**Master Draft – E**

I propose that a massive object induces a “field” in the surrounding space. I propose that when a photon travels through this “field,” the momentum of the photon is shifted in an additive and linear manner – in accordance with the following equation:

Δ*p*=∫*pathp*⃗ ⋅*dl*⃗

where we integrate along the path of the photon and *p*⃗ is defined as

*p*⃗ =*r*^*Gm*ℏ*r*2

in units where c = 1.

Based on this proposition, we can make various calculations without using General Relativity. The results accord with empirical observation, thus “saving the appearances.”

**Bending of light.**

We imagine a photon that emanates from a distant source, passes close by a massive object, then continues beyond the object to an observer. The closest point while passing, i.e., the impact parameter, is at a distance of b from the center of the object. For ease of calculation, we will say that both the point of emanation and the observer are infinitely far from the massive object.

[figure]

*Note that as the photo approaches and then recedes from the massive object, the horizontal vectors cancel each other and the perpendicular vectors add together.*

We assume that to a first-order approximation the trajectory of the photon is a straight line. To calculate its change in momentum, we integrate along the straight-line path of the photon:

Δ*p*=∫*p*⃗ ⋅*dl*⃗ =∫+∞−∞*Gm*ℏ*r*3  *r*⃗ ⋅(*ωdz*⃗ )

*Since there is symmetry of vectors in the approach to and the recession from the massive object.* We can easily calculate the change in momentum in the direction perpendicular to the direction of travel:

Δ*py*=∫+∞−∞*b*  *Gm*ℏ(*z*2+*b*2)3/2  *ωdz*

This yields:

Δ*py*=ℏ*ω*2*Gmb*

We therefore get:

*θ*≈Δ*pypz*=2*Gmb*

which yields the deflection angle:

*α*=4*Gmb*

This is the same result as in the theory of General Relativity.

**Blue/Red-shift of light**

Using the same initial proposition, we can calculate the blue-shift of light. As a photon falls into a gravitational well, the momentum and hence the energy of the photon is shifted. Because the energy of a photon is generally expressed as a frequency, we say that the frequency of the photon observed at infinity is changed compared to when it is observed in a gravitational field at a distance *R* from the center of the massive object. We use the following equation to express this change:

ℏ*ω*′=ℏ*ω*+Δ*p*

To calculate the change in momentum, we again integrate along the path of the photon:

Δ*p*=∫*R*∞*p*⃗ ⋅*r*^*ωdr*=∫*R*∞*Gm*ℏ*r*2*ωdr*=ℏ*ωGmR*

This yields:

ℏ*ω*′=ℏ*ω*(1+*GmR*)

In the theory of General Relativity the equation is given as:

ℏ*ω*′=ℏ*ω*1(1−2*Gm*/*R*)1/2

As Gm/R approaches zero, equations [X] and [Y] converge. As Gm/R approaches one, the equations diverge.This could be a testable difference between my theory and Einstein's.