Stellar Metamorphosis: The New Gyrochronology, Version 4

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Abstract: Gyrochronology can be used to measure the age of a low mass, or highly evolved star. Depending on how fast the star is spinning, we can also determine how fast it lost its mass from earlier stages of evolution, which in turn tells us if it was orbiting very close to another host. This is all in accordance with the general theory, meaning the oldest, most highly evolved and/or dead stars will barely spin at all and have very low comparable axial angular momentum. Examples are provided with hand written notes to prove that I did not steal the idea from anybody, as it is a natural consequence of realizing stars are young hot planets, and planets are very old, slowly spinning stars.

According to the dogma, the Sun is a low mass star.

Gyrochronology

From Wikipedia, the free encyclopedia

Gyrochronology is a method for estimating the age of a low-mass star like the Sun from its rotation period. The term is derived from the Greek words *gyros*, *chronos* and *logos*, roughly translated as *rotation*, *age*, and *study* respectively. It was coined in 2003 by Sydney Barnes[1] to describe the associated procedure for deriving stellar ages, and developed extensively in empirical form in 2007.[2]

Unfortunately the dogma is wrong, again. The Sun is actually a very young star with 330,000 times the mass of the Earth. Calculations done by Lord Kelvin have the Sun at around 20 million years old. The reason why astronomers have the Sun as being ~4.5 billion is because they forced it to be similar in age to the Earth, which is totally false. The Earth is a very highly evolved, low mass, post ocean world stage star, comparatively speaking. Only highly evolved stars, or stars that evolved extremely quickly can be low mass. The young stars are very heavy, like the Sun and Rigel. This is in accordance with the general theory.

We can determine how old a star is by its rotation, only if we understand first what old stars look like. That is only possible using the general theory. Old and dead stars look like this (Credit NASA's Messenger probe).

Mercury. This is an extremely old, dead star.

Now that we understand what an extremely old dead star looks like, we can measure its properties and make inferences. Only the stars that are still evolving rotate with any significant frequency on their own, without any interrupting body. A few notes that need to be sorted are listed below, simply because this is a brand new understanding and is still ignored by the establishment:

1. Venus is extremely old ~450 billion - ~1.56 trillion years old. It barely spins at all. http://vixra.org/pdf/1905.0251v1.pdf

2. Mercury barely spins, which signals it is extremely old similar to Venus. Measurements of its D/H ratios still need to be made.

3. Neither Mercury or Venus are tidally locked, but probably were tidally locked at one point.

4. The Moon is tidally locked to the Earth, which signals that it has been orbiting the Earth for an extremely long time, and inside of a much closer orbit. Since the Earth was much more massive in its past, this means the tidal locking of Moon to the Earth was probably done with Earth's vastly thicker atmosphere and oceans, and possibly was even irradiated by the Earth when Earth was a red dwarf star. The case stands, the Moon has been in orbit around the Earth for billions of years, and clearly was captured by the Earth's past huge gravitational field.

5. If there is no tidal locking from a close in body to a host, then it can mean the companion hasn't been in orbit around its host for a long time, or it is orbiting too far from the host. This means a couple of things. For instance if there is a companion tidally locked to a host and it is orbiting much further out than tidal forces can impact, it means it was pulled by some other body away from the host.

6. Dogma teaches that stars that shine and have extreme masses are as old as the oldest stars which no longer shine and have lost the majority of their early mass. The case stands, they teach people that the Sun is ~4.5 billion years old and the Earth is also 4.5 billion years old. When the General theory predicts that the Sun should be a couple million years old, based on its extremely low D/H ratio of 1/10,000,000. This fits with Lord Kelvin's estimate of the age of the Sun as being ~20 million years old, which runs counter to dogma that young stars like the Sun are the same age as extremely evolved, differentiated, extremely chemically complex and life hosting stars such as the Earth.

The dogma's problem is that they place extremely young, massive stars as being as old as objects like the Earth, which is totally false. Earth is vastly older than the Sun. This means that the claims of the extremely old stars being tidally locked to the youngest stars, is probably false. There just simply hasn't been enough time for older, spinning, evolving stars to be tidally locked to younger hosts (the stars that shine). All star systems are polymetamorphic, this means they contain stars in many different stages of evolution. Forcing all the stars in a system to all be related to the central pair or host via formation is wrong. Just because objects are orbiting others does not mean they are related. That is a central falsehood to astronomy, yet is still taught to students in Universities around the Earth by the millions. I think students are owed the truth now that the discovery that planets and stars are the same objects has been made.

What is most interesting, is that we can determine how long objects have been in orbit around a host by if it is tidally locked or not. Now that we have an age for Jupiter for instance of ~632-731 million years old, and most of its large moons are tidally locked, then it means tidal locking comes rather quickly, when compared to the

total ages of the objects. Saturn even more so, since its age is ~590 million years old, and Titan is tidally locked.
http://vixra.org/pdf/1905.0467v1.pdf

7. Both Jupiter and Saturn are probably both at least 30 times older than the Sun. What this means is that basically all star systems that are counted as "star systems" by the Kepler and TESS telescopes have objects that are not tidally locked to their host. Every single object orbiting a young, hot, Sun like star all the way to brown dwarf most likely are not tidally locked. Tidal locking only comes after the object has been in orbit around a host for long periods of time. What this means is that the claims of there being permanently hotter and colder sides to objects that orbit close in to hotter hosts is probably false. It probably takes a good 350 million years for a close in orbiting object to become tidally locked to its host. By that time though, most stars have transitioned into brown dwarf stages of evolution. All the light curves found by TESS and Kepler that have black body spectrums above 2200 Kelvin shows that brown dwarfs are basically ignored.

This is to tie into the Simon Marius rule of brown dwarf companions. All brown dwarfs have at least 4 large moons (highly evolved, dead/rocky stars) in orbit around them. Some are tidally locked too, but only because the brown dwarf is old enough to cause the internal friction to slow its spin down. Basically the heavier the dead/highly evolved star is, the harder it is to get it to lock tidally. As well, the younger it is, the more mass and axial angular momentum there will be for the most part, so we will also not see tidally locked Sun-like binary star systems or red dwarf binary systems anywhere. There will probably be tidally locked brown dwarf systems though, where two brown dwarfs are permanently facing each other. As well, if two objects are not tidally locked in reference to one another, and they are claimed to be very close in age, far beyond the 350 million year cut off, then chances are they were not young stars together. The larger adopted the smaller. This is the case with the Moon and the Earth. The moon is tidally locked to the Earth, but the Earth spins freely as if the moon isn't even there, minus some ocean effects. The brown dwarf cut off is useful too, as it shows us that since the Moon is tidally locked to the Earth, that the Earth has had it in orbit for at least 350 million years.

