Recent thoughts:

-Dad says (after we read Hamilton's river model paper): To sound more official to academics, make sure to say your work involves the "Painlevé-Gullstrand metric" of the Schwarzschild solution!

-I should get a special bound notebook for my Flowing Space/GR calculations, to keep them all in one place and in sequence.
-I should go over chapters 9 and 12 (Schwarzschild geometry and black holes) of Hartle *thoroughly* and see if it's all just flowing space and if it can tell me anything about the differences/commonalities between GR and FS. This morning I derived the r = 3GM/c^2 circular light ray orbit just by requiring v = c (=> vt = c/sqrt 3 because vesc = c\sqrt{2/3}) and v^2/r = GM/r^2.

-Oh crap, I have to know the GPS system inside-out!!
-work on generalized Doppler effect? wait nvm maybe.
-Check Penney's calculations regarding Gravity Probe A results (partly by using the above general Doppler). Also look into their 'ionospheric correction' which looks SUSPICIOUSLY like the FS prediction… (see Gravity Probe A main report)

-Perhaps the reason why action-extremizing principles are so often satisfied by the trajectories of light/particles/etc. is because IF there is an extremum THEN the surrounding paths will interfere constructively with the extremizing path (assuming that the minimized quantity is related to the PHASE which produces the interference).

-One thing I could do, mathematically: Figure out whether there is a coordinate-independent formula for the ether velocity in GR (vs. Kirkwood's which depends on coordinates). If there isn't, I need to understand why.

-GPS involves sending signals to Earth and back... do they travel at c +- v? Or does the electronics correct for that somehow?-Ether tension <-> quark confinement and hardon (lol) jets?!

PROBLEMS TO BE SOLVED WITHIN SPACE THEORY:

-**Precession of the perihelion of Mercury:** Why does it emerge from GR and does it correspond to a flowing space mechanism? If so, does that mechanism make sense? Additionally, does it make sense even if the sun is a spatial source rather than a sink?

-What is this 368 km/s **anisotropy in the CMB**, supposedly indicating the velocity of our solar system relative to something??

-THE GPS SYSTEM!! And all its 'relativistic' corrections (see specific topic section)

-Does or doesn't light change wavelength as it exits a spatial source/sink, seeing as it's moving through regions of different spatial velocity along its path? So far Dad and I have been assuming that, in the gravitational redshift, the # of wavecrests passing a point in the ether is conserved. BUT,

since the light has a different velocity relative to the earth as it moves out from the Earth, this means the wavelength of the light would have to change! Our conclusion: We may not know enough to predict what happens, because we don't know whether spatial elongation/streaming/etc. occurs and what effect it would have on light.

-**Does gravitational radiation exist in flowing space?** If so, wtf is it? Neutrinos?

-**Ether tension/space removal problem**: Consider a spherical shell of matter. If the matter sucks spaces from ALL directions (including the inside of the shell), then the space on the inside of the shell should be removed and not replaced, so the shell should collapse. So, either the matter gets all its space from outside (in which case it would appear to have stronger gravity/be more massive than it is??) OR, as Dad says, there's 'ether tension'/canceling – the inner space is being 'pulled' equally in all directions by all the matter in the shell collectively, so it just doesn't go anywhere.

-**How does entrainment account for the (apparently) extra gravitational lensing that is seen around galaxies** (normally attributed to dark matter)**?**
My/dad's guess: the additional centripetal acceleration (and consequent velocity) from the entrainment (which is the source of the 'dark matter' effect) would also lens any light that passes through that space, exactly as expected. BUT, outside of this entrainment region, there should be no extra lensing. So I have to figure out where the lensing is seen to occur.

-**What determines the outflow strength of a source**, e.g. a star?
Why do most of the stars we see, for which we have measured their gravitational mass from kinematic effects on nearby bodies, appear to have a mass commensurate with what we would expect from a sink of similar composition?

-Will the flow field between a source and a sink (or 2 sources) produce different effects than that between 2 sinks? For example, between 2 sinks there will be a spatial stationary point (clock rate = rate of clock at infinity commoving with the planets), but between a sink and a source the flows add, so there's no stationary point.

-What happens **to light as it passes through spatial shears/strains?**
(see also: gravitational lensing, Shapiro effect, and the 'aberration' problem of why an observer on the Earth doesn't see the positions of all objects as being distorted due to light 'falling' with the inflow as it travels from the source to the observer. Dad says it's because light goes everywhere and the observer's velocity relative to space causes an aberration effect.) Relevant phenomena: Stellar aberration, Shapiro delay, gravitational lensing, GPS redshifts and travel time errors/lack thereof.

