \text{ m}$

**Wheel (car)**  $r_c = r \cos \varphi^a = 8,726 \text{ e-}8\text{m} = 0,08 \mu\text{m}$

**Wheel (aeroplane)**  $r_c = r \cos \varphi^a = 8,7267\text{e-}7\text{m} = 0,87 \mu\text{m}$

**Earth**  $r_c = r \cos \varphi^a = 11,19 \text{ m}$ , see you **Table 6** in this article.

The centers of gravity rises every second  $f$   $r_c = f * r \cos \varphi = \omega r \cos \varphi / 2\pi = v_{\text{rot}} (\cos \varphi) / (2 \pi) = v_{\text{climb}}$

$v_{\text{rot circl}} = 0,6324555320336758663997787088865 v_{\text{rot real ball}}$ ,  $v_{\text{rot}} / c$ ,  $v_{\text{rot}}$  (as a surface feet speed per seconde),  $v_{\text{climb}}$ ,  $v_{\text{transl}} = v_{\text{climb}} \sin \varepsilon^\circ$

$v_{\text{transl}} = v_{\text{climb}} \sin \varepsilon$ , average  $v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 0,70710678118654752440084436210485 v_{\text{climb}}$

$v_{\text{rot}} = \omega r$   $\omega = v/r = 2\pi f$ , **Neutron star**  $r_{\text{min}} = 10 \text{ km}$ ,  $r_{\text{max}} = 15 \text{ km}$

$v_{\text{rot circl}} = 0,6324555320336758663997787088865 v_{\text{rot real ball}} = 0,4^{0,5} v_{\text{rot real ball}} = (2/5)^{0,5} v_{\text{rot real ball}}$

**Table 2** Calculation  $v_{\text{rot}}$

<b>T</b>	<b>f</b>	$v_{\text{rot real ball}} = 2 \pi r f$ $v_{\text{rot real ball min}} =$ <b>62831,853071795864769252867</b> <b>66559 m*f</b> $v_{\text{rot real ball max}} =$	$v_{\text{rot circl}} = 0,6324555320336758663997787088865 v_{\text{rot real ball}}$ $v_{\text{rot circl min}} =$ <b>39738,353063184404937734202681247 m*f</b> $v_{\text{rot circl min}} / c =$ $v_{\text{rot circl max}} =$	
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		94247,779607693797153879301 498385 m*f	59607,529594776607406601304021871 m*f Vrot circl max /c =	
0,001s	1000 Hz	Vrot real ball min = 62831853,071795864769252867665 59 m/s = 62831,8531 km/s Vrot real ball max = 94247779,607693797153879301 49838 m/s =94247,7796 km/s	Vrot circl= 0,6324555320336758663997787088865 Vrot real ball Vrot circl mim =39738353,06318440493773420268124 m/s Vrot circl mim /c = 0,13255287784185819957396727665924  Vrot circl max =59607529,59477660740660130402187 m/s Vrot circl max /c = 0,1988293167627872993609509149889	
0,001557708 s	f =641,968841400 3137943696764 7338269 Hz	Vrot real ball min = 40336091,919535538604958610 770171 m/s = 40336,0919 km/s Vrot real ball max =60504137,87930330790743791 6155253 m/s = 60504,1379 km/s	Vrot circl= 0,6324555320336758663997787088865 Vrot real ball Vrot circl mim =25510784,475129103103877108342022 m/s 39738,353063184404937734202681247 m*f Vrot circl mim /c =0,085094817412415035150340934667616 Vrot circl max = 38266176,71269365465581566251304 m/s 59607,529594776607406601304021871 m*f Vrot circl max /c = 0,12764222611862255272551140200145	
0,0015578065 s	f =641,9282497537 402751882213869 3092 Hz	Vrot real ball min = 40333541,471162088981688590 762452 m/s = 40333,5415 km/s Vrot real ball max =60500312,20674313347253288 6143675 m/s =60500,3122 km/s	Vrot circl= 0,6324555320336758663997787088865 Vrot real ball Vrot circl mim =25509171,429946148599157984435961 m/s 39738,353063184404937734202681247 m*f Vrot circl mim /c = 0,085089436872845375580322252256129 Vrot circl max =38263757,144919222898736976653948 m/s 59607,529594776607406601304021871 m*f Vrot circl max /c =0,12763415530926806337048337838422	
0,01s	100Hz	Vrot real ball min = 6283185,3071795864769252867 66559 m/s = 6283,1853 km/s Vrot real ball max = 9424777,9607693797153879301 49838 m/s = 9424,77796 km/s	Vrot circl= 0,6324555320336758663997787088865 Vrot real ball Vrot circl mim =3973835,306318440493773420268124 m/s 39738,353063184404937734202681247 m*f Vrot circl mim /c = 0,013255287784185819957396727665924 Vrot circl max =5960752,959477660740660130402187 m/s 59607,529594776607406601304021871 m*f Vrot circl max /c =0,01988293167627872993609509149889	

**Table 3 Extreme values for neutron stars**

<p><b>Neutron star</b> <math>r_{\min} = 10\text{km}</math>,</p> <p><math>r_{\max} = 15\text{km}</math>,</p>	<p><math>V_{\text{rot real ball min}} =</math>  <b>62831,85307179586476925286766559 *f</b></p> <p><math>V_{\text{rot real ball max}} =</math>  <b>94247,779607693797153879301498385 *f</b></p>	<p><math>V_{\text{rot circl}} = 0,6324555320336758663997787088865</math> <math>V_{\text{rot real ball}}</math></p> <p><math>V_{\text{rot circl min}} /c</math></p> <p><math>V_{\text{rot circl max}} /c</math></p>	<p><math>V_{\text{climb}} = v_{\text{rot}} (\cos\phi) / (2 \pi)</math></p> <p><math>V_{\text{transl}} = v_{\text{climb}} \sin 45^\circ</math></p>
<p><b>T = 0,01s</b> <math>r_{\min} = 10\text{km}</math>  <b>f = 100Hz</b></p> <p><math>r_{\max} = 15\text{km}</math></p>	<p><math>V_{\text{rot real ball min}} =</math>  <b>6283185,307179586476925286766559</b>  m/s = <b>6283,1853 km/s</b></p> <p><math>V_{\text{rot real ball max}} =</math>  <b>9424777,960769379715387930149838</b>  m/s = <b>9424,77796 km/s</b></p>	<p><math>V_{\text{rot circl min}} = 3973835,306318440493773420268124</math> m/s</p> <p><math>V_{\text{rot circl min}} /c = 0,013255287784185819957396727665924</math></p> <p><math>V_{\text{rot circl max}} = 5960752,959477660740660130402187</math> m/s</p> <p><math>V_{\text{rot circl max}} /c = 0,01988293167627872993609509149889</math></p>	<p><math>V_{\text{climb}} = 16,5557</math> km/s  <math>V_{\text{transl}} = 11,707</math> km/s</p> <p><math>V_{\text{climb}} = 28,5411</math> km/s  <math>V_{\text{transl}} = 20,182</math> km/s</p>
<p><b>T = 0,001s</b> <math>r_{\min} = 10\text{km}</math>  <b>f = 1000 Hz</b></p> <p><math>r_{\max} = 15\text{km}</math></p>	<p><math>V_{\text{rot real ball min}} =</math>  <b>62831853,07179586476925286766559</b> m/s =  <b>62831,8531 km/s</b></p> <p><math>V_{\text{rot real ball max}} =</math>  <b>94247779,60769379715387930149838</b>  m/s = <b>94247,7796 km/s</b></p>	<p><math>V_{\text{rot circl min}} = 39738353,06318440493773420268124</math> m/s</p> <p><math>V_{\text{rot circl min}} /c = 0,13255287784185819957396727665924</math></p> <p><math>V_{\text{rot circl max}} = 59607529,59477660740660130402187</math> m/s</p> <p><math>V_{\text{rot circl max}} /c = 0,1988293167627872993609509149889</math></p>	<p><math>V_{\text{climb}} = 1603,422</math> km/s  <math>V_{\text{transl}} = 1133,791</math> km/s</p> <p><math>V_{\text{climb}} = 3431,081</math> km/s  <math>V_{\text{transl}} = 2426,141</math> km/s</p>

**Table 4 Calculation of extreme velocities**

<p><b>Fast-spinning body</b></p>	<p><math>\phi^\circ</math></p>	<p><math>\cos = \frac{r_c}{r}</math></p>	<p><math>V_{\text{rot}} /c, V_{\text{rot}} \dots</math> (Surface feet speed per seconde), <math>v_{\text{climb}}</math>, <math>v_{\text{transl}} = v_{\text{climb}} \sin \epsilon^\circ</math></p> <p>For <math>\epsilon^\circ = 45^\circ</math>, <math>\sin 45^\circ = 0,70710678118654752440084436210485</math></p> <p><math>V_{\text{rot circl}} = 0,63245553203367586639977870888654</math> <math>V_{\text{rot real ball}}</math></p>
<p><b>Neutron star T = 0,01s</b>  <b>f = 100Hz</b>  if <math>r_{\min} = 10\text{km}</math>,</p>		<p><math>V_{\text{rot real ball min}} =</math>  <b>6283185,307179586476925286</b>  <b>766559</b> m/s = <b>6283,1853 km/s</b></p> <p><math>V_{\text{rot real ball max}} =</math></p>	<p><math>V_{\text{rot circl min}} = 3973835,306318440493773420268124</math> m/s</p> <p><math>V_{\text{rot circl min}} /c = 0,013255287784185819957396727665924</math></p> <p><math>V_{\text{rot circl max}} = 5960752,959477660740660130402187</math> m/s</p>

