On the Dzhanibekov Effect, the solar cycle, the anomalous advance in the perihelion precession of Mercury, and the quadrupole moment of the Sun

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Abstract: The anomalous advance of the perihelion precession of Mercury has been enigmatic ever since it was discovered by Le Verrier in 1859. An accurate theoretical mathematical relation for the anomaly was obtained both by Paul Gerber in 1898 and Albert Einstein in 1915. The search for its cause generated various hypotheses, including a gravitational potential flowing at the speed of light by Gerber, curved space-time by Einstein, and a proposal for an elusive planet, Vulcan, based on Le Verrier's search for intramercurial matter. All parallel attempts to link the phenomenon classically to the quadrupole moment of the Sun were viewed as pointless, because a gaseous Sun was believed to have a quadrupole moment, J_2, on the order of only 1.6×10^{-7}. This value is much too small to account for the precession. However, in the liquid metallic hydrogen solar model, a quadrupole moment for an inertially asymmetric solid solar core ($J_2 = 1.7 \times 10^{-4}$) can be computed from the anomalous advance. This value can then be combined with the known 430 nHz rotational frequency of the solar core obtained from helioseismology and the 11 year solar cycle. Subsequently, the Dzhanibekov effect can be utilized to calculate all three inertial moments of the solar core. By means of classical mechanics, the anomalous advance of the perihelion precession of Mercury is thereby fully accounted for and simultaneously used to constrain the solar core while accounting for the solar cycle using the Dzhanibekov effect. These findings invalidate the work of Einstein, as the cause for the anomalous advance of the perihelion of Mercury is not curved spacetime. The consequences for astronomy and astrophysics are profound.

Key words: Solar cycle, perihelion of Mercury, intermediate axis theorem, Dzhanibekov Effect, solar quadrupole moment, General Relativity

I. Introduction

It is well known that the interior of the Sun experiences solid body rotation at a frequency of $\sim$ 430 nHz (Schou, 1998; Thompson et al., 2003). The rotation is found to be consistent across all reliably measured latitudes ($< \pm 75^\circ$) and extends throughout the central region of the Sun. This finding is incompatible with a fully gaseous solar body, as such a structure would be unable to support the internal cohesive forces required in solid body rotation. Clearly, the presence of solid body rotation directly points to the existence of a rigid solar core comprised of condensed matter (Robitaille, 2013). In the liquid metallic hydrogen solar model (LMHSM), it is thus reasonable to set the radius of the solar core, R_{core} at $\approx 0.65 R_\odot$, since a radiative zone does not exist in this framework (Robitaille, 2013; Robitaille and Robitaille, 2013).§

The hydrogen contained in the solar core adopts a body centered cubic lattice as the most stable structure under these conditions of extreme pressure. Setsuo Ichimaru (1991, 1999, 2000, 2017) has also employed this lattice structure for the core but set its density at 150 g/cm^3, in agreement with the Standard Solar Model (Bahcall et al. 1995, 2005). In so doing, Ichimaru deprived the Sun of sufficient density to build the semi-metallic Type I material required to account for the production of a solar

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§Schou et al. (1998) set the reliable solid body rotation of 430 nHz at a radius of $< 0.7 R_\odot$. However, from published Gong measurements (https://gong.nso.edu/gallery/disk2k10/data/resource/torsional/gongcut.png), a more reliable measure of the core would begin at about $< 0.65 R_\odot$. This is the value which will be adopted for this analysis. The approach presented below will remain valid if a slightly different value for R_{core} (e.g. $R_{core} = 0.7 R_\odot$) is adopted. Altering the values of R_{core}, ρ_{core}, and M_{core} will simply alter the final values for the moments of inertia I_1, I_2, and I_3.

spectrum at the level of the photosphere (Robitaille, 2011a,b; Robitaille, 2013). As such, the density advanced by Ichimaru cannot be correct. Conversely, if the combined density of the convective zone and tachocline layer averages about 1.3 g/cm^3 and if these layers occupy the outer 35% of the solar radius, then, given the average density of the Sun at 1.41 g/cm^3, the core should have an average density on the order of $\sim$ 1.7 g/cm^3. Should only hydrogen be present, this would correspond to a Wigner-Seitz radius of r_S = 0.62 Å, just slightly greater than the Bohr radius at $\sim$ 0.53 Å. Consequently, within the LMHSM, very little change in density occurs within the solar body when moving from the convective zone to the core.* This is in keeping with the concept that liquid stars are essentially incompressible, as initially advanced by James Jeans (1928, 1933).