At the very latest, Earth probably adopted the Moon when it was in early ocean world stages, so its mass was easily at least 3-5 times greater than it is now when it adopted the Moon. This is 18-30 sextillion tons. It is important to note that the claimed discrepancies of the dogmatists of the Moon having a much larger mass per Earth mass vanish. The Moon as it stands now is 1/81 times the mass of the Earth, but when Earth adopted it >350 million years ago, the Moon's mass was 1/243rd - 1/405th times the mass of the Earth. Comparing the claimed discrepancy of the huge mass difference starts vanishing even more if you go back further than 350 million years. Moving the Earth up to grey dwarf stage at ~60 times the mass it is now, the mass difference becomes similar to Triton and Neptune. In short, the Earth had the mass it needed to adopt anything it wanted

the earlier you go back, similar to the way the Sun is now. Most objects have been lost though, the Moon stuck around. By examining the observations with new theory it becomes clear that progress comes by doing things differently, in an unpredictable fashion. Remember, the Earth is not an evolutionary structure according to the dogma, they have it as always having been nearly the same size it is now. Regardless, all the observations of Kepler and TESS are going to show that the dogma's anti-evolutionary stance is on its last leg.

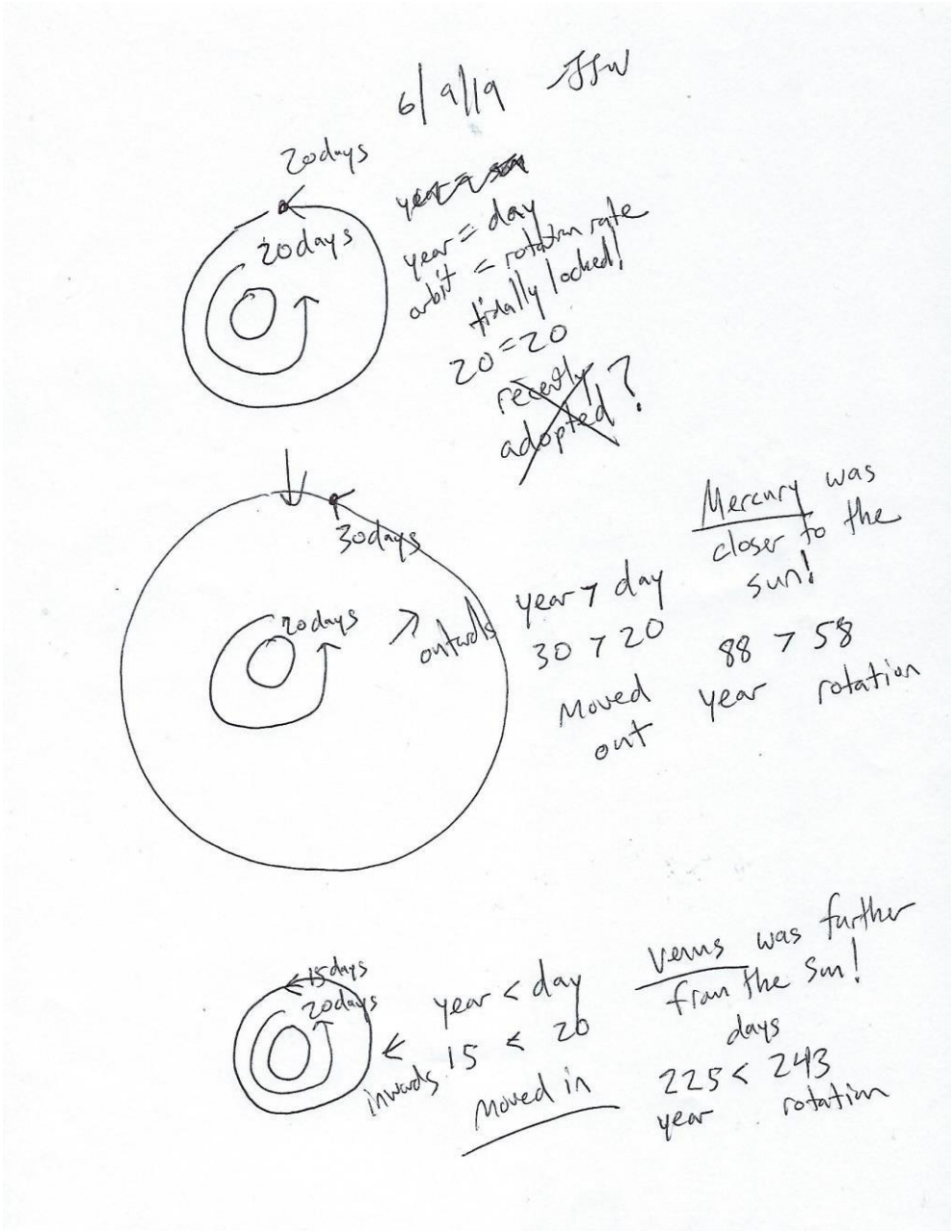
8. Stars remain spinning as they evolve, unless they experience tidal forcing from another object, which can make them speed up or slow down. So most interestingly, Venus and Mercury, the dead stars that clearly were probably tidally locked to a different body in their past, can have their previous orbits inferred. For instance, Venus's year is 225 days, but its rotation is 243 days. Since it is too far to have experienced any tidal locking mechanism from the Sun, its past orbit must have been a bit wider. As well, the Sun was vastly larger than it is now, so it could have caused tidal locking with Venus earlier. Venus has since moved in closer to the Sun as the Sun shrunk from earlier stages of evolution. Mercury is different. It was closer in and moved outwards from the Sun. Its year currently is 88 days, and it rotates once every 58 days. This means it was tidally locked at 58 days (a closer orbit). This is really cool, because the angular momentum of Mercury was transferred to Venus. So Mercury moved outwards, and Venus moved inwards.