if $r_{\max} = 15\text{km}$ ,		9424777,960769379715387930 149838 m/s = 9424,77796 km/s	$V_{\text{rot circl max}} / c = 0,01988293167627872993609509149889$
Neutron star T = 0,01s f = 100Hz if $r_{\min} = 10\text{km}$ ,	88,5°	0,026176948307873152610611 685554113 ( $\cos\phi$ )/(2 $\pi$ ) = =0,00416619071825903750912 89210347223	$V_{\text{rot circl mim}} / c = 0,013255287784185819957396727665924$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 16555,75576907394593683145206195 \text{ m/s} = 16,5557 \text{ km/s}$ $V_{\text{transl}} = V_{\text{climb}} \sin \varepsilon^{\circ} = 16,5557 * \sin 45^{\circ} = 11,707 \text{ km/s}$
Neutron star T = 0,01s f = 100Hz if $r_{\max} = 15\text{km}$	88,276°	0,030084936125369204818494 256092281 ( $\cos\phi$ )/(2 $\pi$ ) = =0,00478816629695644195366 90026585691	$V_{\text{rot circl max}} / c = 0,01988293167627872993609509149889$ $V_{\text{rot circl max}} = 5960752,959477660740660130402187 \text{ m/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 28541,076425054303129252336458349 = 28,5411 \text{ km/s}$ $V_{\text{transl}} = V_{\text{climb}} \sin \varepsilon^{\circ} = 28,5411 * \sin 45^{\circ} = 20,182 \text{ km/s}$
Neutron star T = 0,001s f = 1000Hz if $r_{\min} = 10\text{km}$ ,	75,3139°	0,253523277221852020522635 11241255 ( $\cos\phi$ )/(2 $\pi$ ) = =0,04034948275871466336624 4713765043	$V_{\text{rot circl mim}} / c = 0,13255287784185819957396727665924$ $V_{\text{rot circl mim}} = 39738353,06318440493773420268124 \text{ m/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 1603421,99178267517677875257418 \text{ m/s} = 1603,422 \text{ km/s}$ $V_{\text{transl}} = V_{\text{climb}} \sin \varepsilon^{\circ} = 1603,422 * \sin 45^{\circ} = 1133,791 \text{ km/s}$
Neutron star T = 0,001s f = 1000Hz if $r_{\max} = 15\text{km}$ ,	68,79735°	0,361667690813356360640756 53636272 ( $\cos\phi$ )/(2 $\pi$ ) = =0,05756120074957692910051 7270459969	$V_{\text{rot circl max}} / c = 0,1988293167627872993609509149889$ $V_{\text{rot circl max}} = 59607529,59477660740660130402187 \text{ m/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 3431080,97719128423917370897567 \text{ m/s} = 3431,081 \text{ km/s}$ $V_{\text{transl}} = V_{\text{climb}} \sin \varepsilon^{\circ} = 3431,081 * \sin 45^{\circ} = 2426,141 \text{ km/s}$

Table 5 Summary values for neutron stars

Fast-spining body	$\phi^{\circ}$	$\cos = \frac{r_c}{r}$	$V_{\text{rot}} / c, V_{\text{rot}} \dots$ (Surface feet speed per seconde), $V_{\text{climb}}$ , $V_{\text{transl}} = V_{\text{climb}} \sin \varepsilon^{\circ}$ For $\varepsilon^{\circ} = 45^{\circ}$ , $\sin 45^{\circ} = 0,70710678118654752440084436210485$
	89°	0,017452406437283512819418 978516316	$V_{\text{rot circl}} = 0,63245553203367586639977870888654 V_{\text{rot real ball}}$ $v_{\text{rot}}/c = 0,008727975640433114855122820917221639967376342934278782564200\dots$ $v_{\text{rot}}/c = 0,00872797564043311485512282091722163996737634$

		$(\cos\phi)/(2\pi) =$ <b>=0,00277763675334248530714</b> <b>35936608051</b>	<b><math>v_{rot} = 2616581,2706095676870135843746012</math> m/s = 2616,58 km/s</b> <b><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 7267,9123053527145610210251190232</math> m/s</b> <b><math>v_{climb} = 7,2679</math> km/s</b> <b>average <math>v_{transl} = v_{climb} \sin 45^\circ = 5,139</math> km/s</b>
<b>Neutron star T = 0,01s</b> <b>f = 100Hz</b> if $r_{min} = 10$ km,  if $r_{max} = 15$ km,		<b><math>v_{rot}</math> real ball min =</b> <b>6283185,307179586476925286</b> <b>766559 m/s = 6283,1853 km/s</b>  <b><math>v_{rot}</math> real ball max =</b> <b>9424777,960769379715387930</b> <b>149838 m/s = 9424,77796 km/s</b>	<b><math>v_{rot}</math> circl mim = 3973835,306318440493773420268124 m/s</b> <b><math>v_{rot}</math> circl mim /c = 0,013255287784185819957396727665924</b>  <b><math>v_{rot}</math> circl max = 5960752,959477660740660130402187 m/s</b> <b><math>v_{rot}</math> circl max /c = 0,01988293167627872993609509149889</b>
<b>Neutron star T = 0,01s</b> <b>f = 100Hz</b> if $r_{min} = 10$ km,	88,5°	<b>0,026176948307873152610611</b> <b>685554113</b> $(\cos\phi)/(2\pi) =$ <b>=0,00416619071825903750912</b> <b>89210347223</b>	<b><math>v_{rot}</math> circl mim /c = 0,013255287784185819957396727665924</b> <b><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 16555,75576907394593683145206195</math> m/s = 16,5557 km/s</b> <b>average <math>v_{transl} = v_{climb} \sin \varepsilon^\circ = 16,5557 * \sin 45^\circ = 11,707</math> km/s</b>
<b>Neutron star T = 0,01s</b> <b>f = 100Hz</b> if $r_{max} = 15$ km	88,276°	<b>0,030084936125369204818494</b> <b>256092281</b> $(\cos\phi)/(2\pi) =$ <b>=0,00478816629695644195366</b> <b>90026585691</b>	<b><math>v_{rot}</math> circl max /c = 0,01988293167627872993609509149889</b> <b><math>v_{rot}</math> circl max = 5960752,959477660740660130402187 m/s</b> <b><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 28541,076425054303129252336458349 = 28,5411</math> km/s</b> <b>average <math>v_{transl} = v_{climb} \sin \varepsilon^\circ = 28,5411 * \sin 45^\circ = 20,182</math> km/s</b>
	88°	<b>0,034899496702500971645995</b> <b>181625333</b> $(\cos\phi)/(2\pi) =$ <b>=0,03489949670250097164599</b> <b>5181625333</b>	<b>0.017463933237681592327144152660111110344490850835546791955029...</b> <b><math>v_{rot}/c = 0,01746393323768159232714415266011111034449085</math></b> <b><math>v_{rot} = 5235555,4716724627851084856462686</math> m/s = 5235,555 km/s</b> <b><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 29080,512826926810132624625022137</math></b> <b><math>v_{climb} = 29,0805</math> km/s</b> <b>average <math>v_{transl} = v_{climb} \sin 45^\circ = 20,563</math> km/s</b>
	87°	<b>0,052335956242943832722118</b> <b>629609078</b> $(\cos\phi)/(2\pi) =$ <b>=0,00832952613750565012082</b> <b>12572246279</b>	<b>0.026215883170382501294797482593212593293946245879689283725651...</b> <b><math>v_{rot}/c = 0,0262158831703825012947974825932125932939</math></b> <b><math>v_{rot} = 7859324,0542898028633555199187677</math> m/s = 7859,324 km/s</b> <b><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 65464,445133333788080522294679504</math> m/s</b> <b><math>v_{climb} = 65,4644</math> km/s</b> <b>average <math>v_{transl} = v_{climb} \sin 45^\circ = 46,290</math> km/s</b>

	86°	0,069756473744125300775958 835194143 $(\cos\phi)/(2\pi) =$ =0,01110208760903755340662 5303034432	0.034991892902415155481444102185912156157984547716105394726321... $v_{rot}/c = 0,03499189290241515548144410218591215615798$ $v_{rot} = 10490305,5832877935982343 \text{ m/s} = 10490,305583 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 116464,29163123687749909943954997 \text{ m/s}$ $v_{climb} = 116,4643 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 82,353 \text{ km/s}$
	85°	0,087155742747658173558064 270837474 $(\cos\phi)/(2\pi) =$ =0,01387126727713540624010 0330023427	0.043800116133369449162243192210722769426360805129544737054659... $v_{rot}/c = 0,04380011613336944916224319221072276942636$ $v_{rot} = 13130944,476308282986454927386402 \text{ m/s} = 13130,94 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 182142,84043209699937457117013179 \text{ m/s}$ $v_{climb} = 182,1428 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 128,794 \text{ km/s}$
	84°	0,104528463267653471399834 1548025 $(\cos\phi)/(2\pi) =$ =0,01663622162284666021377 9183752024	0.052648822689310354155112108480039421972918532818959442949836... $v_{rot}/c = 0,052648822689310354155112108480$ $v_{rot} = 15783719,964834521397011572266782 \text{ m/s} = 15783,72 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 262581,46336793659223664313126767 \text{ m/s}$ $v_{climb} = 262,5815 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 185,673 \text{ km/s}$
	83°	0,121869343405147481112893 91923153 $(\cos\phi)/(2\pi) =$ =0,01939610841429289749526 5636178703	0.061546429419037647937207344430091477007293160179421032989100... $v_{rot}/c = 0,061546429419037647937207344430091477$ $v_{rot} = 18451155,356656808469634019442322 \text{ m/s} = 18451,1554 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 357880,60966667659085697677318286 \text{ m/s}$ $v_{climb} = 357,8801 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 253,059 \text{ km/s}$
	82°	0,139173100960065444112496 66330111 $(\cos\phi)/(2\pi) =$ =0,02215008696322181987671 6065270417	0.070501532377454639860328775364899457683965648939309596758992... $v_{rot}/c = 0,070501532377454639860328775364899$ $v_{rot} = 21135827,684203710267232740254503 \text{ m/s} = 21135,8277 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 468160,42124478343051766323233437 \text{ m/s}$ $v_{climb} = 468,1604 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 331,039 \text{ km/s}$



