

**You've never seen me debate anybody. On anything. Ever. My investment of time, as an educator, in my judgment, is best served teaching people how to think about the world around them. Teach them how to pose a question. How to judge whether one thing is true versus another.**

**Neil deGrasse Tyson**



# **Energy in Everyday Life**

**yea, ok, but what IS energy?**

**Frank Timmes**  
**[ftimmes@asu.edu](mailto:ftimmes@asu.edu)**

**Currently there is no good answer to this question.**

**We've given operational definitions of energy, what laws govern energy, and how energy transitions from one form to another.**

**Energy is the fundamental concept, and for this reason, we currently can't say what energy it is in terms of something more fundamental.**

**The situation is reminiscent of gravity.**

**When Issac Newton invented “gravity” he gave an operational definition, expressed how it behaved and how it explained many natural phenomena.**

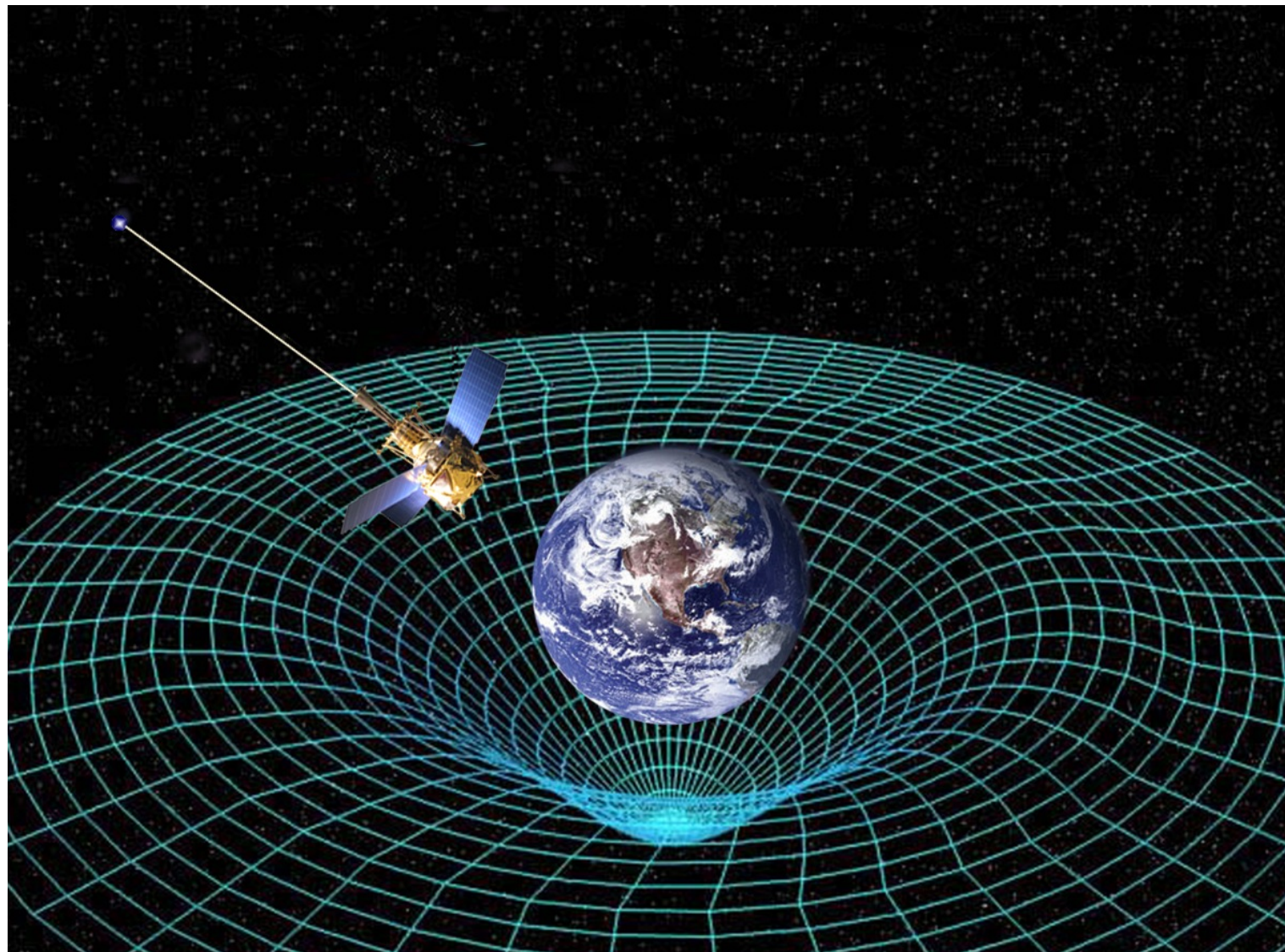