Given the line of thought discussed in #7, we can also infer that fact that Venus and Mercury, if they were tidally locked to another body (which they probably were, that said body would have had to have been 20+ million years old (the age of the Sun) + the time it took to become tidally locked to a previous host at ~350 million years. This leads us to the possibility that whatever hosted Venus and Mercury before the Sun did, was at a different stage of evolution as it is now, and those objects might be in our system still. For instance, Jupiter and Saturn both ~700, and ~590 million years old respectively, were 330 million and 220 million years old, at 370 million years ago. This means Jupiter was a brown dwarf, and Saturn was a red dwarf. So Venus and Mercury could have been in orbit around one of those two objects, before the Sun stole them. The possibilities are endless though.

9. The Sun will contract further and will start to spin faster (increase in angular velocity) as it loses mass. The rate of mass loss will be slower than its contraction though. Once it reaches red dwarf stages the contraction will exceed the rate at which it can expel mass, so the star will begin flaring more violently. As the violent flaring increases, the loss of mass rate will increase, the red dwarf Sun will move into brown dwarf stages, and the star will slow down its spin rate (decrease in angular velocity). This means younger brown dwarfs will be spinning fast, and older brown dwarfs will be spinning slow. A young brown dwarf could have a rotation rate of 51 minutes (a day of 51 minutes long), and an old one about 10

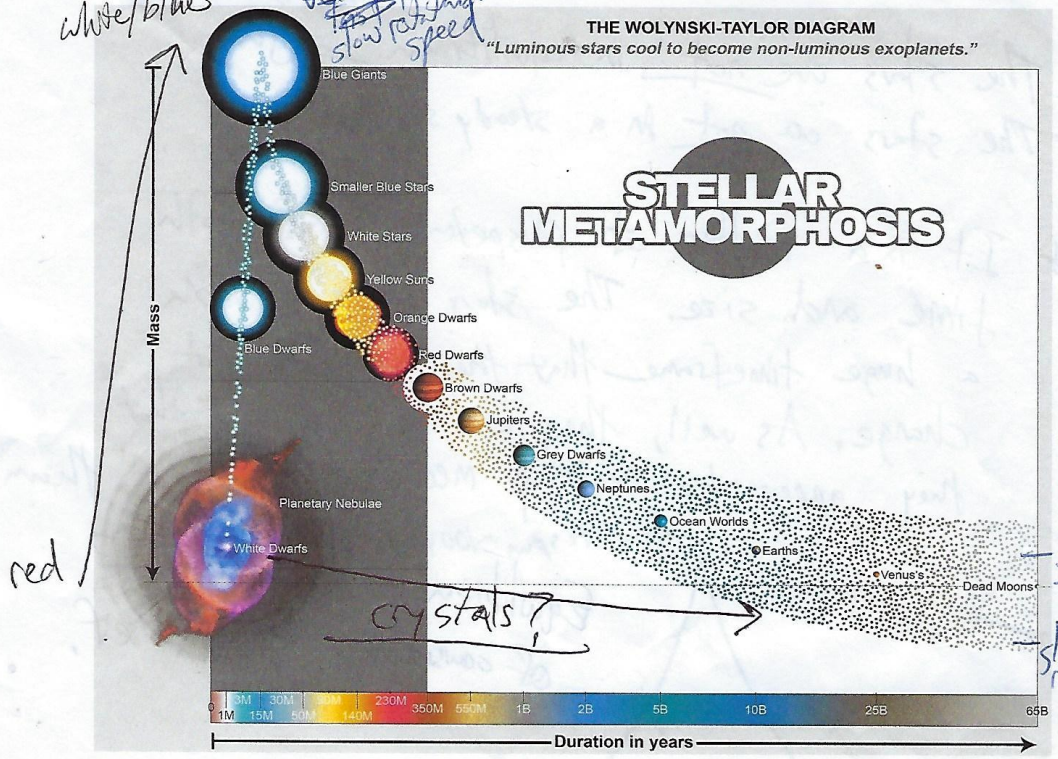
hours. So, what this means is that determining the rate of spin of a brown dwarf will determine how fast it lost its mass. More work will need to be done to outline these ideas.

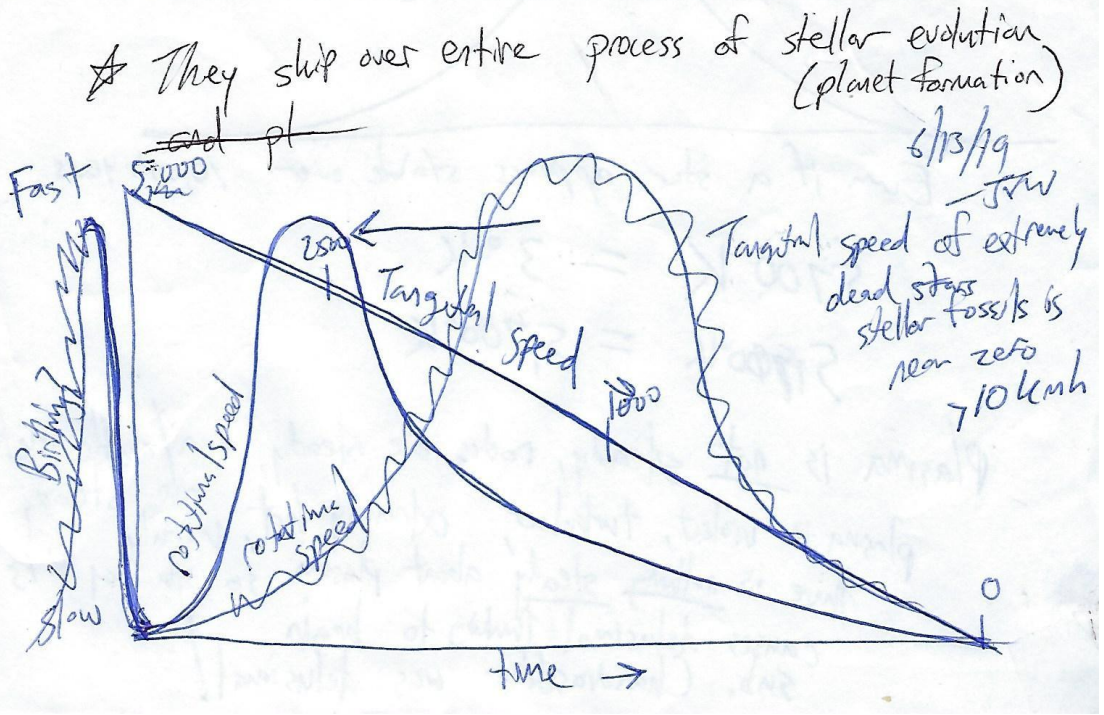
10. A dead star can have its rotation spun up considerably if it is adopted by a more massive star. What happens is that the dead star gets tidally locked to the host at a close in orbit. Next, the dead star's orbit is interrupted by the host adopting another object which absorbs the angular momentum of the previous dead star, flinging it out of its close in orbit. This leaves the rotation rate of the object that was in a close in orbit the same as it was when it was close in to the host. For dead stars that do this we can make a simple inference. Its year will be longer than its day, this is the case with Mercury. For stars that move inwards from a further out orbit, their year will be shorter than their day, this is the case of Venus. Much more work will need to be done to expand this idea.