	81°	0,156434465040230869010105 31946717 (cosφ)/(2 π) = =0,02489731838108903435484 1502930117	0.079522940598973804892724421154906775310115207065009741007176... <b>v<sub>rot</sub>/c = 0,07952294059897380489272442115491</b> <b>v<sub>rot</sub> = 23840377,829554349246402280534385 m/s = 23840,4 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) = 593561,47714787099719017703866065 m/s</b> <b>v<sub>climb</sub> =593,5615 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =419,711 km/s</b>
	80°	0,173648177666930348851716 62676931 (cosφ)/(2 π) = =0,02763696583459163024882 2422362346	0.088619711790676205327338629151343180429432664295312521755495... <b>v<sub>rot</sub>/c = 0,088619711790676205327338629151343</b> <b>v<sub>rot</sub> =26567521,224978401077195542231529 m/s=26567,52 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) = 734245,6764045160471513309559811 m/s</b> <b>v<sub>climb</sub> =734,2457 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =519,19 km/s</b>
	79°	0,190808995376544812405140 48795839 (cosφ)/(2 π) = =0,03036819480057570985313 6802396938	0.097801190307943836001438986564057051864042361089181828754607... <b>v<sub>rot</sub>/c = 0,097801190307943836001438986564057</b> <b>v<sub>rot</sub> =29320059,237744259520820285319051 m/s=29320,1 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) = 890397,27049623703270774917444291 m/s</b> <b>v<sub>climb</sub> =890,3973 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =629,606 km/s</b>
	78°	0,207911690817759337101742 28440513 (cosφ)/(2 π) = =0,03309017332024022532211 9919992631	0.107077047815431524891573511759277128251736618733142730990486... <b>v<sub>rot</sub>/c = 0,107077047815431524891573511759277</b> <b>v<sub>rot</sub> =32100891,359971747177933006577923 m/s=32100,9 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) = 1062224,0588356670713883098365441 m/s</b> <b>v<sub>climb</sub> = 1062,2241 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =751,1059 km/s</b>
	77°	0,224951054343864998051107 2083428 (cosφ)/(2 π) = =0,03580207225255968883501 2971259894	0.116457327084702694566820976533792415862359393619564735642381... <b>v<sub>rot</sub>/c = 0,11645732708470269456682097653</b> <b>v<sub>rot</sub> =34913028,338832995003410505800788 m/s=34913,028 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =1249958,7631425628566313942052927 m/s</b> <b>v<sub>climb</sub> =1249,9588 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =883,854 km/s</b>
	76°	0,241921895599667722560442	0.125952489438069937853005346598758863645937973547879337155578...

		<b>37410035</b> $(\cos\phi)/(2\pi) =$ $=0,03850306552684856102902$ <b>332888899</b>	$v_{rot}/c = 0,12595248943806993785300534659875886$ $v_{rot} = 37759606,399858025444859715543756 \text{ m/s} = 37759,6 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1453860,5994817438412625883286501 \text{ m/s}$ $v_{climb} = 1453,8606 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 1028,035 \text{ km/s}$
<b>Neutron star T = 0,001s</b> <b>f = 1000Hz</b> if $r_{min} = 10\text{km}$ ,	<b>75,3139°</b>	<b>0,253523277221852020522635</b> <b>11241255</b> $(\cos\phi)/(2\pi) =$ $=0,04034948275871466336624$ <b>4713765043</b>	$v_{rot} \text{ circl mim} /c = 0,13255287784185819957396727665924$ $v_{rot} \text{ circl mim} = 39738353,06318440493773420268124 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1603421,99178267517677875257418 \text{ m/s} = 1603,422 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin \varepsilon^\circ = 1603,422 * \sin 45^\circ = 1133,791 \text{ km/s}$
	<b>75°</b>	<b>0,258819045102520762348898</b> <b>83762405</b> $(\cos\phi)/(2\pi) =$ $=0,04119233039439038414103$ <b>3556846236</b>	$0.135573466417955067974877154676437407574635323374335527425142...$ $v_{rot}/c = 0,1355734664179550679748771546764374$ $v_{rot} = 40643902,737019205161745504448364 \text{ m/s} = 40643,9 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1674217,0700607627288041337014832 \text{ m/s}$ $v_{climb} = 1674,2171 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 1183,850 \text{ km/s}$
	<b>74°</b>	<b>0,275637355816999185649971</b> <b>5746113</b> $(\cos\phi)/(2\pi) =$ $=0,04386904767905501118641$ <b>8070235537</b>	$0.145331716344645600366723958716478652875612833791316124522891...$ $v_{rot}/c = 0,1453317163446456003667239587$ $v_{rot} = 43569352,46832007967282587699096 \text{ m/s} = 43569,4 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1911346,0007782867139710264828404 \text{ m/s}$ $v_{climb} = 1911,3460 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 1351,526 \text{ km/s}$
	<b>73°</b>	<b>0,292371704722736728097468</b> <b>69537714</b> $(\cos\phi)/(2\pi) =$ $=0,04653240202682759073917$ <b>595903321</b>	$0.155239286525448971273996291386331459527282777439583192240504...$ $v_{rot}/c = 0,15523928652544897127399629138633$ $v_{rot} = 46539567,285630626651802739677493 \text{ m/s} = 46539,57 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 2165597,8550895576071908397319786 \text{ m/s}$ $v_{climb} = 2165,5979 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 1531,309 \text{ km/s}$
	<b>72°</b>	<b>0,309016994374947424102293</b> <b>41718282</b> $(\cos\phi)/(2\pi) =$ $=24373580,0491815821541732$	$0.165308881998387903439479120026767317714472488380888307453906...$ $v_{rot}/c = 0,16530888199838790343947912$ $v_{rot} = 49558356,063528661609588099632272 \text{ m/s} = 49558,4 \text{ km/s}$

		98367374393707347	$V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 2437358,3601642072962811913981365 \text{ m/s}$ $V_{\text{climb}} = 2437,358 \text{ km/s}$ $\text{average } v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 1723,47 \text{ km/s}$
	71°	0,325568154457156668714008 93579472 $(\cos\phi)/(2 \pi) =$ =0,05181578109516216042074 419853012	0.175553941838060411400905071631795321859383125932811547829616... $v_{\text{rot}}/c = 0,17555394183806041140090507163$ $v_{\text{rot}} = 52629747,735221168686368554848924 \text{ m/s} = 52629,75 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 2727051,4877418265600993462429554 \text{ m/s}$ $V_{\text{climb}} = 2727,051 \text{ km/s}$ $\text{average } v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 1928,316 \text{ km/s}$
$f_i = \pi/2.57142857 = 70^\circ$	70°	0,342020143325668733044099 61468226 $(\cos\phi)/(2 \pi) =$ =0,05443419644727869355514 9967932637	0.185988723815849022300232841377413792364386228762834947312944... <b>0,185988723815849022300232841377</b> $v_{\text{rot}}/c = 0,185988723815849022300232841377$ $v_{\text{rot}} = 55758016,673036517752283617488735 \text{ m/s} = 55758,0167 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 3035142,8330907105752273290514717 \text{ m/s}$ $V_{\text{climb}} = 3035,1428 \text{ km/s}$ $\text{average } v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 2146,17 \text{ km/s}$
	69°	0,358367949545300273484137 78941347 $(\cos\phi)/(2 \pi) =$ =0,05703603061584148399652 4125304145	0.196628401694940002866400053496715023486129018637067431889057... <b>0,19662840169494000286640005349671502348</b> $v_{\text{rot}}/c = 0,19662840169494000286640005349671502348$ $v_{\text{rot}} = 58947711,856737429621845117648897 \text{ m/s} = 58947,7119 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 3362143,4981946780860871259822083 \text{ m/s}$ $V_{\text{climb}} = 3362,1435 \text{ km/s}$ $\text{average } v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 2377,3945 \text{ km/s}$
Neutron star $T = 0,001\text{s}$ $f = 1000\text{Hz}$ if $r_{\text{max}} = 15\text{km}$ ,	68,79735°	0,361667690813356360640756 53636272 $(\cos\phi)/(2 \pi) =$ =0,05756120074957692910051 7270459969	$V_{\text{rot}} \text{ circl max } /c = 0,1988293167627872993609509149889$ $V_{\text{rot}} \text{ circl max } = 59607529,59477660740660130402187 \text{ m/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi)/(2 \pi) = 3431080,97719128423917370897567 \text{ m/s} = 3431,081 \text{ km/s}$ $\text{average } v_{\text{transl}} = v_{\text{climb}} \sin \varepsilon^\circ = 3431,081 * \sin 45^\circ = 2426,141 \text{ km/s}$
	68°	0,374606593415912035414963 7745012	0.207489168225684948345812096464790187553290447685019956277866... <b>0,20748916822568494834581209646479018755</b>

		$(\cos\phi)/(2\pi) =$ $=0,05962049105695825397267$ $5499032576$	$v_{rot}/c = 0,20748916822568494834581209646479018755$ $v_{rot} = 62203687,750753589398194042405076 \text{ m/s} = 62203,6878 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 3708614,4092536280648771502316964 \text{ m/s}$ $v_{climb} = 3708,6144 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin \varepsilon^\circ = 2622,3864 \text{ km/s}$
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**Table 6. Summary values for spinning bodies**