-The **SN1987A** photon-neutrino delay (SOLVED?):
Dad says that a sphere of new space with diameter of 3 light hrs was produced almost instantaneously, through which the photons then propagated at c. Hence the neutrinos (high-frequency gravitational waves) arrived 3 hrs earlier than the light.

-**The speed of gravity (SOLVED?):**

According to VanFlandern, all known astronomical data require the speed of propagation of the gravitational interaction to be essentially instantaneous. As dad and I worked out, this is explicable in flowing space theory if the interaction between two masses is merely an interaction of their extended flow fields at the interface between them. This is basically another example of entrainment: Mass 1's flow field moves Mass 2's flow field/entrainment sphere, and Mass 2 simply is carried along by its entrained space/flow field, though it is not moving in its own space. (Is this compatible with the observed radial Doppler shifts in binaries? I think so; see also: cosmological redshift.)

-**The cosmological redshift:** is it or is it not a simple Doppler effect?

It could be kinematic, even though the masses are not moving in their own flow fields. Because the distance between us and the mass is changing nonetheless, so doesn't the light have to be redshifted? Maybe the difference is that the 'kinematic' Doppler shift only depends on the relative velocity between source and observer *at the time of emission*. But if the distance between source and observer continues to change after emission because of spatial creation, then that could also contribute to the redshift (which probably corresponds to the "photons being stretched as they travel" in GR cosmology)… But, how exactly would that work? And would it actually change the wavelength of the light or just change the travel time?... Yeah, it only affects the wavelength if a) it occurs during emission or reception and/or b) it actually involves new spatial cells being inserted in the wave (and even that might not do it)

POSSIBLE PHD THESES:

-See if flowing space can improve the GPS system!

-Experimentally test the velocity dependence of gravitational redshift (should disappear for a particle falling at v_esc.)

-Does time dilation occur for non-atomic clocks? (This experiment is probably just about impossible since I don't think any other type of clock is similarly precise)

-Analyze Bell's theorem/anticorrelation experiments?

-Aberration of light in ether shears; implications for stellar aberration and gravitational lensing

-Misapplications of GR?

-Accelerating charged particles; whether they radiate in freefall or when sitting stationary on Earth's surface; whether a comoving detector measures radiation. Note this would be an experimental thesis.

-Show that GR *in general?* (or the good parts of it) can be interpreted as a flowing space theory with the spatial principle of equivalence. Make any revisions or modifications necessary. (Apparently Kirkwood and Martin did this already but I don't totally understand it and maybe they didn't either)

-Calculate how much and what form of entrainment is needed to account for 'dark matter'. (Be careful not to become ad hoc. Ideally, it should be part of a coherent theory that explains why you get this type of entrainment.) See if you can explain why some types of galaxies/clusters have more dark matter effect than others.

-I want to figure out what all this quantum shit is, and electromagnetism and light (probably need to do those first)! It's what I want most of all, and it's the most mysterious. What the hell is quantum mechanics?

Tentative topics for flowing space PhD thesis

(in rough order)

1. Review of Schwarzschild flowing space (stationary spherically symmetric sink) (Kirkwood, 'Physical Basis of Gravitation')
2. GR translated into aether flow (Kirkwood, 'Physics of metric space with a time variable'). Is GR mathematically identical to flowing space in the Schwarzschild setting? evidently not. It seems to lack the directionality of flow in some respects, e.g. directionality of grav. time dilation.
3. Compare predictions of GR to those of FS/show how FS explains GR effects physically: gravitational lensing, Shapiro effect, precession of perihelia, GPS stuff, …
4. Criticisms of GR/explanation of why FS is superior (see dad)
5. Explain inertia:
    1. Use Newtonian/Einsteinian/Lagrangian mechanics, and observations etc. to figure out how the flow pattern changes when a body changes velocity. Results: physical explanations of force, momentum, inertia, possibly relativistic mass change with velocity, etc. How and why does the ether resist acceleration if it's a 'frictionless' 'viscosityless' 'fluid'?
    2. Flow needs to satisfy: Self-sustaining steady flow for constant velocity; 'back-reaction' for acceleration/forcing. (Dad says relativistic mass increase is only inertia increase and probably is an electromagnetic, rather than 'hydrodynamic', phenomenon.)
    3. Also you need to show how flows can 'superposition' in the ways and circumstances that are confirmed to occur as according to Newtonian gravity. Dad says it's 'ether tension', defined as something weird that happens when two masses are simultaneously trying to pull the same body of ether towards themselves.
6. Generalization to arbitrary mass distributions and/or moving bodies (-> entrainment) [BUT FIRST, analyze the corresponding solutions in GR and figure out whether they produce entrainment]
7. Review of current experimental support/constraints; suggestions for experimental tests (preceded by discussion of effects predicted by flowing space that are not predicted by GR). If possible, acquire and analyze GPS data for time dilation difference btw. clocks moving up against or down with aether flow, especially if GR predicts no difference. (Gravity probe A is not sensitive enough to detect the difference, because it looks at Doppler shifts instead of total time elapsed, according to Richard Benish. But if it's not sensitive enough to do that, then how could it be sensitive enough to detect what they claim they detected, since flowing space would produce an equal and opposite effect?...)
8. Analyze Gravity Probe A and figure out whether it doesn't contradict (or possibly supports) the flowing space prediction.
9. Show why FS works with the GPS system. See if there are any observed corrections in the GPS that are predicted by flowing space but unambiguously *not* by GR. (other than the use of the Earth-centered inertial frame of course)
10. Entrainment and how it can account for dark matter: Calculate how much and what form of entrainment is needed to account for 'dark matter'. (Be careful not to become ad hoc. Ideally, it should be part of a coherent theory that explains why you get this type of entrainment.) See if you can explain why some types of galaxies/clusters have more dark matter effect than others.