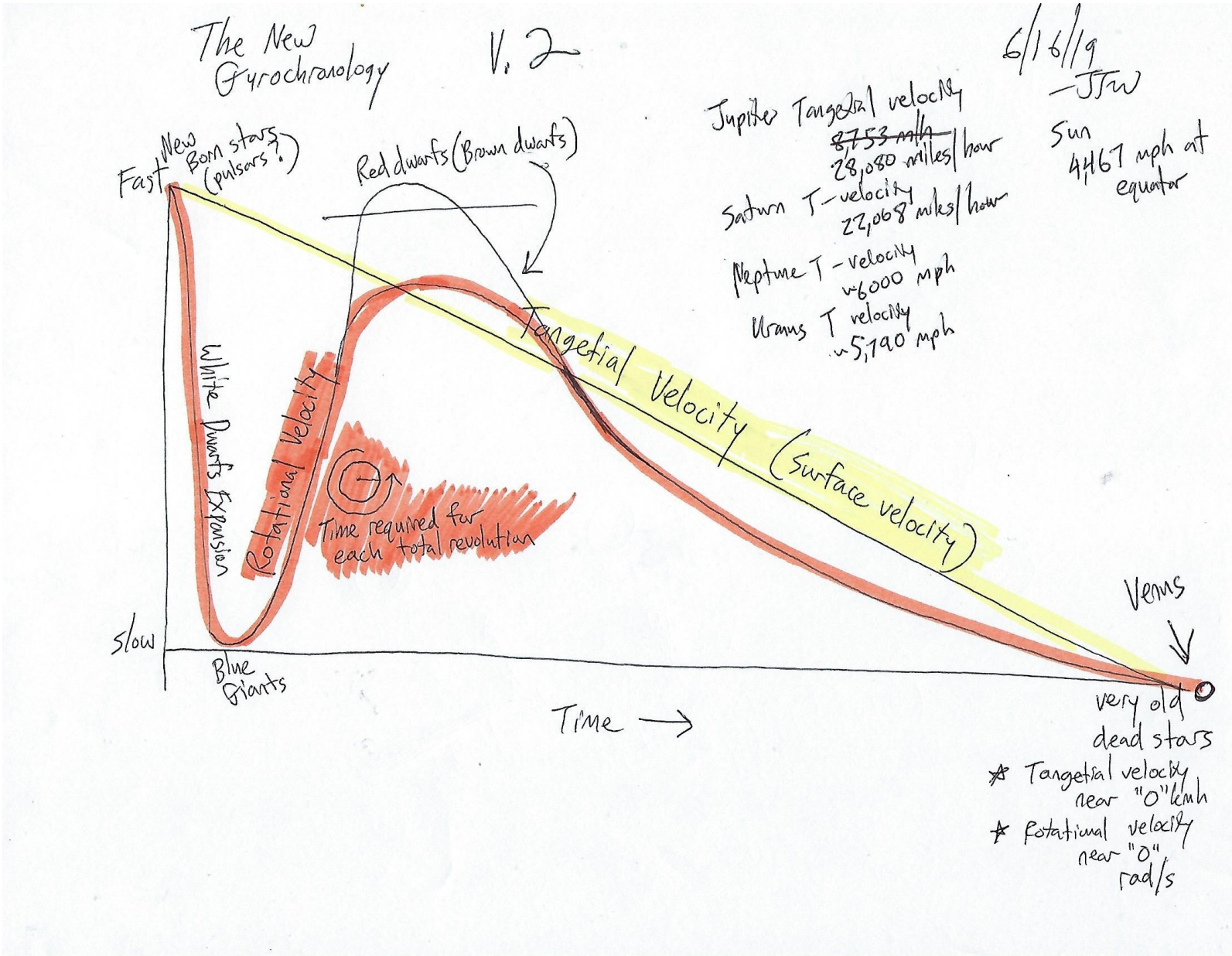


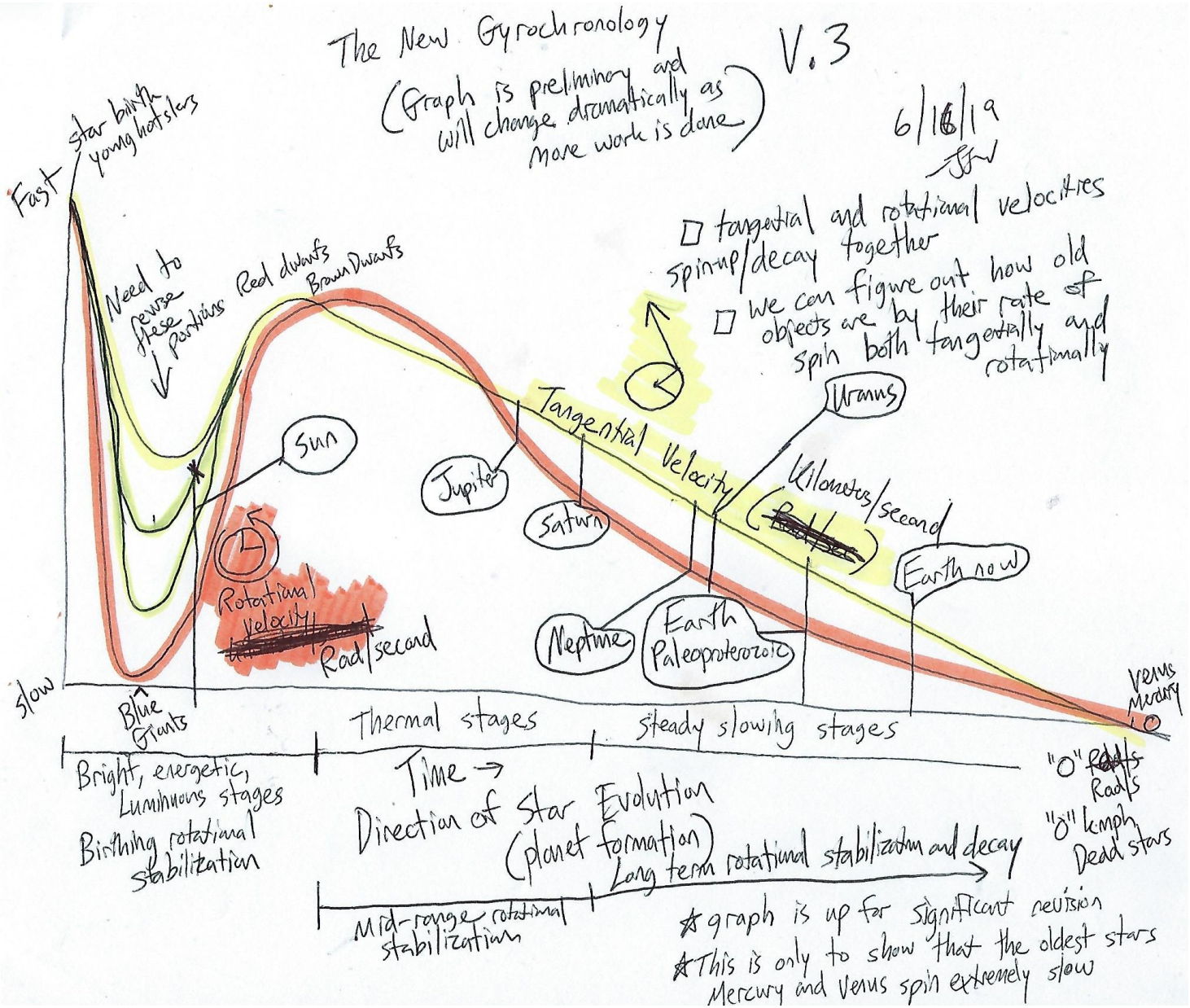
11. Differential rotation plays a part as well. Highly evolved stars will have less and less differential rotation as they evolve. For instance the Sun rotates at 36 days at poles, but 24 days at the equator. Jupiter on the other hand rotates at 9 hours, 56 minutes at the poles, and 9 hours, 50 minutes at the equator. The level of differential rotation of the star probably signals the stability of the star. What is also extremely strange, is the idea that stars when they are young, are essentially ringing themselves like you would a wet wash rag. This means gravitational collapse isn't a phenomenon that only works radially (meaning only down towards the center in straight, or rectilinear lines), it does so with multiple bands of differential rotation which are collapsing semi-independently of the whole body of the star. As the

gravitational collapse happens, the bands of the thick atmosphere play catch up with each other, each with different pressures and temperatures (and naturally chemical compositions). What this means is that differential rotation of a star is direct evidence of gravitational collapse of the whole body. Therefore the case stands, the Sun cannot be expanding outwards into a red giant, because if it were it would not be wringing itself like a giant spherical wet dish rag. As well, the difference between the rotation rates of the body can also signal the intensity of the gravitational collapse. More differential rotation like the Sun's 150%, signals more intense collapse, which is reasonable because that is why it shines so brightly. The heat produced from gravitational collapse turned into friction is being converted to heat and light. What the differential rotation also tells us is that the Sun is very young. Old stars are settled out, and do not rotate differentially. They are composed of rocks and minerals, so their differential rotation rate is nearly non-existent. The only thing that can rotate differentially is the interior versus the exterior, which can cause the magnetic field to be off center as opposed to the total rotation near the surface of the star.