There is one more aspect of the solar core which requires consideration. In the Standard Solar Model (Bahcall et al. 1995, 2005), a gaseous solar core must maintain slowly changing densities with a relatively spherical and uniform distribution of mass at each value of the solar radius. In such a model there is no means to restrict the motion of individual atoms to a particular position in the solar core. All atoms remain unconstrained in their position with the only possible means of altering their placement arising from gravitational forces and the process of gravitational settling. There is no possibility of generating three separate moments of inertia along x, y, and z axes within the solar core based either on deviations from spherical geometry or alternatively, on a varying distribution of non-hydrogen elements within a spherical core. In fact, because gases lack internal cohesive forces in such a system, it is impossible to generate a quadrupole moment, expressed as the dimensionless coefficient, J_2. As such, the geometry or inhomogeneity of the solar core cannot be used to account for the 11 year solar cycle or the overarching 22 year Hale cycle in gaseous stars.† This is not the case in the LMHSM, as heavy elements synthesized in the core can seed pockets of increased density in this region of the Sun.

Within a condensed Sun, elements heavier than hydrogen can occupy intercalate zones within Type I and Type II metallic hydrogen and be released during solar activity (Robitaille and Robitaille, 2013). This does not provide a trigger for the solar cycle. That trigger appears to come from the solar core, as this region of the Sun can be subject to the Dzhanibekov effect, also known as the intermediate axis theorem and first described by Louis Poinsot (1834). If the core is described using a 3-axis system, then rotation about the primary and third principle moments of inertia would be stable, but rotation about the intermediate moment of inertia becomes unstable. The presence of a quadrupole moment, J_2, in the solar core could simultaneously account for the solar cycle through the Dzhanibekov effect and for the anomalous advance in the precession of Mercury, should the z-direction act as the intermediate axis (Pohlmann et al. 2024).‡ This can occur even if the solar core is perfectly spherical, as now the distribution of

*In the LMHSM, the photosphere has a density of $\sim$ 0.6 – 0.8 g/cm^3. Yet, this layer occupies only the small outer skin of the Sun. For instance, the average Wilson depression in a sunspot is only $\sim$ 600 km. This should help define the lower bounds of the photosphere and represents only 0.086% of the solar radius. As a consequence, the photospheric density has essentially no effect on the calculation of the average solar density which is established by the core and convective zone.

†In the Standard Solar Model, the presence of a powerful solar dynamo is advanced to account for the solar cycle. The validity of this scenario has been questioned since it is not possible to build up a dynamo in a fully gaseous object. In the laboratory, dynamos are produced using conductive liquids subjected to specific geometries in order to create a boundary between conductors and insulators (see Robitaille, 2013, for a detailed discussion).

‡The concepts presented in this abstract were preliminary in linking the solar cycle and the anomalous advance in perihelion precession of Mercury to the solar core. This framework is now refined and superseded in this presentation. Floriano Pohlmann first proposed that the Dzhanibekov effect might account for the 11 year solar cycle on 22 Feb 2024. The email read: *"Dear Professor Robitaille, I am resending this email as the first attempt was undelivered. It has just occurred me that the Sun polarity reversal could be caused by the Dzhanibekov effect. Somehow the core of the Sun could be solid (or behave as a solid) and have the asymmetries required to trigger the effect while spinning. Just a thought. Kindest regards, Floriano Pohlmann."* Independently, Stephen J. Crothers had highlighted on many occasions that, beyond the work of Einstein (1915), the solution for the perihelion precession of Mercury had been solved classically, both by Paul Gerber (1898, 1917) and Edward Dowdye (1992, 2001, 2012). Pierre-Marie Robitaille then proposed that the known anomalous advance in the perihelion precession of Mercury could be used to constrain the principle, intermediate, and minor axes of an inertially asymmetric solid solar core, thereby unifying both the solar cycle and the perihelion precession of Mercury. Stephen Crothers would affirm this conclusion and would eventually verify that the presentation contained herein is correct.

mass within the core is not symmetric. Consequently, the LMHSM is able to account for the solar cycle and the anomalous advance in the perihelion precession of Mercury in a manner which far surpasses the Standard Solar Model (Bahcall et al. 1995, 2005; Einstein, 1915), as shown below.

