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On the question: Do electric charges and magnets distort space, in the way that a source of gravity does?

Roger J Anderton
R.J.Anderton@binternet.com

Looking at a Scientific American article dealing with the question: Do electric charges and magnets distort space, in the way that a source of gravity does?

The question "Do electric charges and magnets distort space, in the way that a source of gravity does?" is being answered by Charles Torre, professor of physics at Utah State University and a researcher in gravitational and mathematical physics. [1]

Torre answers: "Electric charges and magnets do indeed "distort space," but this happens on a couple of levels."

Then he must go into details: "First, a word of background. According to the current best theory of gravitation, which is contained in Albert Einstein's famous general theory of relativity, a gravitational field represents a curvature of space-time, rather than a distortion of it."

He seems to be implying that "distortion" and "curvature" of space-time are different things, but I would have thought they were much the same thing.

He continues: "Anything that carries energy, momentum and stresses is a source of a gravitational field, that is, a curvature of space-time."

"Electric charges and magnets are manifestations of certain types of matter, most particularly electrons. Since matter carries energy (via Einstein's famous relation that energy is mass times the speed of light squared), such objects will have a gravitational field and so they will distort space-time."

So, he is back to saying to "distortion" of space-time; thus, it must have been just vagaries in him, and will treat "distortion" and "curvature" of space-time as much the same thing.

He continues: "So one way in which a charge or a magnet will distort space-time is by its matter. That answer may not sound too impressive, but there is more. . .."

"You see, electromagnetic fields themselves carry energy (and momentum and stresses). The energy density carried by an electromagnetic field can be computed by adding the square of the electric field intensity to the square of the magnetic field intensity. As another example, a beam of light (produced from, say, a laser) consists of an electromagnetic field, and it will exert a force on charged particles. Thus, the electromagnetic field carries momentum. Because an electromagnetic field contains energy, momentum, and so on, it will produce a gravitational field of its own. This gravitational field is *in addition* to that produced by the matter of the charge or magnet."

So, an electromagnetic field distorts spacetime. But special relativity deals with electromagnetism in flat spacetime (not in curved spacetime) so something being missed out. There is a problem that general relativity deals with (or replaces) force of gravity as curved spacetime, but special relativity deals with electromagnetic (Lorentz) force in flat spacetime; i.e. two different ways of dealing with force; trying to unify them was Einstein's unified field theory quest. Torre is trying to gloss over this difficulty by omitting mention of it.

He continues: "A simple example of the gravitational (or space-time curvature) effect of electric charges arises in the "Reissner-Nordstrom" solution to Einstein's gravitational field equations. This solution describes the gravitational field in the exterior of a spherical body with non-zero net electric charge. (The solution describing the special case in which the net electric charge is zero is the famous "Schwarzschild solution" to the gravitational field equations.) From the Reissner-Nordstrom solution, the motion of test particles in the gravitational field of the spherically symmetric body depends on whether the body carries a charge. Just as the Schwarzschild solution can be extended to describe the famous phenomenon of a "black hole," the Reissner-Nordstrom solution can be extended to describe a "charged black hole." For an electrically charged black hole, the gravitational field of the hole includes a contribution due to the presence of an electric field."

That's still problematic about unifying electromagnetism and gravity; but not going into enough detail so passing on:

"I do not know (and I doubt) whether this aspect of gravitational theory (that electromagnetic fields produce gravitational fields) has been directly tested by experiment."

This is basically an admission that he doesn't know what he is talking about in trying to combine electromagnetism with gravity; he is not on strong ground with theory and he is not on strong ground as to what empirical evidence to cite.

He continues: "The difficulty is that the gravitational field produced by a typical electromagnetic field you can produce in a laboratory is predicted to be very, very weak. A better place to look for gravitational effects due to electromagnetic fields would be in astrophysical objects carrying a significant net electric charge. Unfortunately, to my knowledge, such objects are expected to be hard to come by. So, while the answer to

the question is definitely "yes" according to theory, the experimental status of this effect appears to be somewhat open."

When he refers to that it is "according to theory", he doesn't really have that "theory", all there is by the mainstream -is the disunified theories of electromagnetism dealt with in flat spacetime, and gravity dealt with in curved spacetime, and attempts to bodge them together. It is just the typical tactic of these science writers to gloss over or omit the difficulties with what they are talking about.

Reference

[1] Do electric charges and magnets distort space, in the way that a source of gravity does? Scientific American https://www.scientificamerican.com/article/do-electric-charges-and-m/ at 21 March2018