THE WOLYNSKI-TAYLOR DIAGRAM
"Luminous stars cool to become non-luminous exoplanets."
STELLAR METAMORPHOSIS
Blue Giants
Smaller Blue Stars
White Stars
Yellow Suns
Orange Dwarfs
Blue Dwarfs
Red Dwarfs
Brown Dwarfs
Jupiters
Grey Dwarfs
Neptunes
Ocean Worlds
Earths
Venus's
Dead Moons
Planetary Nebulae
White Dwarfs
Mass
Duration in years
0
1M
3M
15M
30M
50M
230M
350M
550M
1B
2B
5B
10B
25B
65B


Fast
5000
2500
1000
0
Tangential speed
time


The New Gyrochronology V. 2
6/16/19
—JTW
Jupiter Tangential velocity
~~8753 mi/h~~
28,080 miles/hour
Saturn T-velocity
22,068 miles/hour
Neptune T-velocity
~6000 mph
Uranus T velocity
~5,190 mph
Sun
4467 mph at equator
Fast
New Born stars (pulsars?)
Red dwarfs (Brown dwarfs)
White Dwarfs Expansion
Rotational Velocity
Time required for each total revolution
Tangential Velocity (Surface velocity)
Venus
slow
Blue Giants
Time →
very old dead stars
★ Tangential velocity near "0" km/h
★ Rotational velocity near "0" rad/s


The New Gyrochronology
(Graph is preliminary and will change dramatically as more work is done)
V.3
6/16/19
JJW
Fast
star birth young hot stars
Need to revise these portions
Red dwarfs
Brown Dwarfs
□ tangential and rotational velocities spin up/decay together
□ we can figure out how old objects are by their rate of spin both tangentially and rotationally
Uranus
Tangential Velocity
Sun
Jupiter
Saturn
Kilometers/second
Earth now
Rotational Velocity
Rad/second
Neptune
Earth Paleoproterozoic
slow
Blue Giants
Venus Mercury
Thermal stages
steady slowing stages
Bright, energetic, Luminous stages
Birthing rotational stabilization
Time →
Direction of Star Evolution
(planet formation)
Long term rotational stabilization and decay
"O" Rads
"J" kmph
Dead stars
Mid-range rotational stabilization
★ graph is up for significant revision
★ This is only to show that the oldest stars Mercury and Venus spin extremely slow

Some more notes:

A. Gyroscopes are used in airplanes to "remember" the orientation of the horizon

B. All planets as they evolve maintain their angular reference direction for the most part, that is until they die or evolve too fast.