11. Spatial sources and *cosmology* (esp. the dark energy/the expansion of the universe and its relation to stellar productivity); predictions for and/or constraints from Large Scale Structure
12. Resolutions/responses to most common objections, such as stellar aberration (mostly things Henry has looked into)
13. Bonus exercise: figure out if you can explain the variation in measurements of G.
14. Does energy in general produce gravity, as GR claims? The vacuum energy catastrophe seems to prove that it does not.
15. Does gravitational radiation exist in flowing space? If so, wtf is it? (neutrinos?)

EXPERIMENTAL/OBSERVATIONAL TESTS:

- **Repulsive gravity:** First of all, there should (? I'm still not convinced this is necessarily true) be a repulsive (repelling from the center) force inside any massive object, because the inflowing ether has to stop somewhere. Tom Martin's experiment: Given a relatively small mass on Earth's surface, below or within the mass, there may be a repulsive axial gravitational force (repelling from the central axis of the object). That is, the ether may have to accelerate/brake away from the central axis of the object while or after it flows through the object.
- **Anomalous clock slowing** (no time dilation) in the stagnant (zero flow) region between two sinks (e.g. the sun and the Earth or perhaps the Earth and the Moon)
- Signs of spatial motion in stars that are moving at different velocities relative to the stars in their local area. BUT if the stars entrain the space at their surface, that would remove many of those effects. But there might still be some anomalous gravitational effects at the Hill sphere (see first bullet).
- It appears that there are no anomalous, non-Newtonian gravitational forces in the region surrounding the Earth (specifically at the radius where its flow merges into the Sun's entrainment sphere). One would expect some transverse flows in this region. But maybe it works out so that only velocity effects are anomalous, but the acceleration field still looks Newtonian.
- Find plenty of experimental results that exhibit and confirm the 'special frame', contradicting the principle of relativity. Examples: GPS system, stellar aberration, no position aberration with moving charges (Stark), etc.

EXPERIMENTS/FACTS CONTRADICTING GR:

- **Energy does not produce gravity!** The "**vacuum catastrophe**" probably proves this, at least according to the equations of GR. Reminder: the vacuum catastrophe is the factor of 120 orders of magnitude between the measured vacuum energy and the value of it that would fit the observed expansion of the universe. That is, the measured vacuum energy isn't producing nearly as much gravity as they think it should.
- The "midnight problem": no difference in clock rates on the sides of the earth nearest and opposite the Sun (one would expect such a difference due to the Sun's gravitational field). Source: Dad. (Maybe this is can be accounted for (in GR) because Earth is orbiting the sun???)
- No observed transverse Doppler shift due to the translational motion of the Earth or the Sun. Source: In one of my graduate GR textbooks, they calculate clock rates on the surface of the

Earth. They say you have to account for gravitational redshift and the Earth's rotation, but never mention the Earth's translational motion! Dad has said he's seen this exact same thing elsewhere, and with the Sun.

