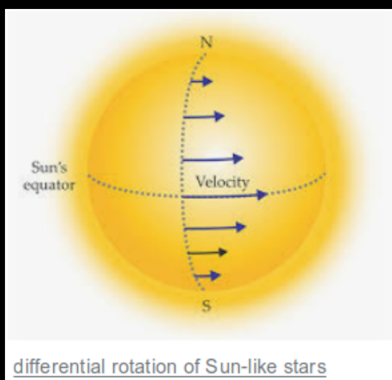
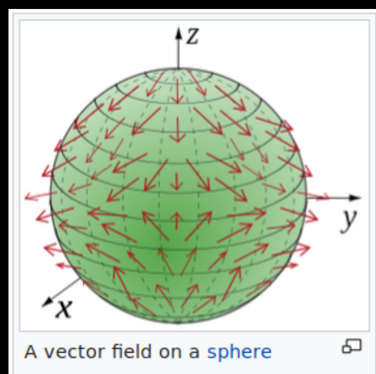
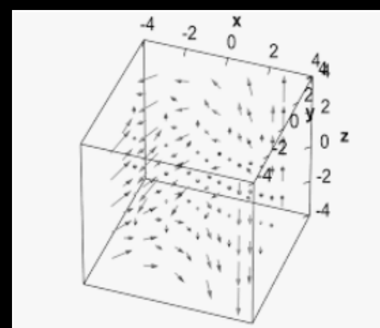
Flat Space Scalar Field Gravitation
sgm, 2018/DEC/17

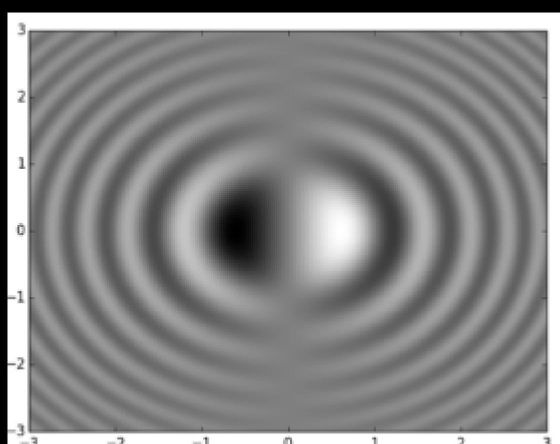
Engineers and physicists who can visualize (some sadly cannot), do. But *our visualizations may not always reflect reality*. They are similar to intuition but of course – are of a visual nature. There are *very few* things I am proud of but one thing I'm both ashamed and proud of is (ashamed that I am proud of a god-given gift): visualizing gravitational effects.







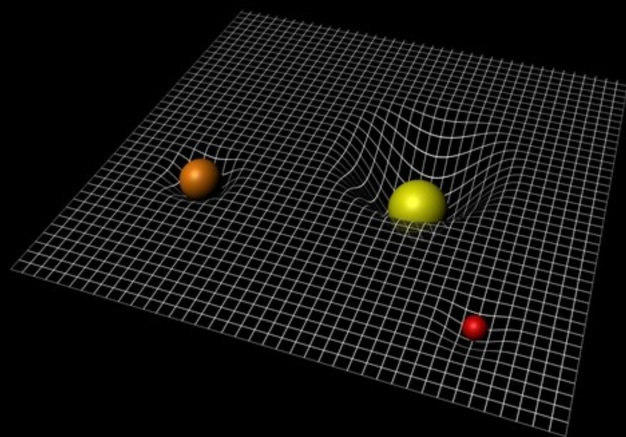
three images of 3D vector fields



an image of a 2D scalar field

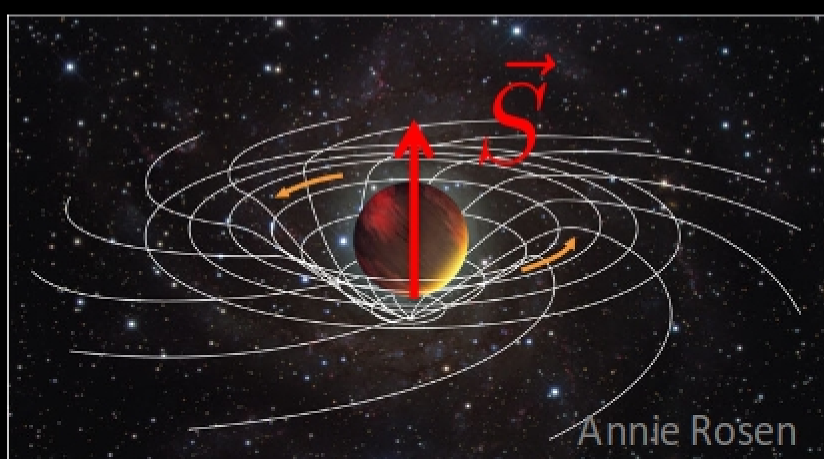
Please note the *striking differences* between vector fields and scalar fields. *Vector* fields contain *magnitude and direction* data – while – *scalar* fields hold at most [complex] *magnitude* data.

There are 3 gravitational effects we need to know if 'scalar is enough': gravitational field, time-dilation, and Lense-Thirring.