C. Gyroscopes are used in missiles, airplanes, ships, torpedoes and spacecraft as reaction wheels, which are basic elements in automatic steering systems

D. the angular reference direction does not change, only tidal forcing can slow it down, as well as slight friction of a younger star's radiation pressure or internal/external interactions of magnetic fields.

E. younger stars maintain their spin axis/ dead stars or stars that evolved too fast can't, those are subject to manipulation of other stars' gravity, this means dead stars or stars that evolved too fast are more likely to be tidally locked to host stars.

F. A Jupiter sized mass object will never be tidally locked to any star it has too much rotational momentum (spinning mass). It can have its rotational momentum diminished slowly as the atmosphere is ripped apart, but this is very complex and needs to be developed more in depth. It could play a part in determining the actual locations of stars on the WT diagram with regards to their transformation curves, phase curves and previous hosts and orbital history (which is the point of designing the theory).

G. An evolved star that still spins rapidly (rotational velocity ~Earths/Mars) means it also never orbited super close to a much more massive host which would cause its atmosphere to rip away quickly and experience much more tidal friction, more work is needed to outline this though, as Mars and Earth are different sizes, meaning Mars probably had a much lower transformation curve. Stars that barely spin at all such as Mercury and Venus shows that they orbited close to a hotter star, which removed their rotational velocities due to tidal friction. Their very slow spin rate also can give us a clue as to what their previous orbit was like, being that they would be easier to manipulate than rapidly spinning objects. For instance, if a very heavy truck is barreling down the freeway, you can't really slow it down by putting a 2 * 4 in the road. There is just too much momentum. Though, if you have a very slow truck moving slowly, you can place a 2 * 4 under the tires and the truck will stop moving completely. The same goes with dead stars that are rotating slowly. They are more subject to slow incremental changes in rotational velocity that are more noticeable than say, the Earth, which is spinning like a top. Given two objects have similar mass, it is much easier to stop and manipulate the slower object than the

faster one. Further, Venus's rotation is backwards, sure, but it at one point probably stopped completely and went the other direction, OR, it probably is slowing down right now to a stop, and then will start rotating in a similar direction as the Earth.

G2. This also signals that it had the time to evolve greatly, and form a large iron core and surface water oceans. Neither Mars/Earth skipping their deep water ocean world stages of evolution. This is subject to further refinement and adjustment.

Using Total Axial Angular Momentum to Determine the Age of Exoplanets, or Why Do Planets Spin at Different Energies?

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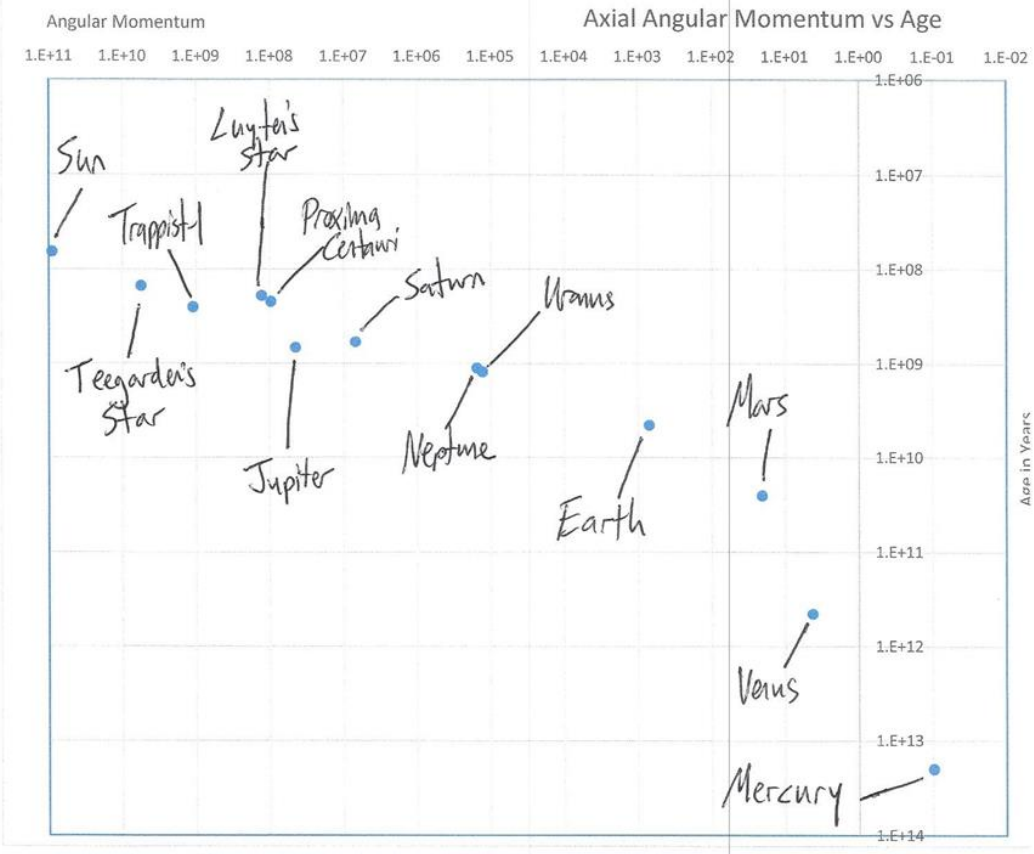
Abstract: Some ideas are presented to try and fit total axial angular momentum into the picture of gyro-chrono-logy, or "spin", "age", "study". The total axial angular momentums are calculated for specific bodies and made into a dimensionless number called William's Number. The William's number cutoff is arbitrarily set at 1 * 10^3. Graphs with explanations are provided, along with a chart with the predicted ages of the old stars in our system and others. The purpose of this paper is to finally give reason as to why some objects in our solar system have more spin energy (a calculated abstraction) than others, and to explain why they spin in the first place. Dimensionless number is total axial angular momentum divided by 1 * 10^31, with the kg *m^2*s^-1 removed. This paper is subject to revision as the new field of gyrochronology is developed.