**But when asked “What IS gravity”, he famously replied “I frame no hypothesis.”**



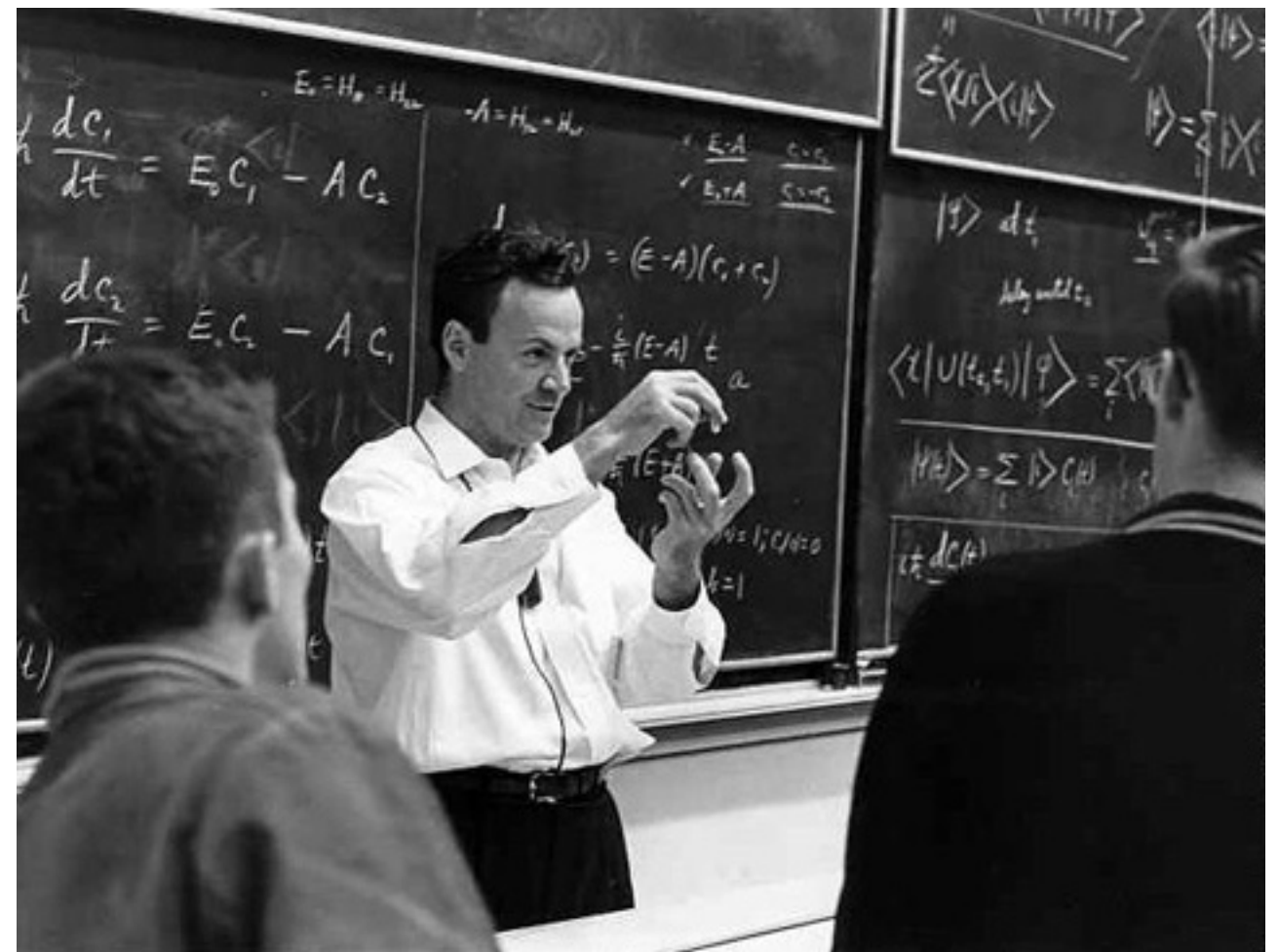
**It took several hundred years for a more fundamental description of gravity to be won.**

**We now know, via Einstein, that gravity is the curvature of spacetime.**



**“It is important to realize that in physics today, we have no knowledge what energy is. We do not have a picture that energy comes in little blobs of a definite amount. It is not that way. It is an abstract thing in that it does not tell us the mechanism or the reason for the various formulas.”**

**Richard Feynman**



**Maybe, like gravity, perhaps tomorrow or in 200 years we'll be able to give a more fundamental answer to “What IS energy”.**

