

CHAPTER 4

GOD'S WORD AND GOD'S WORLD IN CONFLICT?

GRAVITY AND GENERAL RELATIVITY

It usually takes time and many experimental tests for the scientific community to reach consensus about a scientific model. When the scientific community does reach consensus, it's a good indication for non-scientists that the model is reliable. In some cases, however, a long-standing model with the consensus of the scientific community has been overturned by a new discovery. One is the discovery of General Relativity. From the late 1600s to the early 1900s the predictions of Newton's law of gravity were confirmed repeatedly by experimental tests. But as technology improved, slight differences started to appear between predictions and measurements. For example, the orbit of Mercury was slightly different than Newton's model predicted.

In 1915 Albert Einstein proposed a radical new understanding of gravity called General Relativity. In General Relativity, gravity is not modeled as a force that pulls but rather as an effect of the curvature of space-time. The ideas and mathematics of this new model are much more complicated than Newton's model, but it successfully explained the orbit of Mercury.

In the following decades General Relativity successfully predicted the results of dozens of high-precision experiments and observations. In addition to explaining these new measurements, Einstein's model also explains all of the older observations and everyday experiences of gravity that were explained by Newton's model. In the decades since 1915 physicists have accepted Einstein's model as correct, but they also use Newton's model of gravity as a simple approximation for situations where high precision is not needed.

The history of science is full of people who claim to have developed a new scientific model that will overthrow an old, well established one. Most of the time, the new models are bad because they fail to explain the many experiments and observations that support the old model. But once in a while a new model like General Relativity is developed that explains all existing observations as well as the older model does. When this happens, it pushes scientists to invent new experiments in which the competing models make different predictions so that they can discover which one is better.

Scientists get very excited on those rare occasions when a new discovery conflicts with a well established model. This situation opens up a new area of research to pursue. Some scientists make it their business to test accepted models in more and more extreme situations to see if they can find any new natural laws. This experimental testing means that models accepted by the community have generally undergone serious testing. Thus, a scientific model that has community consensus, that has been around for some time, and that has survived many challenges from competing models is very reliable.

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