Mercury's perihelion corresponds to its point of closest approach to the Sun ($\approx 4.6001 \times 10^{12}$ cm) while its aphelion corresponds to its farthest distance ($\approx 6.9818 \times 10^{12}$ cm). It is well understood that Mercury's perihelion advances by 5,599.74 arcsec/century. A large component of this value ($\approx 5,025$ arcsec/century) can be attributed to astrometric/equinox precession, namely the progressive change in the orientation of Earth's rotational axis (Lo et al, 2013). Planetary perturbations from other planets are known to account for ≈ 532 arcsec/century (Lo et al, 2013). The remaining 42.5-43 arcsec/century have typically been attributed to the effects of General Relativity (Einstein, 1915), as the internal quadrupole moment of the Sun, J_2, was believed to make a completely negligible contribution (Lo et al., 2013).*

Paul Gerber had used classical ideas to obtain an expression for the anomalous advance of the perihelion precession of Mercury (Gerber, 1898). The same equation was later obtained by Einstein (1915) who had failed to cite Gerber. Edward Dowdye Jr. (2012), using a different classical method, also obtained effectively the same equation:

$$\Delta\phi = \frac{24\pi^3 a^2}{T^2 c^2 (1 - e^2)} \tag{1}$$

where, $\Delta\phi$, a, e, T, and c correspond to Mercury's anomalous precession (43 arcsec/century or 5.0209×10^{-7} rad), semi-major axis ($\sim 5.7909 \times 10^{12}$ cm), eccentricity (~ 0.20563), orbital period, and the speed of light (or the speed of gravity propagation for Gerber), respectively. The orbital period for Mercury's ellipse, T, is given by $2\pi\sqrt{a^3/GM}$, where a corresponds to the semi-major axis, G to the universal constant of gravitation (6.6743×10^{-11} N·m^2/kg^2), and $M_\odot$ to the mass of the Sun. After Einstein published his analysis (Einstein, 1915), Gerber's paper was republished posthumously by Ernst Gehreke (Gerber, 1917). This was extremely unusual in science, especially since Gerber's proof now entered the most prestigious German physics journal, *Annalen der Physik*, nearly 20 years after it first appeared. Even so, Einstein's solution became widely accepted and served as a key proof for the validity of General Relativity. As for Paul Gerber, his proof has long ago been forgotten. Early on, in an attempt to justify General Relativity, many had argued in defense of Albert Einstein that Gerber's proof was non-physical. Nonetheless, it is important to recall that Gerber was indeed the first scientist to obtain a solution for the anomalous advance of the perihelion precession of Mercury by deriving Eq.(1). He had done so with classical methods, seventeen years before General Relativity.

When Le Verrier (1859) first discovered the anomalous component of the perihelion advance of Mercury, he proposed that intramercurial matter might account for the advance. This would eventually grow to become known as the hypothetical planet Vulcan (Baum and Sheehan, 1997). Le Verrier never considered that the required agent might be found within the Sun itself. In arriving at a solution for the anomalous advance of the perihelion precession of Mercury, Einstein simply invoked a solar mass and assumed spherical solar symmetry (Einstein, 1915). He never considered that the Sun might possess hidden moments of inertia which varied along the x, y, and z axes. The solution he advanced would depend solely on the characteristics of Mercury's ellipse and its distance from the center of the solar body. Yet,

*Godier and Rozelot (1999) estimated that the dimensionless solar quadrupole moment, J_2, was $\approx 1.6 \times 10^{-7}$ based on gaseous solar models. If these models were incorrect, then an externally undetected internal quadrupole moment might be found in a rigid solar core experiencing solid body rotation.

it is well-known that a perfectly spherical object can still be subject to the Dzhanibekov effect, as such an object can actually possess internal variations in density.