- GPS stuff [citation pls. see Hatch.]
- Stellar aberration
- Sagnac effect
- Hafele-Keating experiment (sort of; at the very least is not completely explained by GR.)
- the universe

OTHER (BIG) PROBLEMS I NEED TO WORK ON

- Figure out which parts of mathematics are physical-Cosmic and which aren't, and to what cosmic entities they correspond/are applicable. For example, Olber's paradox exists only because mathematics assume quantities can be infinitely subdivided; whereas in (quantized) reality, if one moves a light sufficiently far away, one will not detect ANY luminosity from it (unless it superposes with something else to add up to a sufficiently strong disturbance – see also dad's analysis of anticorrelation experiments, superposition).

SPECIFIC TOPICS/ISSUES

MISC. THOUGHTS

- Experimenters' inability to measure a consistent precise value for **Newton's constant *G*** almost certainly is the result deviations from ideal ether flow/the flow fields of small masses being heavily distorted by that of the Earth.
- Dad says that a recent experiment (the one with aluminum and some other metal, or something) falsifies the "gaining energy/changing frequency as it falls" explanation of the gravitational redshift, because they actually *saw* the two clocks at different heights running at different rates.
- **Even GR's concepts are FS in disguise:** As I read about GR, it's becoming clear that all the concepts they've invented to deal with curved spacetime are actually flowing space concepts – namely, manifolds (space!), intrinsic vs. extrinsic curvature, lack of background geometry (your local space is all you've got! the only background is other space in other places!), local vs. nonlocal experiments, "straight lines" being defined by physics; in particular, problem of comparing things nonlocally… Flat spacetime is just ether in uniform motion with no accelerations anywhere. I wonder if 'curved space' has any analogue in ether theory? I'm thinking it's related to the missing volume issue.
- **Thoughts about QM**: More waves (oscillations) => higher energy, according to Schroedinger equation. The more outer electrons in an atom have progressively more nodes than the inner ones. Also, the outer electrons need lower frequency light (less waves per e-quant?) in order to eject them. And as far as I know, molecular ionization energies are lower (lower frequency) than atomic ones (whatever that means – need to be specific to make a real comparison), which

surprised Dad. (this is to be expected also b/c the molecule needs to be thermodynamically preferable to the separated atoms)

- 07/07/15: If indeed matter both consumes space and is composed of space, it's kind of interesting (or maybe not at all) that matter doesn't devour itself and other matter as well as light (i.e. all structures and processes existing in and of space)… or does it?? Black holes do, but only via the strength of the sink, not by virtue of the sink itself. See also: matter-antimatter annihilation. Empty space contains so much radiation and particles and activity; is that destroyed when the space is consumed or does it escape somehow? If the former, then why aren't all particles/light consumed similarly?
  Also, isn't it true that bound electrons (or any other kind of structure) around a sink must be constantly moving through space (resisting the flow) in order to avoid being consumed? If so, why aren't they time dilated… more tightly bound electrons need *higher* frequency light to eject them!
- As far as I can tell, **GR incorporates the ether velocity field, but primarily through the gravitational *potential* $\Phi \propto v^2$**. Therefore GR might not always incorporate the *direction* of velocity, only its magnitude and (possibly) the 'bidirection' of it (i.e. the line along which it, as well as its negative, points) (or possibly not the bidirection, but only the gradient/acceleration). To add flows, GR just adds the potentials, which explains why it fails to find saddle points as Tom Martin notes and why the Schwarzschild solution is consistent with both inflowing and outflowing spatial solutions. **BUT, apparently GR incorporates *some* velocity-direction effects**, because it specifically predicts that light can't escape from a black hole and can't enter a white hole (which is also a solution of the Schwarzschild equation, apparently). Note also that Kirkwood's flow analysis of GR, if correct, is based on the anisotropy of the speed of light in a frame moving relative to the ether.
- The easiest way to figure out what GR is might be to understand how Einstein produced it!
- According to LET, a moving observer's rulers are length contracted – therefore he measures everything to be *longer*, not shorter. Similarly, he should see other clocks as running *faster*. This is actually suggested by the form of the Schwarzschild metric (as I noticed a few weeks ago, and as I later found out that (I think) Tom Martin noticed as well). The coefficients in the Schwarzschild metric imply that an observer at radius r should measure less ticks on his clock and more ticks on his ruler than an observer at ∞ measures in the same spacetime interval (that statement makes no sense in GR, of course, because it's 'nonlocal').
- In a recent discussion with dad, he noted that a test particle moving through an (spatially) accelerating ether flow will always end up with its final velocity being closer to the ether velocity (i.e. lower speed relative to the ether) than when it

began (regardless of whether it started out with or against the flow). We think this is why the "**maximization of proper time**" principle of relativity works.

NON-IDEAL FLUID BEHAVIOUR AND 'WHERE DOES THE SPACE GO?'

