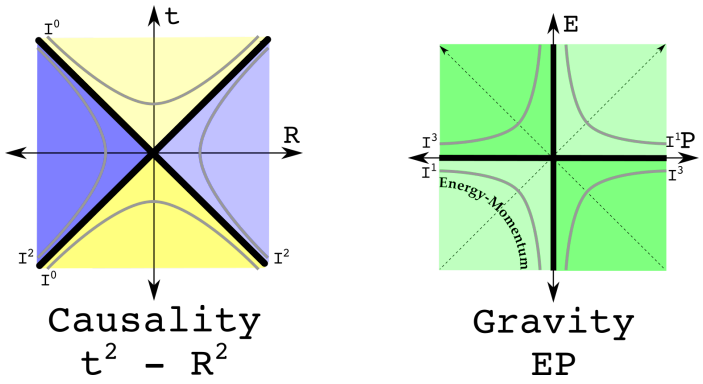
Create Your PGT Homework Assignment (PGT=Personal Gravity Theory)

A. Newton's theory of gravity was *too* simple since gravity only changed measurements of time and not space. Einstein's theory of gravity was *too* hard, requiring finding solutions to 10 nonlinear differential equations. Your assignment is to find a PGT that changes both measurements of time and space but is not too hard. To do physics, one needs to know where things are in space-time, and the energy-momentum. Here are two graphs of space-time and energy momentum, with zeroes in black and invariants in gray:



Treat space-time as a quaternion, with time *t* being real and space *R* being three imaginaries. Treat energy-momentum as a quaternion, with energy *E* as being real and momentum *P* being three imaginaries. Square both space-time and energy-momentum. What sort of physics arises when two observers agree on the real number of space-time squared? What sort of physics would arise if two observers agree on the imaginary value of energy-momentum squared? Show your PGT is consistent with some tests of gravity. Is it consistent with all tests?

(hint: $E \to E' = \frac{1}{\gamma_{esc}} E,\ P \to P' = \gamma_{esc} \quad (E', P')^2 = (\frac{1}{\gamma_{esc}^2} E - \gamma_{esc}^2 P, 2EP)$

B. Derive the transformation law found in the hint above. Note: I did not answer this question myself, it was the work of Purple Penguin. Hint. Set up a transformation law super similar to a Lorentz transformation, a mix of gammas, gamma betas, energy *E* and momentum *P*. For the energy *E* transformation, eliminate *P*. Good luck.

C. Come up with a proposal for all of these gravitational escape velocity gammas. I should confess I don't know the answer.

Email homework solutions to: sweetser@alum.mit.edu.
$100 for the first answer, $50 for the second, $25 for the third, $12, $6, $3, $2, $1.
Nine and later get a numbered and signed business card suitable for framing.