Fast-spinning body shift the center of gravity $r_c$	$\phi^\circ$	$\cos = \frac{r_c}{r}$	$v_{rot}/c, v_{rot} \dots$ (as a surface feet speed per seconde), $v_{climb}$ , $v_{transl} = v_{climb} \sin \varepsilon^\circ$ $v_{rot\ circ} = 0,63245553203367586639977870888654$ $v_{rot\ real\ ball}$
Ideal rotational circle Ring	89,9999999°	$1,745329251994329576037594$ $6128047e-9$ $(\cos\phi)/(2\pi) =$ $=2,777777777777777636751194545$ $85e-10$	$9.761385225306725890874493380900799198121733067437675948... \times 10^{-10}$ $v_{rot}/c = 9,761385225306725890874493380900799198121733067437675948e-10$ $v_{rot} = 0,29263896701795871587575041401647 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 8,1288601949432976590883019143158e-11 = 81,288 \text{ pm/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ$ $\text{average } v_{transl} = 0,70710678118654752440084436210485$ $v_{climb}$ $\text{average } v_{transl} = 57,479 \text{ pm/s}$
Wheel ( bicycle ) 1,52 e-10 m = 15,2 nm	89,9999990°	$1,745329251994329488314075$ $1983588e-8$ $(\cos\phi)/(2\pi) =$ $=2,77777777777777763675119$ $45431892e-9$	$9.7613808317299049249180305404146324619440633075069197168... \times 10^{-9}$ $v_{rot}/c = 9,761380831729904924918030540414632461944063307506919717e-9$ $v_{rot} = 2,9263883530183925895474818242298 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 8,1288565361622012249333433125122e-9 \text{ m/s} = 8,1288 \text{ nm/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 5,7479 \text{ nm/s}$
Wheel ( car ) 8,726 e-8m= 0,08 μm	89,999990°	$1,745329251994320715962133$ $7555219e-7$ $(\cos\phi)/(2\pi) =$ $=2,7777777777777776367511945$	$9.7613368966122347484031474668391648636828855964938683827... \times 10^{-8}$ $9,7613368966122347484031474668391648636828855964938683827e-8$ $v_{rot} = 29,263751816014737280967911540201 \text{ m/s} = 105,34950 \text{ km/hod}$

		43190663e-8	$v_{climb} = v_{rot} (\cos\phi) / (2\pi) = 8,1288199488929413083773297194773e-7 \text{ m/s} = 0,81288 \mu\text{m/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 0,57479 \mu\text{m/s}$
<b>Whell (aeroplane)</b> 8,7267e-7m=0,87 $\mu\text{m}$	89,99990°	1,745329251993443480767989 6054328e-6 $(\cos\phi) / (2\pi) =$ 2,7777777777776367511945432 1194272e-7	$9,7608976104847890620349116752508576980295402590013294089... \times 10^{-7}$ <b>9,7608976104847890620349116752508576980295402590013294089e-7</b> $v_{rot}/c=9,7608976104847890620349116752508576980295402590013294089e-7$ $v_{rot} = 292,62 \text{ m/s} = 1053,45\text{km/hod}$ (X-15 ... 7274 km/h) $v_{climb} = v_{rot} (\cos\phi) / (2\pi) = 8,128333333292066134547234678673e-5 \text{ m/s} = 8,13 \mu\text{m/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 5,7476 \mu\text{m/s}$
<b>Earth ellipsoid</b>  Equatorial radius (m) <b>6,378,136.6</b> $r = 6378136,6 \text{ m}$ $r_c = r \cos \phi^\alpha =$ = <b>11,189834512772133613</b> <b>470204759754 m</b>  $r_c = r \cos \phi^\alpha = 11,19 \text{ m}$ delta =5,2e-7° 89,99990°- 5,2e-7° = =89,9998995°	89,9998995°	1,754404964103800099463251 5019754e-6 $(\cos\phi) / (2\pi) =$ = 2,79222222220789841643832 9958426e-7	9,8119569088313304220127204635308e-7 $v_{rot \text{ circl}} / c = 9,8119569088313304220127204635308e-7$ $v_{rot \text{ circl}} = 0,63245553203367586639977870888654 \text{ } v_{rot \text{ real ball}}$ $v_{rot \text{ real Earth}} = 465,1 \text{ m/s}$ $v_{rot \text{ circl}} = 294,15506794886264546253707750288 \text{ m/s}$ $v_{rot \text{ circl}} / c = 9,8119569088313304220127204635308e-7$ $\phi = 89,9998995^\circ$ $v_{climb} = v_{rot \text{ circl}} (\cos\phi) / (2\pi) = 8,2134631750568068915736381456455e-5 \text{ m/s}$ $v_{climb} = 82,13 \mu\text{m/s} \dots \dots \text{for Earth } 90^\circ - 23,5^\circ = 66,5^\circ = \varepsilon^\circ$ average $v_{transl} = v_{climb} \sin 66,5^\circ = 7,5322391502770724600123489947654e-5 \text{ m/s}$ 86164,09205s* 7,5322391502770724600123489947654e-5 m/s = 6,49m /sidereal day 86636,55535s* 7,5322391502770724600123489947654e-5 m/s =6,52567 m/ solar day bobbing the earth ?
<b>Ideal rotational circle</b> <b>Ring</b>	89,99973°	4,712388980367248827061315 7913787e-6 $(\cos\phi) / (2\pi) =$ =7,4999999997224173762196 69997286e-7	2,6352184060155569617592175981283547210616639026595398148... $\times 10^{-6}$ <b>2,635218406015556961759217598e-6</b> $v/c = 2,635218406015556961759217598e-6$ $v_{rot} = 790,01860330624580780480784786128 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi) / (2\pi) = 0,0005925139524774914014861956918711\text{m/s} = 0,6 \text{ mm/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 0,419 \text{ mm/s}$
	89,99965°	6,108652381942162146557295 4208824e-6	3.4158872970758352174178187128029451318728665406035564385... $\times 10^{-6}$

		$(\cos\varphi) / (2\pi) =$ $=9,72222222216175707466050$ $572589e-7$	$3,41588729707583521741781871280294e-6$ $v/c = 3,41588729707583521741781871280294e-6$ $v_{rot} = 1024,0572490413408522326522849093 \text{ m/s} = 1,024 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\varphi) / (2\pi) = 9,9561121433955607351425226362662e-4 \text{ m/s} = 1 \text{ mm/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 0,7 \text{ mm/s}$
	89,99962°	$6,632251157529830524054490$ $2314347e-6$ $(\cos\varphi) / (2\pi) =$ $=1,0555555554781714488032$ $42998124e-6$	$3.7086220454978589198666567767957543341452713169765480001... \times 10^{-6}$ $3,7086220454978589198666567767e-6$ $v/c = 3,7086220454978589198666567767e-6$ $v_{rot} = 1111,8169188127909593240500673293 \text{ m/s} = 1,1118 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\varphi) / (2\pi) = 0,0011735845254048978722619425582462 \text{ m/s} = 1,2 \text{ mm/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 0,83 \text{ mm/s}$
	89,999°	$1,745329251905719961354910$ $5685129e-5$ $(\cos\varphi) / (2\pi) =$ $=2,77777777763675119454533$ $84209593e-6$	$9.7565112494485723874039284755076672239420265097234762857... \times 10^{-6}$ $9,7565112494485723874039284755076672239420265097234762857e-6$ $v_{rot} = 2924,9284889768386606107519565284 \text{ m/s} = 2,92492848897683866 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\varphi) / (2\pi) = 0,0081248013578565036084746857711894 \text{ m/s} = 8,12 \text{ mm/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 5,74 \text{ mm/s}$
	89,993490770 812547128466 198039896°	$1,136074808435855958343986$ $6031333e-4$ $(\cos\varphi) / (2\pi) =$ $=1,80811921484744550186230$ $84570103e-5$	$0.000056803740910557168763834837156865468959667862894610684386...$ $0,000056803740910557168763834837156$ $v_{rot}/c = 0,000056803740910557168763834837156$ $v_{rot} = 17029,333111171091773230867290259 \text{ m/s} = 17,029 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\varphi) / (2\pi) = 0,30791064414346280821312874528876 \text{ m/s} = 0,3 \text{ m/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 0,2177257 \text{ m/s}$
	89,99°	$1,745329243133368033406726$ $8304459e-4$	
$f_i = \pi/2.00021982 =$ $89,990109187099245921$ $880726089396^\circ$	89,990109187 099245921880 726089396°	$0,000172627249959502966309$ $0642578526$ $(\cos\varphi) / (2\pi) =$ $=2,74744801434150860091375933$ $38148e-5$	$0.000086313626694525180932082216331553815936524555367552768417...$ $0,00008631362669452518093208221633$ $v_{rot} = 25876,174305646119134523658592727 \text{ m/s} = 25,876 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\varphi) / (2\pi) = 0,7109344371480219508707619867285 \text{ m/s} = 0,71 \text{ m/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 0,503 \text{ m/s}$
$f_i = \pi/2.0005 =$ $89,977505^\circ$	89,977505°	$3,926118051496627900381389$ $5333483e-4$	$0.000198144050724876985568508305538126217760311746639807139790...$ $0,000198144050724876985568508305538$