In considering the question of why FS does not flow like an ideal fluid (note: as Dad observed, the acceleration has replaced the velocity!!), it may indeed help me to think about manifolds, especially real ones like curved surfaces and why, physically, they have these properties.

-**Missing space** in a 1/r^2 spherically symmetric inflow!!

Idea: Fiddle with the metric. That is, find a metric which makes the missing space go away. See what it is and if it makes any sense. Otherwise, try more topology stuff… **Better idea:** Actually it seems like dad's ether-cell elongation idea does work. Whew. I'm not completely sure though so think about it thoroughly.

Update (07/07/15): Whether you predict that there are more or less 'ether cells per volume' depends on whether you want ether cell flow rate (#/time) or volume flow rate (vol/time) to be constant at all distances, respectively. (less = spaghettification) BUT either way the # cells/volume still diverges to ∞ or 0 as r increases. Specifically: Constant volume flow => # ether cells per volume $\propto r^{3/2}$, constant ether cell number flow =>$\#$ ether cells per volume $\propto r^{-3/2}$

THE GPS SYSTEM

UPDATE 07/18/15: I did some calculations; see my paper "Some calculations regarding the operation of the GPS in flowing space." FS appears to be perfectly compatible with the GPS system and VLBI.

In fact, there is an eerie correspondence between the errors I calculated FS would produce in their measurements (given that they correct things assuming light propagates isotropically at c) and the reported accuracy of VLBI and the GPS system/magnitude of the relativistic corrections whose FS origin I am uncertain about, e.g. Shapiro delay for GPS system is <= 2 cm..

FS also reproduces the Shapiro delay for a signal passing between Earth and Venus/Mercury via the Sun. Moreover, the way I calculated this is basically identical to how I calculated the VLBI and GPS stuff in my paper. This seems to imply that the Shapiro effect is, indeed, a result of spatial velocity changing the propagation speed of light.

-Hatch claims that the technique of **VLBI** (Very Long Baseline Interferometry) is incompatible with spatial flow – if they were wrong about the timings of the signals then the image would be out of focus.

-Address **Ronald Hatch's objection** to entrained ether:

In the GPS system, the effective path-length traversed by signals in the ether appears to be independent of whether the signal goes across or along the radial flow (according to Hatch). That is, there is no (unexpected) delay of a GPS satellite on the horizon vs. a GPS satellite directly overhead. Oh shit, could this be relevant to the experimental test Dad came up with? It may also be related to the 'disappearing space' problem, hmm. **Update:** The delay due to non-radial propagation (of the signal from the horizon satellite) may be exactly the SHAPIRO DELAY (which, according to Ashby 2003, is so small that GPS people don't account for it but they're working on in nonetheless).

However, I haven't done any calculations yet. I should calculate the expected delay due to non-radial propagation and compare it with the formula for the Shapiro delay. **Update 2:** I did a numerical calculation which seems to indicate that the error would only be a few millimetres, but that sounds implausible so I'll have to find another way to do it.

-**Ronald Hatch's GPS satellites in a uniform flow (SOLVED):**

This is because the transverse Doppler effect is exactly canceled by the RATE OF CHANGE of the travel time due to the satellite's motion. (The travel time, on the other hand, remains anisotropic. But I think Hatch argues that, because the flow is uniform, this can be compensated for by how the GPS clocks are synchronized. **Note**: Any two clocks, both with the same uniform velocity relative to space, can easily be synchronized such that the speed of light appears to be the same both ways (same travel time).

STELLAR ABERRATION AND RELATIVISTIC BEAMING

Status: Light is aberrated upon passing through a shear in the ether flow. So for example, the aberration seen on Earth occurs because the light changes direction at the interface between Earth's entrainment sphere and the ambient (solar) space. Of course, there's no sharp boundary – instead the aberration is integrated as the light passes through gradually more entrained space.

The manner in which light changes direction is intriguing; see the note about van der Togt. According to him, the light maintains its direction relative to the original ambient space – the aberration occurs because the new space is in motion! In this picture, the light was *always* aberrated relative to the Earth. But as dad says, this is an abstraction that may not really be meaningful – and it doesn't answer the question of the physical mechanism.

More interestingly, on 07/13/15 we solved the problems of source aberration and relativistic beaming:

1. **Aberration at the source** occurs at the boundary between the source's entrainment sphere and the ambient space, and it is a *relatively small effect* because it only has the ability to alter the star's position to somewhere else within its entrainment sphere (and possibly distort its surface features and/or size). The bigger the entrainment sphere, the more extreme the distortions and aberration, I think – but maybe it doesn't matter.

