A Leap of Faith.

BY PROF. THEO VON HOHENHEIM.

IT is hard to say whether the speculation over the so-called Perry–Dean Shift will be exacerbated or alleviated by the results presented by Professor Ilan Goethe (the great poet’s nephew) in a recent issue of *Zeitschrift für Physik*¹. At face value they provide an explanation for the anomalies that do not invoke Interventionism. On the other hand, they demand that the Universe be far stranger than we had imagined.

If nothing else, Professor Goethe’s analysis provides welcome clarification of the point at issue. Much of the story has now been well rehearsed in our newspapers, albeit not without confusion. We all know how the work of Professor Einstein at Berne, building on that of Professors Planck and Lorentz, initiated a reconsideration of the foundations of physical science. He proposed a breakdown of Newtonian mechanics at both the smallest and the largest scales.

Einstein’s postulate that light is granular² — ‘quantized’, in the phrase now popular — has led to the development of quantum theory by Professors Bohr, Sommerfeld and others. And his proposal that the speed of light in a vacuum is the same in all inertial frames, contrary to canonical Newtonian thought, has led us to a unified view of time and space³, to a new formulation of the equivalence principle, and to a picture of gravity as curved space. So much is clear.

When, three years ago, Professor Goethe first unveiled his alternative theories of both microscopic and cosmological phenomena, based on nothing but classical mechanics, they were received coolly⁴. This is no more than one would have anticipated. Having made the monumental effort to reconstruct physics from the ground up, his colleagues could hardly be expected to take lightly the idea that their efforts had been for naught.

In certain respects, Goethe’s claims held little novelty. Lorentz and Poincaré, after all, had applied nothing more than Maxwell’s equations in a Newtonian framework to explain the failure by Drs Michelson and Morley to detect the luminiferous ether; Goethe’s ‘classical relativity’ added to this in only minor respects. His avoidance of the ultraviolet catastrophe of blackbody radiation, along with his explanation of light-stimulated emission of electrons from metals, was more inventive, invoking inertial limitations to the vibrations of his occluded ether which knitted the two extremes of the theory neatly together. Many believe that this work may now undermine, or at least postpone, Professor Einstein’s candidature for a Nobel award.

How, though, to distinguish Einstein’s Universe from Goethe’s? Discriminating tests were needed. Professor Adrian Perry and his colleague Miss Pearl Dean at Cambridge were the first to oblige. They showed that Professor Eddington’s eclipse observations of last year fitted Einstein’s relativity better than Goethe’s. Order was restored, but fleetingly. Last November, Perry and Dean uncovered archival astronomical observations from the 1839 eclipse that seemed better to match Goethe’s view.

A similar conundrum was shortly thereafter unearthed for the ‘quantum’ phenomena. Einstein’s theory worked best for the new data collected by Perry and Dean; but the notebooks of none other than Professor Weber, Einstein’s former teacher at

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Zürich, showed that measurements of blackbody radiation made in 1893 supported Goethe, in fine detail, better than they did Einstein himself.

The pattern was repeated wherever one looked: before the turn of the century, the classical theory worked best; after it, relativity and quantum mechanics triumphed. We have for the past several months been wrestling with the uncomfortable notion that the laws of physics themselves shifted around the end of the last century.

It is perhaps a comment on our troubled times that so many were eager to leap to a supernatural conclusion: Interventionism, the idea that some external agency has played a part. Last May, the Vatican issued its now famous statement on the matter. But Professor Goethe has given us what will be to many a more palatable explanation.

He suggests that the entire Universe is capable of undergoing a change of state, akin to that experienced by water as it freezes. Professor van der Waals at Amsterdam showed how these changes can be considered leaps between two energy minima. According to Goethe, the Universe may adopt either a metastable “false vacuum” state in which classical physics holds, or a globally stable “true vacuum” state governed by Einsteinian relativity and quantum theory. We have, he supposes, just witnessed such a transition.

Two aspects of his analysis remain rum, however. The first is that the theory requires the unhappy condition that the Universe is expanding. Professor Einstein has been so kind as to tell me that this may not, in fact, be so hard to credit; but astronomers will surely rebel at the idea.

Second, Goethe’s painstaking analysis of the onset of the Perry–Dean Shift dates it more precisely than previously, and confines it to no more than a day either side of 22 March 1894. Older readers may recall that this was precisely the day on which Professor Kelvin gave his lecture, now oft derided, in which he claimed that all the problems of physics were near to solution. One hopes that even committed Interventionists will not attribute to Professor Kelvin the power to provoke divine retribution for a moment’s hubris. Can we persuade them that “The Lord is subtle, but he is not malicious”?

1. Goethe, *I. Z. Phys.* **22**, 415 (1920).
2. Einstein, *A. Ann. Phys.* **17**, 132 (1905).
3. Einstein, *A. Ann. Phys.* **17**, 891 (1905).
4. Goethe, *I. Ann. Phys.* **29**, 272 (1917).