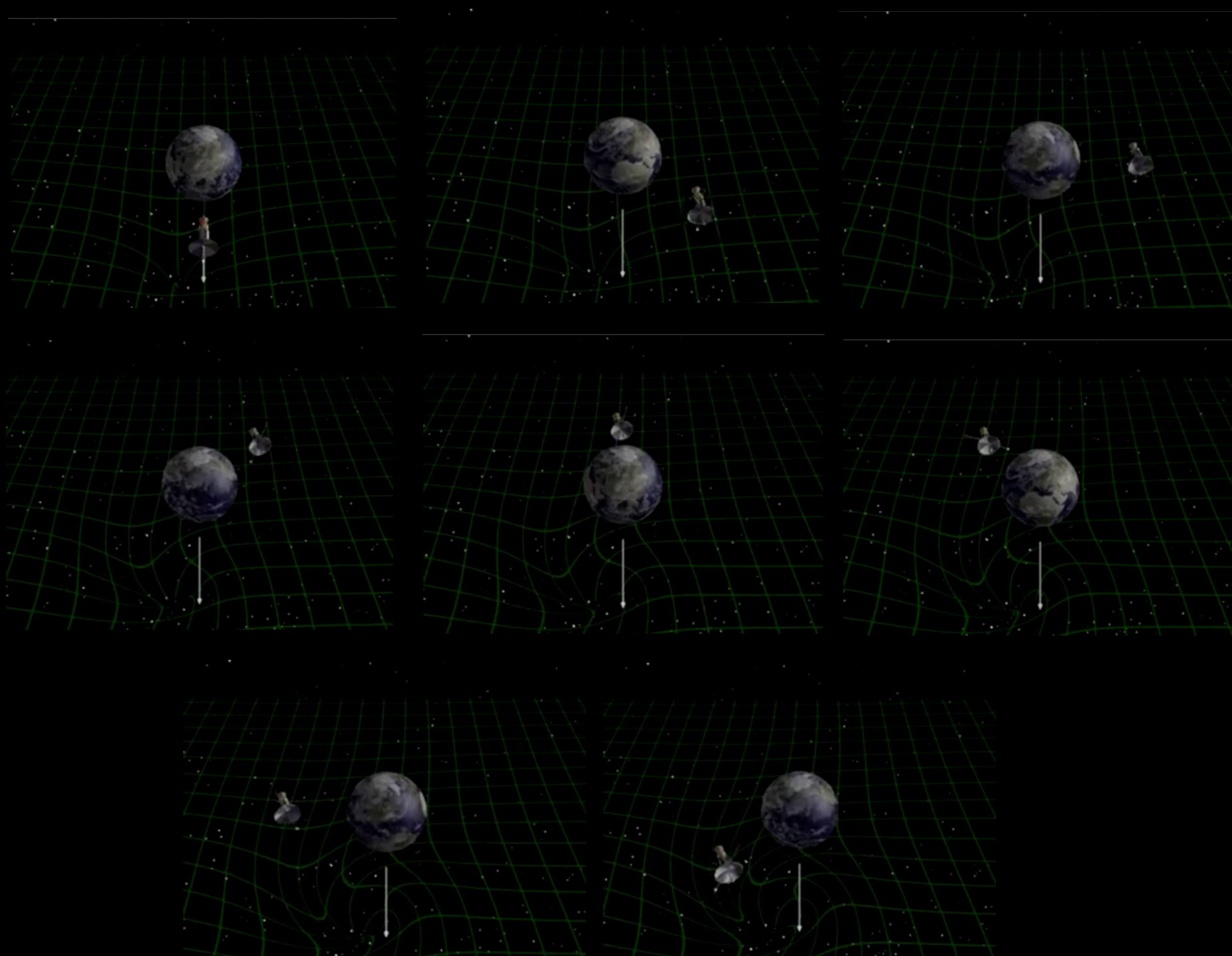
As we can inspect above, gravitational field is clearly representable by a scalar field. What may not be so obvious is time-dilation is as well. Every gravitational field has associated with it a time-dilation field that is typically ignored by physicists. It is not a vector quantity. So above also signifies the fact time-dilation is also representable by a scalar field.

That leaves Lense-Thirring:



This is a problem if we ignore the fact we're allowed complex numbers in a scalar field. This effect *clearly* is a manifestation of a *vector-field phenomenon* – IF we understand it properly. If so, *it appears to be a differential rotation of space-time* similar to the differential rotation of Sun-like stars depicted above on page one.

There have been several attempts to provide a scalar field flat space theory for gravitation over the last century. As far as I know, they have been successful in terms of reproducing / reconstituting General Relativity. However, I'm not sure how well they address Lense-Thirring. I have had trouble visualizing that phenomenon within my TET, temporal elasticity theory, framework since inception. I believe I may have a solution.



An illustration of how Lense-Thirring twists space-time, in conventional GR, but here within TET, *differential temporal dragging*.

	Conv'l GR	**TET**
gravitation	S-T-C	T-D
time-dilation	S-T-C	T-D
Lense-Thirring	S-T-D'g	T-D'g

S-T-C = space-time-curvature

S-T-D'g = space-time-dragging

T-D = time-dilation

T-D'g = temporal-dragging

One should note that 1.7 time-dilation on the surface of a neutron star in conventional GR should also imply 1.7 *space-dilation* which no one seems to recognize. Since space is flat in TET, we don't have to worry about that.

Upon first hearing about Lense-Thirring several years ago, I had trouble understanding it .. Of course later, I wasn't sure if I could accommodate it in TET, a scalar field theory. But just as it took time for me to accurately visualize gravitation in terms of TET, intervening time-dilation, it also took time for me to accurately visualize temporal-dragging to explain Lense-Thirring.

It's reassuring to know that TET is a robust framework which can handle the subtle nuances of GR explored theoretically and experimentally over the last century. Visualization can be a powerful and accurate mental simulation tool when employed carefully and conscientiously. Intuition, in this form, can be quite a gift.

"The intuitive mind is a sacred gift..", A. Einstein.