		$(\cos\phi)/(2\pi) =$ $=6,24861095058008814787968024$ $59618e-5$	$v_{rot}/c = 0,000198144050724876985568508305538$ $v_{rot} = 59402,092004887553251213632149364 \text{ m/s} = 59,4 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 3,7118056258910626829553518525213 \text{ m/s} = 3,71 \text{ m/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 2,625 \text{ m/s}$
$\ddot{f} = \pi/2.0010 =$ $89,955022^\circ$	89,955022°	$7,850141103348687162626247$ $6088787e-4$ $(\cos\phi)/(2\pi) =$ $=1,24938876056680876701795543$ $16626e-4$	$0.000392453329037002152296678192401277332308823590163054030495...$ $0,000392453329037002152296678192401277$ $v_{rot}/c = 0,000392453329037002152296678192401277$ $v_{rot} = 117654,54816228564818831150041468 \text{ m/s} = 117,654 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 14,699627010352597413371053434747 \text{ m/s} = 14,7 \text{ m/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 10,394 \text{ m/s}$
	89,9°	$0,001745328365898308835778$ $20272085$ $(\cos\phi)/(2\pi) =$ $=2,77777636751216022765858$ $52336932e-4$	$0.000934145490600104723459435805348369896155665977256115672053...$ $0,000934145490600104723459435805348369896155665977256115672053$ $v_{rot} = 280049,77275662129010331452327416 \text{ m/s} = 280,05 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 77,791564049049341778880429184767 \text{ m/s} = 77,79 \text{ m/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 55,007 \text{ m/s}$
	89°	$0,017452406437283512819418$ $978516316$ $(\cos\phi)/(2\pi) =$ $=0,00277763675334248530714$ $35936608051$	$0.008727975640433114855122820917221639967376342934278782564200...$ $v_{rot}/c = 0,00872797564043311485512282091722163996737634$ $v_{rot} = 2616581,2706095676870135843746012 \text{ m/s} = 2616,58 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 7267,9123053527145610210251190232 \text{ m/s}$ $v_{climb} = 7,2679 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 5,139 \text{ km/s}$
<b>Neutron star T = 0,01s</b> <b>f = 100Hz</b> <b>r<sub>min</sub> = 10km,</b>	88,5°	$0,026176948307873152610611$ $685554113$ $(\cos\phi)/(2\pi) =$ $=0,00416619071825903750912$ $89210347223$	$v_{rot} \text{ circl mim} /c = 0,013255287784185819957396727665924$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 16555,75576907394593683145206195 \text{ m/s} = 16,5557 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin \varepsilon^\circ = 16,5557 * \sin 45^\circ = 11,707 \text{ km/s}$
<b>Neutron star T = 0,01s</b> <b>f = 100Hz</b> <b>r<sub>max</sub> = 15km</b>	88,276°	$0,030084936125369204818494$ $256092281$ $(\cos\phi)/(2\pi) =$ $=0,00478816629695644195366$ $90026585691$	$v_{rot} \text{ circl max} /c = 0,01988293167627872993609509149889$ $v_{rot} \text{ circl max} = 5960752,959477660740660130402187 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 28541,076425054303129252336458349 = 28,5411 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin \varepsilon^\circ = 28,5411 * \sin 45^\circ = 20,182 \text{ km/s}$
	88°	$0,034899496702500971645995$	$0.017463933237681592327144152660111110344490850835546791955029...$

		181625333 $(\cos\phi)/(2\pi) =$ $=0,03489949670250097164599$ 5181625333	$v_{rot}/c = 0,01746393323768159232714415266011111034449085$ $v_{rot} = 5235555,4716724627851084856462686 \text{ m/s} = 5235,555 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 29080,512826926810132624625022137$ $v_{climb} = 29,0805 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 20,563 \text{ km/s}$
	87°	0,052335956242943832722118 629609078 $(\cos\phi)/(2\pi) =$ $=0,00832952613750565012082$ 12572246279	0.026215883170382501294797482593212593293946245879689283725651... $v_{rot}/c = 0,0262158831703825012947974825932125932939$ $v_{rot} = 7859324,0542898028633555199187677 \text{ m/s} = 7859,324 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 65464,445133333788080522294679504 \text{ m/s}$ $v_{climb} = 65,4644 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 46,290 \text{ km/s}$
	86°	0,069756473744125300775958 835194143 $(\cos\phi)/(2\pi) =$ $=0,01110208760903755340662$ 5303034432	0.034991892902415155481444102185912156157984547716105394726321... $v_{rot}/c = 0,03499189290241515548144410218591215615798$ $v_{rot} = 10490305,5832877935982343 \text{ m/s} = 10490,305583 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 116464,29163123687749909943954997 \text{ m/s}$ $v_{climb} = 116,4643 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 82,353 \text{ km/s}$
	85°	0,087155742747658173558064 270837474 $(\cos\phi)/(2\pi) =$ $=0,01387126727713540624010$ 0330023427	0.043800116133369449162243192210722769426360805129544737054659... $v_{rot}/c = 0,04380011613336944916224319221072276942636$ $v_{rot} = 13130944,476308282986454927386402 \text{ m/s} = 13130,94 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 182142,84043209699937457117013179 \text{ m/s}$ $v_{climb} = 182,1428 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 128,794 \text{ km/s}$
	84°	0,104528463267653471399834 1548025 $(\cos\phi)/(2\pi) =$ $=0,01663622162284666021377$ 9183752024	0.052648822689310354155112108480039421972918532818959442949836... $v_{rot}/c = 0,052648822689310354155112108480$ $v_{rot} = 15783719,964834521397011572266782 \text{ m/s} = 15783,72 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 262581,46336793659223664313126767 \text{ m/s}$ $v_{climb} = 262,5815 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 185,673 \text{ km/s}$
	83°	0,121869343405147481112893 91923153	0.061546429419037647937207344430091477007293160179421032989100... $v_{rot}/c = 0,061546429419037647937207344430091477$



		$(\cos\phi)/(2\pi) =$ $=0,01939610841429289749526$ <b>5636178703</b>	$v_{rot} = 18451155,356656808469634019442322 \text{ m/s} = 18451,1554 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 357880,60966667659085697677318286 \text{ m/s}$ $v_{climb} = 357,8801 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 253,059 \text{ km/s}$
	82°	<b>0,139173100960065444112496</b> <b>66330111</b> $(\cos\phi)/(2\pi) =$ $=0,02215008696322181987671$ <b>6065270417</b>	0.070501532377454639860328775364899457683965648939309596758992... $v_{rot}/c = 0,070501532377454639860328775364899$ $v_{rot} = 21135827,684203710267232740254503 \text{ m/s} = 21135,8277 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 468160,42124478343051766323233437 \text{ m/s}$ $v_{climb} = 468,1604 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 331,039 \text{ km/s}$
	81°	<b>0,156434465040230869010105</b> <b>31946717</b> $(\cos\phi)/(2\pi) =$ $=0,02489731838108903435484$ <b>1502930117</b>	0.079522940598973804892724421154906775310115207065009741007176... $v_{rot}/c = 0,07952294059897380489272442115491$ $v_{rot} = 23840377,829554349246402280534385 \text{ m/s} = 23840,4 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 593561,47714787099719017703866065 \text{ m/s}$ $v_{climb} = 593,5615 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 419,711 \text{ km/s}$
	80°	<b>0,173648177666930348851716</b> <b>62676931</b> $(\cos\phi)/(2\pi) =$ $=0,02763696583459163024882$ <b>2422362346</b>	0.088619711790676205327338629151343180429432664295312521755495... $v_{rot}/c = 0,088619711790676205327338629151343$ $v_{rot} = 26567521,224978401077195542231529 \text{ m/s} = 26567,52 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 734245,6764045160471513309559811 \text{ m/s}$ $v_{climb} = 734,2457 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 519,19 \text{ km/s}$
	79°	<b>0,190808995376544812405140</b> <b>48795839</b> $(\cos\phi)/(2\pi) =$ $=0,03036819480057570985313$ <b>6802396938</b>	0.097801190307943836001438986564057051864042361089181828754607... $v_{rot}/c = 0,097801190307943836001438986564057$ $v_{rot} = 29320059,237744259520820285319051 \text{ m/s} = 29320,1 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 890397,27049623703270774917444291 \text{ m/s}$ $v_{climb} = 890,3973 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 629,606 \text{ km/s}$
	78°	<b>0,207911690817759337101742</b> <b>28440513</b>	0.107077047815431524891573511759277128251736618733142730990486... $v_{rot}/c = 0,107077047815431524891573511759277$

		$(\cos\phi)/(2\pi) =$ $=0,03309017332024022532211$ $9919992631$	$V_{rot} = 32100891,359971747177933006577923$ m/s = 32100,9 km/s $V_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1062224,0588356670713883098365441$ m/s $V_{climb} = 1062,2241$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 751,1059$ km/s
	77°	$0,224951054343864998051107$ $2083428$ $(\cos\phi)/(2\pi) =$ $=0,03580207225255968883501$ $2971259894$	$0.116457327084702694566820976533792415862359393619564735642381...$ $v_{rot}/c = 0,11645732708470269456682097653$ $V_{rot} = 34913028,338832995003410505800788$ m/s = 34913,028 km/s $V_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1249958,7631425628566313942052927$ m/s $V_{climb} = 1249,9588$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 883,854$ km/s
	76°	$0,241921895599667722560442$ $37410035$ $(\cos\phi)/(2\pi) =$ $=0,03850306552684856102902$ $332888899$	$0.125952489438069937853005346598758863645937973547879337155578...$ $v_{rot}/c = 0,12595248943806993785300534659875886$ $V_{rot} = 37759606,399858025444859715543756$ m/s = 37759,6 km/s $V_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1453860,5994817438412625883286501$ m/s $V_{climb} = 1453,8606$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 1028,035$ km/s
Neutron star T = 0,001s f = 1000Hz r <sub>min</sub> = 10km,	75,3139°	$0,253523277221852020522635$ $11241255$ $(\cos\phi)/(2\pi) =$ $=0,04034948275871466336624$ $4713765043$	$V_{rot} \text{ circl mim} /c = 0,13255287784185819957396727665924$ $V_{rot} \text{ circl mim} = 39738353,06318440493773420268124$ m/s $V_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1603421,99178267517677875257418$ m/s = 1603,422 km/s average $v_{transl} = v_{climb} \sin \epsilon^\circ = 1603,422 * \sin 45^\circ = 1133,791$ km/s
	75°	$0,258819045102520762348898$ $83762405$ $(\cos\phi)/(2\pi) =$ $=0,04119233039439038414103$ $3556846236$	$0.135573466417955067974877154676437407574635323374335527425142...$ $v_{rot}/c = 0,1355734664179550679748771546764374$ $V_{rot} = 40643902,737019205161745504448364$ m/s = 40643,9 km/s $V_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1674217,0700607627288041337014832$ m/s $V_{climb} = 1674,2171$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 1183,850$ km/s
	74°	$0,275637355816999185649971$ $5746113$ $(\cos\phi)/(2\pi) =$ $=0,04386904767905501118641$ $8070235537$	$0.145331716344645600366723958716478652875612833791316124522891...$ $v_{rot}/c = 0,1453317163446456003667239587$ $V_{rot} = 43569352,46832007967282587699096$ m/s = 43569,4 km/s $V_{climb} = v_{rot} (\cos\phi)/(2\pi) = 1911346,0007782867139710264828404$ m/s