2. Source aberration is exactly **relativistic beaming**! This is technically what the relativists were already saying, but it doesn't make the phenomenon relative at all because the source aberration has almost no effect on the observed aberration (that is, what location the observer thinks the light is coming from).

But it's just because the source emits isotropically *in its entrained space* which is aberrated upon exiting its space (just add the velocity vector). Also, this shows that the

'speed of light constant w.r.t. all observers' postulate of SR is actually *a result and consequence of entrainment!!!*

So far we've been saying that source aberration happens because of the entrainment sphere. But in fact, one aspect of source aberration is also seen in *moving free charges* – namely, relativistic beaming! And the experiments of J. Stark show that *no aberration of position* is seen with moving charges – which is exactly what dad and I would predict for an object with no entrainment sphere! Another immediate conclusion: **relativistic beaming in free charges is just the reverse of (stellar) aberration as seen by a nonmassive moving observer with no entrainment sphere.** (Note that this is just a less stupid version of how relativists understand it.) And for massive space-entraining objects, both of these effects occur the same way, but *at the boundary of the entrainment sphere of the object* instead of at the object's surface. This implies that the same physical process is at work in both cases!!

Moreover, Dad says that the experiment to determine **whether the aberration occurs at the Earth observer** or not has already been performed – it's just **Airy's water-filled telescope experiment!** This is cited as a failure to detect the luminiferous aether via Earth's motion through it (ether drag). In fact, it is just another support for the entrainment hypothesis!!

Sidenote: Carel Van der Togt ("Unbelievable")'s understanding of stellar aberration with entrained ether is the same as ours, but he expresses it in an interesting way: When entering the Earth's entrained ether-sphere (Ether II) from the ambient ether (Ether I), light *maintains* its direction *relative to the earth/relative to Ether I* (but *not* relative to its surrounding ether, which is now ether II rather than ether I). Consequently, its direction relative to the new ether is different than its direction relative to ether II – by exactly the stellar aberration prescription. But at the same time, its speed has to be c relative to Ether II (not Ether I), and to accomplish this its wavelength (not frequency b/c of conservation of cycles) must change – which, Togt says, turns out to be exactly the **Doppler effect.** This, of course, is the same as my/Dad's/Stokes' idea that the aberration occurs at shears in ether flows.

DARK ENERGY/EXISTENCE OF SPATIAL SOURCES

Created: 07/20/15

Reasons to suspect that stars (hence galaxies) are spatial sources: Explains the structure of the universe (voids and filaments); explains the apparent expansion history of the universe, and hence the stability of the universe (as opposed to steady-state); leads to a very believable bang-crunch theory of cosmic evolution; is the natural complement of the idea that matter

consumes space (but that space shouldn't just disappear from existence forever, and in particular should be released when matter is destroyed) (see below). It also may provide an explanation for relativistic jets from black holes, forming stars, etc.

If matter is consuming space and not releasing it, then logically, space should be released if matter is destroyed (nuclear reactions). One should also believe this because matter is some kind of spatial cell-structure, so if the structure disappears then only space is left (although perhaps the amount of space is equal to that which was already occupied by the structure).

Note also that the idea of matter consuming and somehow 'containing' the consumed space seems to *require* the idea that spatial cells can change volume, shape, etc. It also implies that older massive particles should yield more space (more neutrinos?) upon destruction. I may be able to find some experimental evidence to support or counter this.

Dad says he also tends to believe nuclear reactions create space because of the nuclear blast effect seen with nuclear weapons (which was also seen with high-altitude nuke tests, albeit not as strong).

Question: As far as I know, there seems to be a pretty stable relationship between the mass of a star and its apparent composition (based on spectral lines). Therefore, if stars are sources, there must be something constraining the relationship between the mass and source strength of the star. This constraint would probably be related to the fact that the star is prevented from collapsing by the 'pressure' from the nuclear reactions.

Halton Arp thinks that matter increases in mass as it ages (and that this is the source of the cosmological redshift: heavier electrons, which Dad and I currently suppose is nonsensical. but maybe a heavier proton would do it instead.) which would make sense if the matter consumes and keeps spaces.

Another possibility: The space consumed by matter is somehow 'radiated away', perhaps not in the form of free space, but something else (e.g. Hawking radiation or some other quantum particles/excitations/light etc.).