II. The Solar Cycle and the Perihelion Precession of Mercury*

Within the context of the LMHSM, wherein the core is solid and its structure maintained by the lattice, the restrictions imposed by gaseous solar models can be lifted. A solar core possessing a quadrupole moment, J_2, could be used to *simultaneously* account for *both* for the solar cycle through the Dzhanibekov effect *and* the anomalous advance in perihelion precession of Mercury.† The key parameters are as follows: total solar mass, $M_\odot = 1.9498 \times 10^{33}$ g; solar radius, $R_\odot = 6.957 \times 10^{10}$ cm; average solar cycle = 11 years = 3.471×10^8 s; radial boundary of the solar core, $R_c = 0.65R_\odot = 4.52205 \times 10^{10}$ cm; mass of the solar core ($M_c = (4\pi/3)R_c^3 \times 1.7$ g/cm^3 $= 6.58482 \times 10^{32}$ g); rotational frequency of the solar core, $\Omega_\circ = 430$ nHz or 2.7018×10^{-6} rad/s; density of the convective zone, $\rho_{conv} = 1.3$ g/cm^3, extending from $0.65R_\odot$ to $R_\odot$; average core density, $\rho_{core} = 1.7$ g/cm^3; Mercury's orbital period = 87.969 days, or 0.24085 orbits/year, or 415.196 orbits/century.‡

It is then possible to classically account for the anomalous advance of the perihelion precession of Mercury per orbit, $\Delta\phi$, using an internal quadrupole moment, J_2, instead of General Relativity (Einstein, 1915). This can be accomplished by evaluating the orbital geometry using the following classical expression (Danby, 1988; Murray and Dermott, 1999; Chobotov, 2002):

$$\Delta\phi = \frac{3\pi J_2 R_\odot^2}{a^2(1-e^2)^2}\left(2 - \frac{5}{2}\sin^2 i\right) \tag{2}$$

where, $\Delta\phi$, a, e, and i correspond to Mercury's anomalous precession (43 arcsec/century or 5.0209×10^{-7} rad/century), semi-major axis ($\sim 5.7909 \times 10^{12}$ cm), its eccentricity (~ 0.20563), and its orbital inclination relative to the Sun's equatorial plane ($i = 3.38°$), respectively.§ For an anomalous perihelion precession of 43 arcsec/century, the required solar quadrupole moment, J_2, would be $\sim 1.700 \times 10^{-4}$, a value more than 1,000 times greater than computed using gaseous models (Godier and Rozelot, 1999). This relates directly to the core's principal moments of inertia through:

$$J_2 = \frac{I_2 - \frac{I_1+I_3}{2}}{M_\odot R_\odot^2} = \frac{\Delta I}{M_\odot R_\odot^2} \tag{3}$$

Given the total solar mass, $M_\odot$, and radius, $R_\odot$, the value of ΔI could then be determined as:

$$M_\odot R_\odot^2 J_2 = \Delta I = I_2 - \frac{I_1 + I_3}{2} \approx 1.6294 \times 10^{51}\ \mathrm{g \cdot cm^2} \tag{4}$$

Next, treating the core as a rigid body spinning without any external torques about its intermediate axis, I_2, Euler's equations of motion yield an instability growth rate for the intermediate axis as follows:

*Some of these ideas have previously been presented in this video: Robitaille PM, *Solid Bodies and Mercury: The Perihelion Precession Explained!*, https://www.youtube.com/watch?v=qUZ0Obpihbc for "Sky Scholar" (2024). This video can also be found for Sky Scholar on Rumble.com.

†Pierre-Marie Robitaille utilized Google AI Overviews to perform initial calculations, check analytical formulas, and provide references from November 1-2, 2026, google.com. The results were confirmed by ChatGPT (OpenAI) on November 5, 2026.

‡For the sake of this discussion, these parameters for the extent and density of the solar core and convective zones are adopted for illustrative purposes. Some may choose to adopt slightly different values, but the overall demonstration of feasibility will not be altered.

§The inclination in this expression, i, is not relative to the ecliptic which has a very different value of 7.005°. This expression is also given by Zeebe and Kocken (2025) in slightly altered form. It can be placed in identical form by rearrangement followed with multiplication by the orbital period, $T = 2\pi/n$.

$$\lambda = \frac{\pi}{\tau_{flip}} = \Omega_0 \sqrt{\frac{(I_3 - I_2)(I_2 - I_1)}{I_1 I_3}} \tag{5}$$

where Ω_0 corresponds to the observed steady-state rotational frequency of the solar core ($\sim$ 430 nHz) and where τ_{flip} corresponds to the 11 year flip interval, which is $\sim 3.471 \times 10^8$ s. The instability growth rate, λ, governs how fast the intermediate axis inertial torque is able to overcome the rotation vector. This is because within the context of the intermediate axis theorem, angular momentum constantly gets transferred between the three axes, while the total angular momentum and kinetic energy remain conserved. In any case, note that Eq.(5) is a key step in the solution, as now the instability growth rate becomes linked to the moments of inertia in the core.