			<b>V<sub>climb</sub> = 1911,3460 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =1351,526 km/s</b>
	<b>73°</b>	<b>0,292371704722736728097468</b> <b>69537714</b> <b>(cosφ)/(2 π) =</b> <b>=0,04653240202682759073917</b> <b>595903321</b>	<b>0.155239286525448971273996291386331459527282777439583192240504...</b> <b>v<sub>rot</sub>/c = 0,15523928652544897127399629138633</b> <b>v<sub>rot</sub> = 46539567,285630626651802739677493m/s = 46539,57km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =2165597,8550895576071908397319786 m/s</b> <b>v<sub>climb</sub> =2165,5979 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =1531,309 km/s</b>
	<b>72°</b>	<b>0,309016994374947424102293</b> <b>41718282</b> <b>(cosφ)/(2 π) =</b> <b>=24373580,0491815821541732</b> <b>98367374393707347</b>	<b>0.165308881998387903439479120026767317714472488380888307453906...</b> <b>v<sub>rot</sub>/c = 0,16530888199838790343947912</b> <b>v<sub>rot</sub> =49558356,063528661609588099632272 m/s=49558,4 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) = 2437358,3601642072962811913981365 m/s</b> <b>v<sub>climb</sub> =2437,358 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =1723,47 km/s</b>
	<b>71°</b>	<b>0,325568154457156668714008</b> <b>93579472</b> <b>(cosφ)/(2 π) =</b> <b>=0,05181578109516216042074</b> <b>419853012</b>	<b>0.175553941838060411400905071631795321859383125932811547829616...</b> <b>v<sub>rot</sub>/c = 0,17555394183806041140090507163</b> <b>v<sub>rot</sub> =52629747,735221168686368554848924 m/s=52629,75 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =2727051,4877418265600993462429554 m/s</b> <b>v<sub>climb</sub> =2727,051 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =1928,316 km/s</b>
<b>fí = π/2.57142857= 70°</b>	<b>70°</b>	<b>0,342020143325668733044099</b> <b>61468226</b> <b>(cosφ)/(2 π) =</b> <b>=0,05443419644727869355514</b> <b>9967932637</b>	<b>0.185988723815849022300232841377413792364386228762834947312944...</b> <b>0,185988723815849022300232841377</b> <b>v<sub>rot</sub>/c =0,185988723815849022300232841377</b> <b>v<sub>rot</sub> = 55758016,673036517752283617488735 m/s = 55758,0167 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) = 3035142,8330907105752273290514717 m/s</b> <b>v<sub>climb</sub> =3035,1428 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° = 2146,17 km/s</b>
	<b>69°</b>	<b>0,358367949545300273484137</b> <b>78941347</b> <b>(cosφ)/(2 π) =</b>	<b>0.196628401694940002866400053496715023486129018637067431889057...</b> <b>0,19662840169494000286640005349671502348</b> <b>v<sub>rot</sub>/c =0,19662840169494000286640005349671502348</b>

		=0,05703603061584148399652 4125304145	$v_{rot} = 58947711,856737429621845117648897 \text{ m/s} = 58947,7119 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 3362143,4981946780860871259822083 \text{ m/s}$ $v_{climb} = 3362,1435 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 2377,3945 \text{ km/s}$
Neutron star T = 0,001s f = 1000Hz r <sub>max</sub> = 15km,	68,79735°	0,361667690813356360640756 53636272 (cosφ)/(2π) = =0,05756120074957692910051 7270459969	$v_{rot \text{ circl max}} / c = 0,1988293167627872993609509149889$ $v_{rot \text{ circl max}} = 59607529,59477660740660130402187 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 3431080,97719128423917370897567 \text{ m/s} = 3431,081 \text{ km/s}$ average $v_{transl} = v_{climb} \sin \varepsilon^\circ = 3431,081 * \sin 45^\circ = 2426,141 \text{ km/s}$
	68°	0,374606593415912035414963 7745012 (cosφ)/(2π) = =0,05962049105695825397267 5499032576	0.207489168225684948345812096464790187553290447685019956277866... <b>0,20748916822568494834581209646479018755</b> $v_{rot}/c = 0,20748916822568494834581209646479018755$ $v_{rot} = 62203687,750753589398194042405076 \text{ m/s} = 62203,6878 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 3708614,4092536280648771502316964 \text{ m/s}$ $v_{climb} = 3708,6144 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 2622,3864 \text{ km/s}$
	67°	0,390731128489273755062084 58888909 (cosφ)/(2π) = =0,06218679051894240884617 8710373583	0.218588360161304046262455466832795250429697582641401147406284... <b>0,2185883601613040462624554668327952504297</b> $v_{rot}/c = 0,2185883601613040462624554668327952504297$ $v_{rot} = 65531141,782946616514367237517103 \text{ m/s} = 65531,1418 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 4075171,3865232153936722749349765 \text{ m/s}$ $v_{climb} = 4075,1714 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 2881,581 \text{ km/s}$
	66°	0,406736643075800207753985 9903415 (cosφ)/(2π) = =0,06473414728211752712943 3089629846	0.229944593319214769283095123057183521523081091270580895879991... <b>0,2299445933192147692830951230571835215231</b> $v_{rot}/c = 0,2299445933192147692830951230571835215231$ $v_{rot} = 68935654,834977774313281984789071 \text{ m/s} = 68935,6548 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 4462490,8330766684572208976359625 \text{ m/s}$ $v_{climb} = 4462,4908 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 3155,458 \text{ km/s}$
f <sub>i</sub> = π/2.76923076923 =	65°	0,422618261740699436186978	

65°		48964773 $(\cos\phi)/(2\pi) =$ =0,06726178539693674661119 4276241963	0.241577919126684096973848691726649936311538644581330743459550... <b>0,241577919126684096973848691</b> $v_{rot}/c = 0,241577919126684096973848691$ $v_{rot} = 72423238,173513838821300460794972 \text{ m/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 4871316,3037781250609652002206478 \text{ m/s}$ $v_{climb} = 4871,316 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 3444,54 \text{ km/s}$
$f_i = \pi/2.8125 = 64^\circ$	64°	0,438371146789077417452734 54065827 $(\cos\phi)/(2\pi) =$ =0,06976893492034451312285 0071727462	0.2535100032041404810619179228232 0.253510003204140481061917922823240953562766969137556959069307... <b>0,2535100032041404810619179228232</b> $v_{rot}/c = 0,2535100032041404810619179228232$ $v_{rot} = 76000386,988157150594854824277361 \text{ m/s} = 76000,387 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 5302466,053697734181244169499053 \text{ m/s}$ $v_{climb} = 5302,466 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 3749,41 \text{ km/s}$
$180/2,81690140845 = 63,900000000001^\circ$	63,9°	0,439939169855915140833045 76528102 $(\cos\phi)/(2\pi) =$ =0,07001849354231385018391 3679461913	0.254720530502096569804559171822028443558904964570508421300898... <b>0,254720530502096569804559171822</b> $v_{rot}/c = 0,254720530502096569804559171822$ $v_{rot} = 76363293,942287504815077373726962 \text{ m/s} = 76363,294 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 5346842,8037678720104498302946058 \text{ m/s}$ $v_{climb} = 5346,8428 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 3780,789 \text{ km/s}$
$f_i = \pi/3 = 60$ stupňov	60°	0,5 $(\cos\phi)/(2\pi) =$ =0,07957747154594766788444 1881686257	0.304728158522405804988532559989798534395286045112822783532734... $v_{rot}/c = 0,30472815852240580498853255998979853439528$ $v_{rot} = 91355203,665245684350980837972135 \text{ m/s} = 91355,204 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 7269816,120 \text{ m/s}$ $v_{climb} = 7269,816 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 5140,536 \text{ km/s}$
	59°	0,515038074910054210081631 93639814	0.318551835664780456174193289801635673880790343754972419379154... $v_{rot}/c = 0,31855183566478045617419328980163567$