Stars spin with less energy because they are more evolved than others. Earth spins because it is a 4.5 billion year old star. Younger stars spin with more axial angular momentum, older stars spin with less axial angular momentum. A "planet's" or "exoplanet's" spin energy is a direct result of losing energy and mass over its long, long life. Values below the Williams Number of 1 * 10^3 can be expected to be subject to more tidal interactions, thus the tidal interactions make the age more variable, therefore are more scatter shot than the younger stars. Using D/H ratios can help alleviate discrepancies and make the measurements more accurate. Another note, in order to calculate the age, it is best to use the closest William's Number to the star. This new concept gives us a much better estimate of the huge variance in age of highly evolved stars, as opposed to the dogma, which has no method for determining the age of exoplanets. Their belief is that evolved stars are the same ages as their hosts, which is outdated.

	angular	age in years
	momentum	
	Dimensionless	

	William's Number	
Sun	90,237,000,000	65,000,000
Jupiter	44,900,000	680,000,000
Saturn	6,910,000	590,000,000
Neptune	154,660	1,120,000,000
Uranus	130,000	1,230,000,000
Earth	706	4,500,000,000
Mars	20.82	25,000,000,000
Venus	4.267	450,000,000,000
Proxima Centauri	97,000,000	220,000,000
Luyten's Star	129,600,000	190,000,000
Trappist-1	1,106,000,000	250,000,000
Teegarden's Star	5,610,000,000	150,000,000
Mercury	0.0971	19,770,000,000,000-32,750,000,000,000
Beta Pictoris b	3,481,600,000	242,000,000

9/7/19 JSW



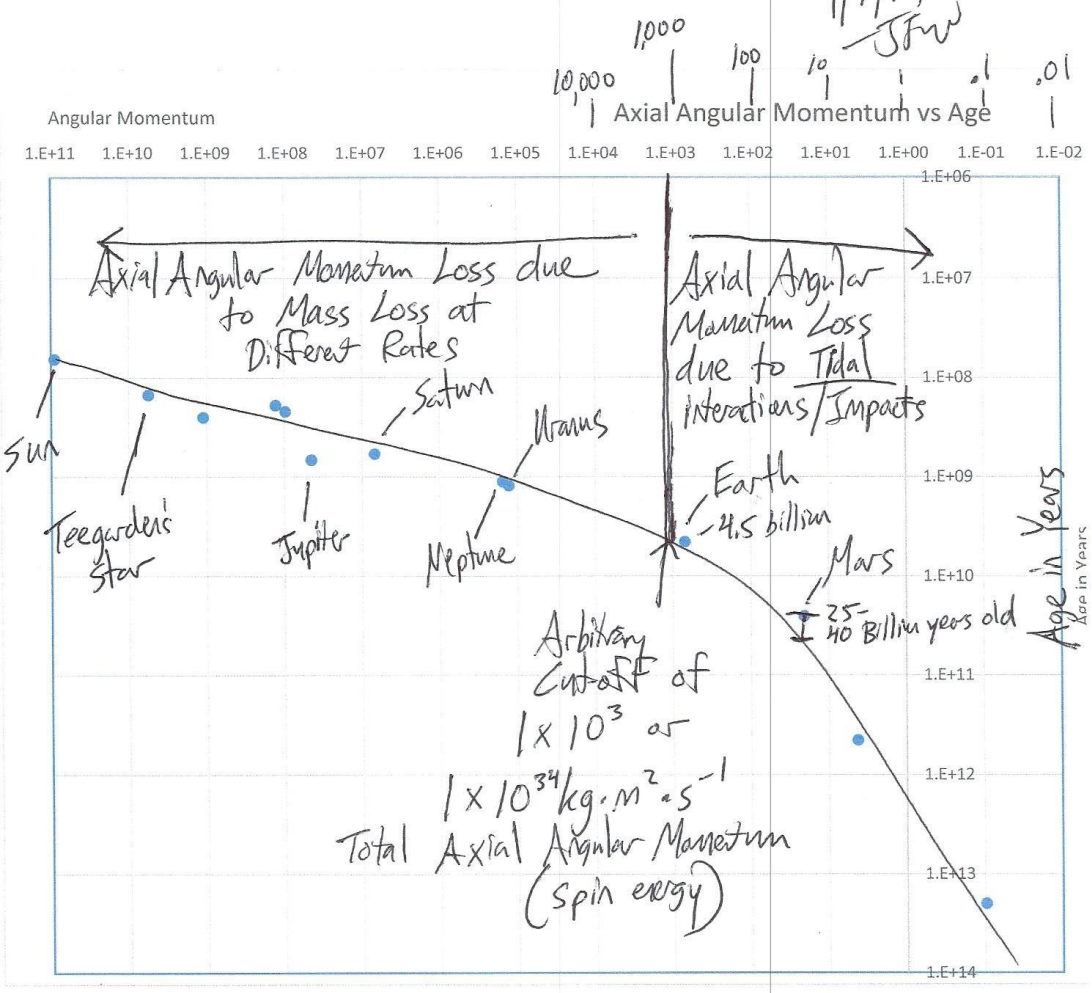
(on this graph)

★ Angular momentum is dimensionless removes 31 zeros!