Next, it is possible to define exact axis asymmetries as $\epsilon_1 = I_2 - I_1$ and $\epsilon_3 = I_3 - I_2$. Substituting the relationships from above yields a deterministic system of two equations:

$$\epsilon_1 - \epsilon_3 = 2\Delta I \approx 3.2588 \times 10^{51}\ \mathrm{g \cdot cm^2} \tag{6}$$

$$\epsilon_1 \cdot \epsilon_3 = \left(\frac{\lambda}{\Omega_0}\right)^2 I_{c,base}^2 \approx 3.2469 \times 10^{102}\ \mathrm{g \cdot cm^2} \tag{7}$$

where $I_{c,base} \approx \frac{2}{5} M_c R_c^2 \approx 5.385 \times 10^{53}\ \mathrm{g \cdot cm^2}$, represents the baseline moment of inertial of a perfectly spherical rigid core where $R_c = 0.65 R_\odot$ and $\rho_c = 1.7\ \mathrm{g \cdot cm^2}$. Solving this quadratic system isolates the exact principal moments of inertia as follows:

$$\begin{gathered}\text{Minor Axis: } I_1 \approx 5.3553 \times 10^{53}\ \mathrm{g \cdot cm^2},\\ \text{Intermediate Axis: } I_2 \approx 5.3959 \times 10^{53}\ \mathrm{g \cdot cm^2},\\ \text{Major Axis: } I_3 \approx 5.4039 \times 10^{53}\ \mathrm{g \cdot cm^2}.\end{gathered}$$

Consequently, $\epsilon_1 \approx 4.0587 \times 10^{51}\ \mathrm{g \cdot cm^2}$ and $\epsilon_3 \approx 7.9998 \times 10^{50}\ \mathrm{g \cdot cm^2}$. Note that these three axes differ from one another by less than 1%.* Furthermore, they differ almost imperceptibly from the values of a uniform core.†

The conclusion is certain. The Sun has a rigid core which experiences solid body rotation and which results in a quadrupole moment which can be determined from observations. However, the specific moments of inertia obtained will depend on the model adopted for the core as to radius and average density. Such selections however, will not affect either the solar cycle or the perihelion precession of Mercury. In any event, it appears that the core can remain essentially symmetric. Only very minor local differences in densities within the axes have a tremendous effect both on the solar cycle and on the advance of the perihelion precession of Mercury.

If the core remains perfectly spherical, mass can redirected completely via variable density gradients. Yet, the total angular momentum, L, and the kinetic energy, K_E, must remain strictly conserved throughout the process. Before the inversion begins or assuming perfect initial rotation strictly about the intermediate axis, the object rotates with an initial angular velocity Ω_0 exclusively around this axis. Consequently, at the initial state, $\omega_1 = 0$, $\omega_2 = \Omega_0$, and $\omega_3 = 0$.

*Percent differences relative to the smaller axis: I_1 vs I_2 = 0.758%, I_2 vs I_3 = 0.148%, I_1 vs I_3 = 0.907%.

†Percent differences relative to the solar core: $I_{c,base}$ vs. I_1 = 0.552%, $I_{c,base}$ vs. I_2 = -0.202%, and $I_{c,base}$ vs. I_3 = -0.351%.

Substituting these initial conditions for L^2 yields $L^2 = (I_2\Omega_0)^2$ and therefore:

$$L^2 = I_1^2\omega_1^2 + I_2^2\omega_2^2 + I_3^2\omega_3^2 = (I_2\Omega_0)^2 \tag{8}$$

Similarly, at the beginning, just as was the case for angular momentum, kinetic energy is conserved because there are no dissipative forces. For the same initial conditions where $\omega_1 = 0$, $\omega_2 = \Omega_0$, and $\omega_3 = 0$ and therefore $2K_E = I_2\Omega_0^2$, yielding:

$$2K_E = I_1\omega_1^2 + I_2\omega_2^2 + I_3\omega_3^2 = I_2\Omega_0^2. \tag{9}$$

At the exact midpoint of the flip trajectory, the rotation about the intermediate axis drops to zero, $\omega_2 = 0$. The maximum angular frequency Ω_{max} occurs as the spin alignment compresses completely into the minor axis, I_1:

$$\Omega_{max} = \Omega_0 \sqrt{\frac{I_2(I_1 + I_3 - I_2)}{I_1(I_3 - I_1)}} \approx 430.0024 \text{ nHz} \tag{10}$$

The resulting rotational frequency increase is governed by:

$$\Delta f = \Omega_{max} - \Omega_0 \approx 0.0024 \text{ nHz}. \tag{11}$$

However, it is unlikely that such a fluctuation could ever be observed, as the tachocline layer could act to absorb the resultant energy and transfer it into the convective zone. This could act to cause a disturbance in this zone responsible for the observed solar cycle, while at the same time masking the effect on the precession of Mercury. When the Sun becomes active, deep convective flows are known to disrupt the meridional circulation typically transporting material from the equator towards the poles near the solar surface (Schunker, 2010).