		$(\cos\phi)/(2\pi) =$ $=0,08197085550246900476007109600$ <b>5015</b>	$v_{rot} = 95499437,814356596986822682516548$ m/s = 95499,4378 km/s $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 7828170,6176476490036263375754919$ m/s $v_{climb} = 7828,1706$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 5535,35$ km/s
	58°	<b>0,529919264233204954046781</b> <b>15181609</b> $(\cos\phi)/(2\pi) =$ $=0,08433927034233478188574327909$ <b>3773</b>	0.332852260246659094685012496781253640967548895621120049768867... <b>0,332852260246659094685012496781253640967</b> $v_{rot}/c = 0,332852260246659094685012496781253640967$ $v_{rot} = 99786597,250201616283674632170693$ m/s = 99786,59725 km/s $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 8415928,8020264346749535117691155$ m/s $v_{climb} = 8415,9288$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 5950,96$ km/s
	57°	<b>0,544639035015027082224083</b> <b>69208157</b> $(\cos\phi)/(2\pi) =$ $=0,08668199462344142641037710791$ <b>7454</b>	0.347670443615053024906944129218651334488014236004770095297750... <b>0,347670443615053024906944129218651334488</b> $v_{rot}/c = 0,347670443615053024906944129218651334488$ $v_{rot} = 104228976,86530715213718800176693$ m/s = 104228,9769 km/s $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 9034775,6122453553799141044896179$ m/s $v_{climb} = 9034,7756$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 6388,551$ km/s
	56°	<b>0,559192903470746830160428</b> <b>13998599</b> $(\cos\phi)/(2\pi) =$ $=0,08899831472927843354563490820$ <b>4638</b>	0.363052015987941542976649443075091058011519245215177091963385... <b>0,3630520159879415429766494430750910580115</b> $v_{rot}/c = 0,3630520159879415429766494430750910580115$ $v_{rot} = 108840256,25488029352928237314379$ m/s = 108840,2563 km/s $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 9686599,3813871519841958331379241$ m/s $v_{climb} = 9686,5994$ km/s average $v_{transl} = v_{climb} \sin 45^\circ = 6849,460$ km/s
	55°	<b>0,573576436351046096108031</b> <b>91282616</b> $(\cos\phi)/(2\pi) =$ $=0,09128752508630286862404550849$ <b>3706</b>	0.379047978240177071958459592216686240078807782195906368778044... <b>0,3790479782401770719584595922166862400788</b> $v_{rot}/c = 0,3790479782401770719584595922166862400788$ $v_{rot} = 113635725,09655319875766947504411$ m/s = 113635,7251 km/s

			$V_{\text{climb}} = v_{\text{rot}} (\cos\phi) / (2\pi) = 10373524,105451816599426702963116 \text{ m/s}$ $V_{\text{climb}} = 10373,5241 \text{ km/s}$ average $v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 7335,189 \text{ km/s}$
	54°	<b>0,587785252292473129168705 95463907</b> $(\cos\phi) / (2\pi) =$ $= 0,09354892837886390332129190661$ 5298	0.395715611750978600029725609456302308682079065376417368690490... <b>0,3957156117509786000297256094563023086821</b> $v_{\text{rot}/c} = 0,3957156117509786000297256094563023086821$ $v_{\text{rot}} = 118632555,91579955840831031352436 \text{ m/s} = 118632,5559 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi) / (2\pi) = 11097948,476768700147212056262624 \text{ m/s}$ $V_{\text{climb}} = 11097,9485 \text{ km/s}$ average $v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 7847,435 \text{ km/s}$
	53°	<b>0,601815023152048279917977 00044149</b> $(\cos\phi) / (2\pi) =$ $= 0,09578183576161191794690970665$ 5076	0.413119588304284127254042024818710764709544094771888524174559... <b>0,41311958830428412725404202481871076471</b> $v_{\text{rot}/c} = 0,41311958830428412725404202481871076471$ $v_{\text{rot}} = 123850136,82568939043987404905549 \text{ m/s} = 123850,1368 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi) / (2\pi) = 11862593,464491345202163081817685 \text{ m/s}$ $V_{\text{climb}} = 11862,5935 \text{ km/s}$ average $v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 8388,120 \text{ km/s}$
	52°	<b>0,615661475325658279668811 09284366</b> $(\cos\phi) / (2\pi) =$ $= 0,09798556706932746793318540217$ 6855	0.431333335712503600432023485890084642865573418727826266874255... <b>0,43133333571250360043202348589008464286</b> $v_{\text{rot}/c} = 0,43133333571250360043202348589008464287$ $v_{\text{rot}} = 129310480,93059063570736618274869 \text{ m/s} = 129310,4809 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi) / (2\pi) = 12670560,801991379304817026233654 \text{ m/s}$ $V_{\text{climb}} = 12670,5608 \text{ km/s}$ average $v_{\text{transl}} = v_{\text{climb}} \sin 45^\circ = 8959,439 \text{ km/s}$
	51°	<b>0,629320391049837452705902 45827997</b> $(\cos\phi) / (2\pi) =$ $= 0,10015945102410619858640314656$ 053	0.450440733884034951042720585336522598434182084472832960300761... <b>0,450440733884034951042720585336522598434</b> $v_{\text{rot}/c} = 0,450440733884034951042720585336522598434$ $v_{\text{rot}} = 135038734,79441872493100686728508 \text{ m/s} = 135038,7348 \text{ km/s}$ $V_{\text{climb}} = v_{\text{rot}} (\cos\phi) / (2\pi) = 13525405,543998847911020546773589 \text{ m/s}$

			<b>V<sub>climb</sub> =13525,4055 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =9563,906 km/s</b>
	50°	<b>0,642787609686539326322643 40990726</b> <b>(cosφ)/(2 π) =</b> <b>=0,10230282543983659756836 144428118</b>	<b>0.470538242982286784213163470243639059508461902585435700422035...</b> <b>0,47053824298228678421316347024363905950846190</b> <b>v =141063816,44666100550017987269996 m/s=141063,816 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =14431226,98982 m/s</b> <b>V<sub>climb</sub> = 14431,227 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =10204,418 km/s</b>
	49°	<b>0,656059028990507284782495 96402342</b> <b>(cosφ)/(2 π) =</b> <b>=0,10441503742390829920393342651 164</b>	<b>0.491737604014022502909715177407920663244906940262248117011060...</b> <b>0,491737604014022502909715177407920663244906940</b> <b>v<sub>rot</sub>/c = 0,491737604014022502909715177407920663244906940</b> <b>v<sub>rot</sub> = 147419224,99839447261461566511475 m/s = 147419,2250 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =15392783,895210916737681967718408 m/s</b> <b>V<sub>climb</sub> =15392,7839 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =10884,342 km/s</b>
	48°	<b>0,669130606358858213826273 33068678</b> <b>(cosφ)/(2 π) =</b> <b>=0,10649544357608949831118640842 987</b>	<b>0.514169308786758038063079998523898222904356994379319410544104...</b> <b>0,514169308786758038063079998523898222904357</b> <b>v<sub>rot</sub>/c =0,514169308786758038063079998523898222904357</b> <b>v<sub>rot</sub> = 154144080,90934319008218831180785 m/s =154144,0809 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =16415642,271069132105538295478463 m/s</b> <b>V<sub>climb</sub> =16415,6423 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =11607,612 km/s</b>
	47°	<b>0,681998360062498500442225 78471113</b> <b>(cosφ)/(2 π) =</b> <b>=0,10854341018451289356723930589 27</b>	<b>0.537987120650597373732519087630134274136576692766403561879564...</b> <b>0,5379871206505973737325190876301342741365767</b> <b>v<sub>rot</sub>/c = 0,5379871206505973737325190876301342741365767</b> <b>v<sub>rot</sub> = 161284481,27218514583961653181252 m/s = 161284,4813 km/s</b> <b>v<sub>climb</sub> = v<sub>rot</sub> (cosφ)/(2 π) =17506367,607123180207801390353896 m/s</b> <b>V<sub>climb</sub> =17506,3676 km/s</b> <b>average v<sub>transl</sub> = v<sub>climb</sub> sin 45° =12378,871 km/s</b>



	46°	<p>0,694658370458997286656406 29942269</p> <p><math>(\cos\phi)/(2\pi) =</math> =0,11055831341871046119295020672 757</p>	<p>0.563374056350870713618120737276089953294418249855650027444279... <b>0,5633740563508707136181207372760899532944182</b></p> <p><math>v_{rot}/c = 0,5633740563508707136181207372760899532944182</math></p> <p><math>v_{rot} = 168895293,12685804167579048916874 \text{ m/s} = 168895,2931 \text{ km/s}</math></p> <p><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 18672778,752464146156624333259705 \text{ m/s}</math> <math>v_{climb} = 18672,77875 \text{ km/s}</math></p> <p>average <math>v_{transl} = v_{climb} \sin 45^\circ = 13203,648 \text{ km/s}</math></p>
	45°	<p>0,707106781186547524400844 36210485</p> <p><math>(\cos\phi)/(2\pi) =</math> =0,11253953951963825869439989887 584</p>	<p>0.590550441005343139857616745859240142449175429864725911211494... <b>0,5905504410053431398576167458592401424491754</b></p> <p><math>v_{rot}/c = 0,5905504410053431398576167458592401424491754</math></p> <p><math>v_{rot} = 177042568,28197581103135269426303 \text{ m/s} = 177042,5683 \text{ km/s}</math></p> <p><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 19924289,109827671679449851512959 \text{ m/s}</math> <math>v_{climb} = 19924,2891 \text{ km/s}</math></p> <p>average <math>v_{transl} = v_{climb} \sin 45^\circ = 14088,600 \text{ km/s}</math></p>
	44°	<p>0,719339800338651139356054 67445671</p> <p><math>(\cos\phi)/(2\pi) =</math> =0,11448648498663337526514009114 531</p>	<p>0.6197849727861213103167083421650774529216017432977111116326678... <b>0,6197849727861213103167083421650774529216017</b></p> <p><math>v_{rot}/c = 0,6197849727861213103167083421650774529216017</math></p> <p><math>v_{rot} = 185806860,42301441590602675236675 \text{ m/s} = 185806,8604 \text{ km/s}</math></p> <p><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 21272374,336232923004972166035402 \text{ m/s}</math> <math>v_{climb} = 21272,3743 \text{ km/s}</math></p> <p>average <math>v_{transl} = v_{climb} \sin 45^\circ = 15041,84 \text{ km/s}</math></p>
	43°	<p>0,731353701619170483287543 60827562</p> <p><math>(\cos\phi)/(2\pi) =</math> =0,11639855676124607995102115602 631</p>	<p>0.651410273235464532154914358266781752178405001571186583900534... <b>0,6514102732354645321549143582667817521784050</b></p> <p><math>v_{rot}/c = 0,6514102732354645321549143582667817521784050</math></p> <p><math>v_{rot} = 195287886,97971152486654181224406 \text{ m/s} = 195287,8870 \text{ km/s}</math></p> <p><math>v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 22731228,197391761216247022547971 \text{ m/s}</math> <math>v_{climb} = 22731,2282 \text{ km/s}</math></p> <p>average <math>v_{transl} = v_{climb} \sin 45^\circ = 16073,406 \text{ km/s}</math></p>
	42°	<p>0,743144825477394235014697 04897426</p>	<p>0.685845329136720827536274917044548895376948283201177384115602...</p>