so $2 \times 10^{40}\ kg \cdot m^2 \cdot s^{-1} =$

2×10^{9}

9/7/19
JFW



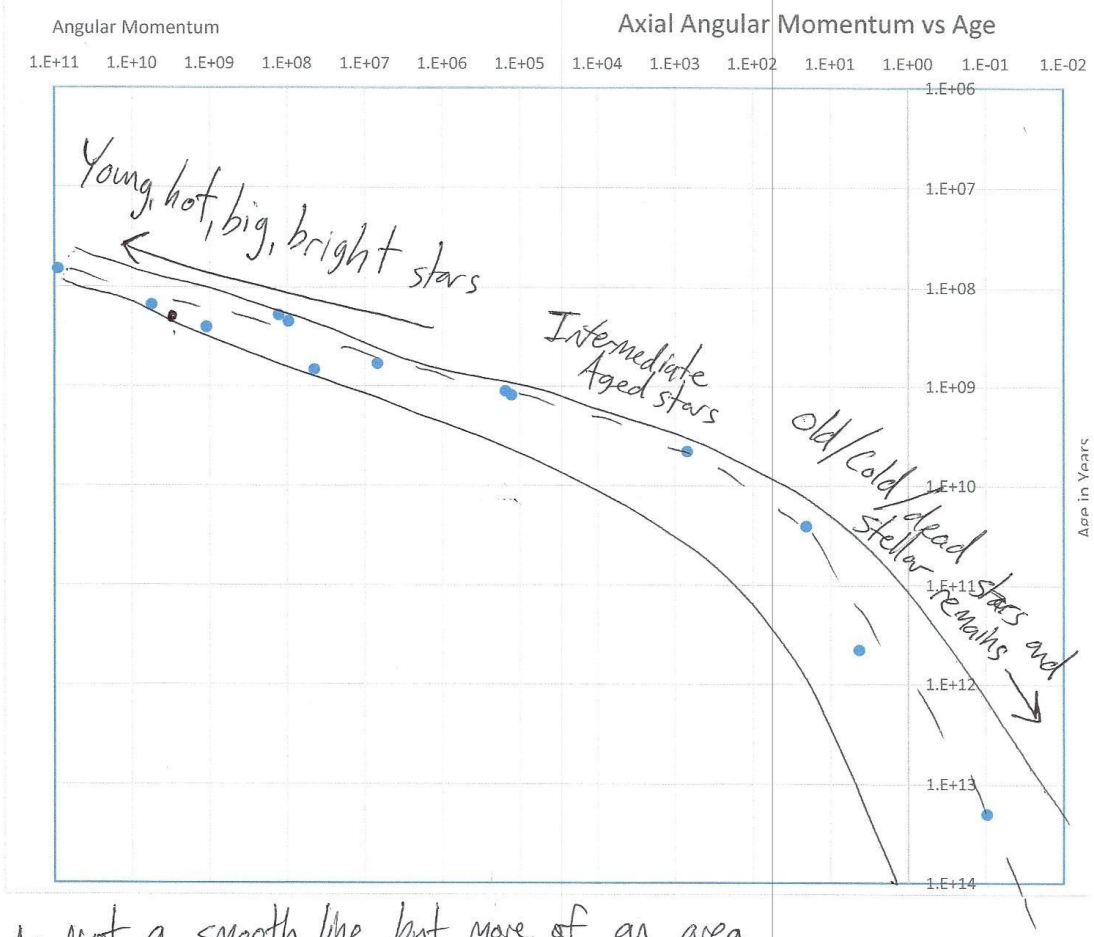
Line of Best Fit!

★ Notice gas type and young, hot, large stars on the left hand side are most subject to angular momentum (spin energy) loss due to mass loss, both are conserved quantities

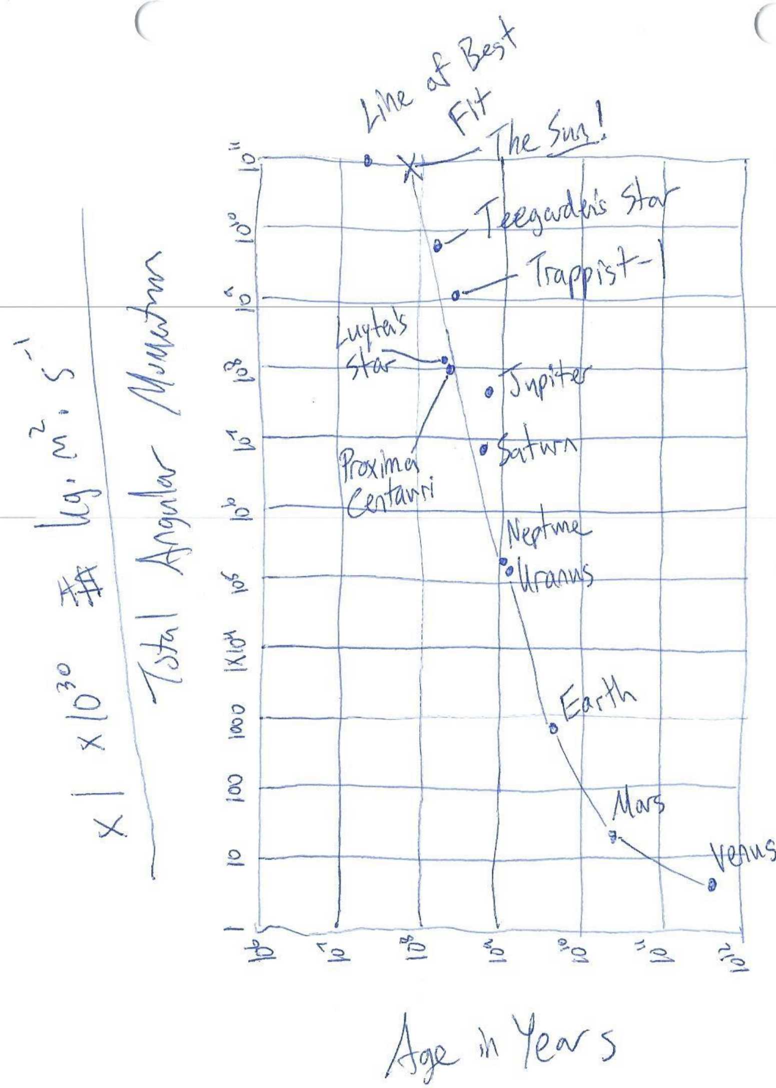
Mass loss = Axial angular momentum loss

★ Notice ~~once~~ once the inflection point is reached then the star can age ~~signifit~~ significantly with very little mass loss (but still loses comparable spin energy)

9/7/19
-SJW



- ☆ Not a smooth line but more of an area
- ☆ dotted line is line of best fit but...
- ☆ smooth lines give margin of error (subject to revision)
- ☆ It is important to know this is why the "planets" spin. They are old stars that have lost most of their mass, thus most of their angular momentum
- ☆ some stars spin with more axial angular momentum because they are younger



9/7/19
JJW

Sheet #35 on Excel

still more to work out

Most stable diminishing total axial angular momentum for ancient stars not tidally locked.

9/7/19

Mercury's age vs Venus

1.977×10^{13}

Magnetochronology paper #441 (not integrated)
Total Axial Angular Momentum #438 (integrated)
Proposed Age of Beta Pictoris b #437 (not integrated)
Stellar Axial Angular Momentum #428 (not integrated)
The New Gyrochronology Version 2 #424 (now this paper, V4)