III. Conclusions

It is well known that the solar cycle can vary. For instance, solar cycle 19 (spanning 1954 to 1964) was exceptionally short, lasting only 10 years and 6 months. Conversely, solar cycle 23 (spanning 1996 to 2008) stretched significantly, lasting 12 years and 4 months. This means the cycle's inversion timescale (τ_{flip}) has fluctuated by roughly ±12.5% from its median value. Yet, under this rigid spherical-core model, variations in the solar cycle period over the past 100 years would have no effect on the perihelion precession of Mercury, as the two phenomena are mathematically uncoupled. Along these lines, it is known that the presence of external torques can act to stabilize the intermediate axis. This is especially true if the rotational rate of the core is insufficient to overcome these effects. For the Sun however, it appears that the interaction of the tachocline layer with the core remains insufficient to stabilize the intermediate axis. This suggests that while shear forces are present at the level of the tachocline, the convective material itself must be characterized by an extremely low viscosity. In any event, such phenomena cannot be used to modify the solar cycle, precisely because the viscosity of the tachocline and convective zone would be constant.

Finally, Mercury's perihelion precession depends strictly on the quadrupole moment, J_2, which dictates the exact effect of the gravitational field. Conversely, the solar cycle period depends strictly on the instability growth rate (λ), which dictates how fast the intermediate-axis torque overpowers the rotation vector. When the mathematical layout of the moments of inertia are evaluated, the parameters balance independently. Mercury's precession vector is governed by Eqs.(3) and (6) which define ΔI. This value is entirely anchored to Mercury's observed 43 arcsec orbital drift per century. Because Mercury's precession did not change over the last 100 years, ΔI must be treated as a rigid, static constant. Material can get redistributed in the solar core, but ΔI does not change as a result. The quantity is conserved. Conversely, the solar cycle vector is governed by Eq.(7). When the solar cycle shortens to 10.5 years or lengthens to 12.3 years, the instability growth rate, λ, given by Eq.(8), scales in inverse proportion. Mathematically, the difference between ϵ_1 and ϵ_3 must remain constant, but the product can vary. Consequently, the local concentrations of heavier elements within the core can slowly vary along the x, y, and z axes. This serves to alter the internal torques involved relative to the solar core, but the global quadrupole term, J_2, remains completely fixed.

As a result of this derivation it is clear that Eq.(1) (Gerber, 1898; Einstein, 1915; Dowdye, 2012), while yielding the correct value for the anomalous advance of the perihelion precession of Mercury, fails to reveal the complete story. These derivations take no account of asymmetry in the solar core and do not link the anomalous advance of the perihelion precession of Mercury and the solar cycle through the quadrupole moment, J_2. Neither Gerber, nor Einstein could have recognized this in their day, as the solid body rotation of the solar core was not discovered with helioseimology until the end of the 20^{th} century (Shou, 1998; Thompson, 2003).

This exposition strikes a significant blow to all gaseous models of the Sun. Hence, there is no longer a need for a solar dynamo in order to account for the solar cycle. Everything remains controlled by the solar core. The key to the solar cycle is found in the realization that the core undergoes solid body rotation and is endowed with three moments of inertia. This, in turn, enables the Sun to overtly display the consequences of the Dzhanibekov Effect every 11 years with the renewed appearance of sunspots. The consequences for physics are immense, as this treatment subverts the second of the three great purported *'proofs'* of general relativity: 1) the bending of light at the limb of the Sun, 2) the anomalous advance of the perihelion of Mercury, and 3) the gravitational red shifts observed on white dwarfs. There is more than sufficient observational basis to suspect all of these 'proofs'. Gravity does not travel at the speed of light. It is doubtful that the theory of general relativity will long be able to survive the profound implications of this solution.

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