Experimental/observational tests: Obviously the velocity-dependent gravitational redshift could be done (expecting the opposite result) if we actually had the means to do it. Other than that, maybe there's some way of seeing the gravitational redshift of things which happen to be on the sun and are moving in a known manner (if such things exist). Apart from that, you have to make sure that stars being sources is consistent with everything we know about them (relativistic effects e.g. gravitational lensing, Shapiro delay (confirmed), precession of the perihelion of Mercury…)

Facts: -Wilczek (in Lightness of Being) says that dark energy has the property of being proportional to the amount of space; that is, if you add more space to the universe, you add a proportional amount more dark energy (linear).

Reading: https://en.wikipedia.org/wiki/High-altitude_nuclear_explosion

https://en.wikipedia.org/wiki/Effects_of_nuclear_explosions

FLOWING SPACE GRAVITATIONAL REDSHIFT EXPERIMENT

This experiment could be done many ways, but the basic idea is to measure the *(radial) velocity dependence of the gravitational redshift.* For a clock moving upwards against the flow, FS predicts higher redshift than GR. For a clock moving downwards with the flow, FS predicts that the grav. redshift should be reduced, disappear completely at v = v_{esc}, and then increase as v increases further:

GR prediction: $\frac{f'}{f} = \sqrt{1 - 1/c^2 \left[\left(\frac{2GM}{R}\right) + v^2\right]}$

FS prediction: $\frac{f'}{f} = \sqrt{1 - 1/c^2 \left(\sqrt{\frac{2GM}{R}} + v\right)^2}$ (v positive if moving upwards, negative if falling)

Two potential experiments that could be done:

1. ***Macro*** experiment: Send a rocket straight upwards as in Vessot-Levine. Measure the proper time elapsed or the Doppler shift (which is just what Vessot-Levine did but with lots of weird untrustworthy corrections and a built-in Doppler cancellation) along the trajectory.
2. ***Micro*** experiment: Accelerate a small object (perhaps an atom(s)) up to/almost to the escape velocity. Measure the redshift (e.g. of spectral lines) when it's moving straight upwards and straight downwards. When corrected for primary Doppler, the results should reveal that the gravitational redshift disappears/is greatly reduced when the atom is falling, and is enhanced when it is moving upwards.

DARK MATTER

- Recently, dad suggested that to test the entrainment hypothesis of dark matter, we should see if there's any way to experimentally distinguish the solar system's 'local' velocity (velocity relative to its local space) to its orbital velocity around the galactic center. If entrainment is occurring, the local velocity should be less than the orbital velocity.
- According to "Galactic searches for dark matter" (Strigari, 2013) and all previous studies of the same type, there's positively no sign of dark matter in the disk of the galaxy. They appear to use the same analysis that this conclusion was based on in earlier years, namely that stars moving through the galactic disk exhibit no excessive attraction to it (as measured from their velocities). As Freeman and Mcnamara describe, this is an uncomfortable situation for dark matter theorists. This supports the entrainment hypothesis, which predicts that the entrainment, being cylindrical in the plane of the galaxy, has little or no acceleration perpendicular to the disk.

- Robin Ciardullo at PSU has found evidence (by measuring radial velocities of planetary nebulae) that some elliptical galaxies do not appear to contain any dark matter, neither within the galaxy nor in a halo surrounding the galaxy.

THE SPEED OF GRAVITY

See VanFlandern's paper; all known celestial mechanics is consistent only with an infinite (or ~ 10^10 c) speed of progagation of gravity (otherwise you might have a Poynting-Robertson effect or at least a retarded potential => masses orbit each others' retarded positions, unless it's like E&M where somehow the field compensates for velocity, but even if so, the masses are still accelerating!). I do not know whether or not this conflicts with GR; I have to ask people. But Dad said that in Flowing Space, the problem is solved because the masses' *flow fields* interact – the masses are as big as their fields, so the interaction is direct and not 'at a distance'. Does that work? Don't different parts of the field still have to communicate changes to one another?

LENGTH CONTRACTION

I think that, if length contraction is real, it simply means that moving objects are shortened in the direction of motion. Prediction: Objects moving at equal and opposite velocities in the ether should measure each other's lengths as proper, despite the large relative velocity between them.

I have yet to see any direct evidence for the reality of length contraction. However, it does appear to apply to charges (classical electromagnetism), and apparently even nuclei. Here are three excerpts from Wikipedia, 'Length Contraction'.