		$(\cos\phi)/(2\pi) =$ $=0,11827517240789117052444638128$ 938	<b>0,6858453291367208275362749170445488953769483</b> $v_{rot}/c = 0,6858453291367208275362749170445488953769483$ $v_{rot} = 205611257,02971655494689394154437 \text{ m/s} = 205611,2570 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 24318706,874192950950445221869163 \text{ m/s}$ $v_{climb} = 24318,7069 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 17195,923 \text{ km/s}$
	41°	<b>0,754709580222771997942984</b> 21956102 $(\cos\phi)/(2\pi) =$ $=0,12011576029126349491717672038$ 87	0.723628905896127114622943945099559347167951654003695060918427... <b>0,72362890589612711462294394509955934716795165</b> $v_{rot}/c = 0,72362890589612711462294394509955934716795165$ $v_{rot} = 216938488,37845064037326010849745 \text{ m/s} = 216938,4884 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 26057731,46801502859807768072853 \text{ m/s}$ $v_{climb} = 26057,7315 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 18425,599 \text{ km/s}$
	40°	<b>0,766044443118978035202392</b> 65055542 $(\cos\phi)/(2\pi) =$ $=0,12191975975046360272519$ 486150119	0.765471182644718647941843491555499291792214259709542355577987... $v_{rot}/c = 0,76547118264471864794184349155549929179$ $v = 229482487,37322714418492190138458 \text{ m/s} = 229482,487 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 27978449,727482650 \text{ m/s}$ $v_{climb} = 27978,4497 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 19783,752 \text{ km/s}$
	39°	<b>0,777145961456970879979937</b> 7436724 $(\cos\phi)/(2\pi) =$ $=0,12368662126978048642538$ 717137345	0.812337240247962577500438231077154664761882437709082223948385... $v_{rot}/c = 0,81233724024796257750043823107715466476$ $v_{rot} = 243532577,97887323060087187337175 \text{ m/s} = 243532,577 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi)/(2\pi) = 30121721,7393 \text{ m/s}$ $v_{climb} = 30121,722 \text{ km/s}$ average $v_{transl} = v_{climb} \sin 45^\circ = 21299,274 \text{ km/s}$
	38°	<b>0,788010753606721956693977</b> 78783585 $(\cos\phi)/(2\pi) =$ $=0,12541580664607939022665$	0.865589873165299252596244857083262245043548736323475707999352... <b>0,8655898731652992525962448570832622</b> $v_{rot}/c = 0,8655898731652992525962448570832622$ $v_{rot} = 259497315,69613330324139112727477 \text{ m/s} = 259497,316 \text{ km/s}$

		934953968	$v_{climb} = v_{rot} (\cos\phi) / (2 \pi) = 32545065,170522876799874203488266 \text{ m/s}$ $v_{climb} = 32545,065 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 23012,836 \text{ km/s}$
	37°	0,798635510047292846284000 80406894 $(\cos\phi) / (2 \pi) =$ =0,12710678915274369860738 762826401	0.927252176787297809060361720101420332427917437377393303373237... <b>0,927252176787297809060361720</b> $v_{rot}/c = 0,927252176787297809060361720$ $v_{rot} = 277983209,26491455335622051040791 \text{ m/s} = 277983,209 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi) / (2 \pi) = 35333553,168038522770352834960169 \text{ m/s}$ $v_{climb} = 35333,55 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 24984,593 \text{ km/s}$
	36°	0,809016994374947424102293 41718282 $(\cos\phi) / (2 \pi) =$ =0,12875905370012096625181 62753936	1.000539256342261797177587246863717366813671224737318366317102... $v_{rot}/c = 1,0005392563422617971775872468637$ $v_{rot} = 299954122,98433875345536634324651 \text{ m/s} = 299954,123 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi) / (2 \pi) = 38621809,029211864455641499894486 \text{ m/s}$ $v_{climb} = 38621,809 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 27309,743 \text{ km/s}$
	35°	0,819152044288991789684488 38591684 $(\cos\phi) / (2 \pi) =$ =0,13037209699242421597040 718095714	1.091092423269137244471728663728448923118127020887074303695945... $v_{rot}/c = 1,091092423269137244471728663728448923118$ $v_{rot} = 327101279,47703105005952644760807 \text{ m/s} = 327101,279 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi) / (2 \pi) = 42644879,734326 \text{ m/s}$ $v_{climb} = 42644,8797 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 30154,4834 \text{ km/s}$
	32,123°	0,846908536072527033724612 6886004 $(\cos\phi) / (2 \pi) =$ =0,13478967986266342820631 84886597	$v_{rot}/c = 1,89550406058$ $v_{rot} = 568257821,47025910564 \text{ m/s} = 568257,8215 \text{ km/s}$ $v_{climb} = v_{rot} (\cos\phi) / (2 \pi) = 76595289,835430773270630504574016 \text{ m/s}$ $v_{climb} = 76595,2898 \text{ km/s}$ $\text{average } v_{transl} = v_{climb} \sin 45^\circ = 54161,0488 \text{ km/s}$

## The proposed views

In short, when four protons fuse to become one helium nucleus, two of which must be converted into neutrons, and each such transition depends on the penetration of the two electrons from the Universe, to the interior of the star .

Penetration  $10^{38}$  to  $10^{58}$  of high energy electrons from the Universe to the interior of the star, transferred huge amounts of energy from the Universe into a small space of the star.(Also at the beginning of ignition stars in the nebulae too ... there where stars are born ).

This huge cosmic energy is responsible for thermonuclear fusion.

Currently prevailing opinion that the star itself is the source of the nuclear fusion powering the star.

In fact, without a high-energy electrons from other stars of the Universe, single star can not be able to a nuclear fusion, because without a high-energy electrons from other stars, her stellar protons cannot be transform into her neutrons.

The idea that inside the star, the mass converted to energy and energy into mass, without regard to high-energy electrons from the surrounding Universe, so finally falls. It is unsustainable.

Neutronization, i.e. injection of free electrons to protons to form neutrons and neutrinos, as a consequence of the Pauli principle can therefore simply replace with the above considerations. Although the inverse beta-decay is common to both considerations, the qualitative difference is obvious.

The free electrons in the stars are replaced by high-energy electrons from the Universe and neutrinos are replaced by waves which spread in the opposite direction to the movement of high-energy electrons from the Universe, i.e.

by kinetic energy ( of wave = of neutrinos ) =  $E_w = mc^2 [\ln | 1 + v / c | - (v / c) / (1 + v / c)]$  against direction of motion of electron (from the interior of the star, to the Universe), where  $v$  is velocity of electron.

Moreover, formation of a supernova is only possible, if the increase the number of penetrating high-energy electrons from the Universe.

At the end of life star :

1. high-energy electrons from the Universe are penetrating into the star,

2. by waves (= by electron neutrinos) propagated from inside of star to her surface, the star expands, more and more. More and more active are mutual repellent protons of star. In combination with neutrino waves, star more and more expands.

Gradually grows, its radius will expand about 100 times ( $R_{RG} = 100 R_S \dots$  Arcturus) and due to conservation of angular momentum

( $L = I \cdot \omega = \text{const}$ ) decreases rotation of the magnified star from  $\omega_s = 2,8 \cdot 10^{-6}$  Hz on  $\omega_{RG} = 10^{-8}$  Hz. This creates a Red Giant.

This makes that the high-energy electrons from the Universe easily penetrate into the interior of stars (electrons have a small radius of force reach  $r_e = 2,840401487397554751560630135382e-24$  m in direction of motion from the Universe) and in particular the impact of  $10^6$  times more (since the volume of Red Giant is a  $100^3 = 10^6$  times greater).

Therefore into the interior of Red Giant can easily penetrate slower electrons from the universe too. Total number all electrons from the Universe is approximately  $10^7$  times more than in the middle of life stars. As a result, inside the Red Giant arises approximately  $10^7$  times more neutrons per second.

After some time, almost all protons inside the Red Giant will turn into neutrons (repulsive force of protons is replaced without force, or a weak attractive force of neutrons respectively).

After the conversion of protons into neutrons, leads to of neutrons concentration and a very dense neutron star with a radius of  $R_{ns} = 10\ 000$  km, and due to conservation of angular momentum,

neutron star spinning at  $\omega_{ns} = 1$  Hz to 716 Hz.<sup>[17]</sup>

Together with this reduction of the Red Giant in neutron star, arises emission neutrino waves in the opposite direction of movement of electrons from the Universe.

This creates a shock wave which ejects the remnants of star into Universe - thus creating a circular cloud of gas that is growing with time after the supernova explosion.

The remaining protons, which did not create with electrons from the Universe neutrons,

create hydrogen atoms - electron capture (K-capture).

And either because some electrons from the Universe have a lower speed of  $0,003 c - 0,6c$  or because they are located in areas distant from the center of the star where the pressure is significantly lower. These hydrogen atoms are entrained by the neutrino waves propagating from inside of the star out into Universe.<sup>[16]</sup>

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