- Heavy ions that are spherical when at rest should assume the form of "pancakes" or flat disks when traveling nearly at the speed of light. And in fact, the results obtained from particle collisions can only be explained when the increased nucleon density due to length contraction is considered.
- The ionization ability of electrically charged particles with large relative velocities is higher than expected. In pre-relativistic physics the ability should decrease at high velocities, because the time in which ionizing particles in motion can interact with the electrons of other atoms or molecules is diminished. Though in relativity, the higher-than-expected ionization ability can be explained by length contraction of the Coulomb field in frames in which the ionizing particles are moving, which increases their electrical field strength normal to the line of motion.[14][10]
- In free-electron lasers, relativistic electrons were injected into an undulator, so that synchrotron radiation is generated. In the proper frame of the electrons, the undulator is contracted which leads to an increased radiation frequency. Additionally, to find out the frequency as measured in the laboratory frame, one has to apply the relativistic Doppler effect. So, only with the aid of length contraction and the relativistic Doppler effect, the extremely small wavelength of undulator radiation can be explained.[15][16] **NOTE:** I did some calculations (with suggestions from Dad because I have a 5-volt brain) and found out that the formula for the result is identical if you apply a *primary Doppler shift only*, without the time dilation (= relativistic

Doppler –primary Doppler) or length contraction. (See "FLASHundulatorelectronscalculation.jpg" in Deformography.) So according to this, **the wavelength of the radiation emitted by accelerating electrons suffers no relativistic corrections/transverse Doppler shift.** In this example it also appears to be independent of the velocity of the electron (however, the calculation assumes v ~ c). Additionally, note that the formulae for the radiation (power and spectrum thereof) emitted by an accelerating charge do not feature Planck's constant h anywhere. So evidently **radiation by accelerating charges is a purely electromagnetic (not quantum, not electronic) phenomenon.**

- Relevant experiments: The Trouton-Rankine experiment allegedly shows that an observer moving with a moving object measures no change in length. They measured the resistance across a rotating Wheatstone bridge and found it to be constant (duh).

RELATIVITY OF SIMULTANEITY

!!! Ignore stuff below. <u>Final conclusion:</u> See Mansouri and Sexl. The difference between SR and ether theory is nothing but CLOCK SYNCHRONIZATION – which is not physical, it's just a choice the observer makes. Synchronizing one's clocks under the assumption of constant isotropic c (or something equivalent) is exactly what leads to the illusions of constancy of c, symmetric length contraction/time dilation, and relativity of simultaneity, etc.

And **SR only applies to observers in uniform motion for all time in flat space** (that is, these are the only observers for whom all things will appear relative). <u>Whenever</u> one has a situation where one observer/entity changes velocity (e.g. any SR paradox), it reveals and requires a third frame (the ether frame) – in GR terms, it is motion of the geodesic, so it has to be treated with GR/space theory.

One question: does stellar aberration also only become a problem for non-uniform motion? (e.g. orbiting binary, Earth's orbit, etc.) In other words, does 'absolute' aberration matter. I think yes because, even though you won't see anything physically abnormal, you would still find that the object is not where you think it is if you try to send a probe there (unless there's other rel effects going on).

(Old writing, before I understood this issue): ...is bullshit, because it's **based on the assumption that the speed of light is the same *in all directions* in all frames.** Whereas I have shown that, if a moving observer's rods are shortened and clocks slowed, he will measure the speed of light to be *c only for light propagating in the same direction as him.* Whereas **light traveling opposite or transverse to his motion will appear to have higher and somewhat higher velocity than c, respectively, when measured with his rods and clocks. NOTE**: This directly implies that Maxwell's equations are basically not "frame-invariant" (unless you measure distances and times in the way specified by the Lorentz transformations). But come to think of it, the Lorentz transformation is just a specification of how you "should" measure things in a new frame… I'm not sure it if has any physical content. One has to specify what type of device measures space and time according to the Lorentz transformations, and why.

In particular, it follows that the Lorentz transformations do *not* predict that a moving observer will measure parallel lengths as contracted. Because the derivation that predicts that relies on relativity of simultaneity to choose points that are simultaneous in the moving observer's frame.

If the observer instead measures the spacetime length between the ends of the rod that are simultaneous in the rod's (the rest) frame, then he measures $L' = \gamma L_0$, which is what would happen if his measuring rods are shortened.

But this is all meaningless unless we talk about how the observer actually measures the length of the rod and why he does it that way. Because what I'm talking about is a theory of what's really happening, not just about what observers measure, so the discussion cannot be restricted to the latter topic.

EXPERIMENTS TO KEEP AN EYE ON/PIGGYBACK

-ACES (Atomic Clock Ensemble in Space)

-Microgravity, Vomit Comit (now decommissioned), clock drop tower microgravity stuff

-Vertical atom interferometers – they drop atoms down a long tower, but they measure acceleration, not gravitational redshift/velocity. In fact papers have been published specifically proving that they don't measure gravitational redshift.