

Prof. von Jolly's 1878 prediction of the end of Theoretical Physics as Reported by Max Planck

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Abstract: It is provided here the original German and an English translation of a passage from a 1924 essay by Max Planck that reports a prediction of the end of theoretical physics expressed to him by one of his esteemed physics professors, Philipp von Jolly, while Planck was attending the University of Munich as a student in 1878. The decades to come, which saw the revolutions of relativity and quantum mechanics, proved the prognostication to be misguided.

Introduction

Periodically there are unimaginative voices that declare we are in a very unique and special time of history. A time when fundamental science is over and all that is left is carrying out more precise measurements and applying already understood and known laws toward applied engineering problems. Invariably such pronouncements of the barren future of science turn out to be more of a reflection on the pronouncer's mindset than on the actual prospects of future science progress.

Anyone who declared physics over in the 19th century was quite mistaken. What we know now would be mostly unrecognizable to the Victorians. General Relativity, Inflationary Cosmology, Nuclei, Atomic theory, Quantum Mechanics, Particle Physics, Quarks, Gluons, and the Higgs boson are just a few of the terms that evoke revolutions in our understanding of the natural world. All would be met with blank stares by even the best physicist equipped with only 19th century understanding.

In the present era we know about these revolutions in physics that took place over the last century, but some of the scientists those many years ago were not able to discern progress on the day to day level. They did not recognize that pushing hard to expand current understanding, whose benefit may go at an unrecognized glacial pace, will one day pay off. Measurements of progress can not be made easily in the course of weeks or years. The arc of truly meaningful discoveries is often only seen from a perspective of decades or more.

It is helpful to be reminded periodically of confident wrong predictions in order to inoculate ourselves against similar wrong thinking today. And the task of doing that was taken up by Max Planck in 1924, when he gave an address to the University of Munich entitled “Von Relativen zum Absoluten” (From the Relative to the Absolute). The passage below speaks for itself but let us say a few short words about Max Planck for those who are not familiar.

Max Planck was born in 1858 in Kiel and was educated at Friedrich Wilhelms University (FWU) in Berlin, where he was taught by several luminaries of physics and mathematics, including Helmholtz, Weierstrass and Kirchhoff. After defending his habilitation thesis in 1880 he became *Privatdozent* in Munich and ultimately made his way back to Berlin where he became a full professor in 1892 at the age of 34. He retired from FWU Berlin in 1926. He is most known today for his work in 1900 explaining black body radiation. His quantization ideas heralded the beginning of the quantum mechanics era which brought revolutions of basic science insight and applied science applications to the world. He also was a philosophical thinker and his ideas and approach to science were influential in the early 20th century.

In the passage below Planck refers to Prof. Philipp von Jolly (1809-1884). Unfortunately for von Jolly, he is most known today for his comments to Planck in 1878, near the end of von Jolly’s career, regarding the end of physics. However, von Jolly’s career was also illustrious, having made important contributions to the fields of gravitation and osmosis science. The esteem in which he was held among those in the scholarly community is evidenced by his knighthood in 1854. As we see, even knighted, respected scholars can be wrong, especially when prophesying that the future (no new science) will be fundamentally different than the past (continual new science breakthroughs).

In the next two sections the original German version and English translation of the quote by Planck is presented. As mentioned above, this comes from his talk “Vom Relativen zum Absoluten” in 1924 which is reprinted on pp. 128-146 of Planck (1933).

Passage in the Original German

“Als ich meine physikalischen Studien begann und bei meinem ehrwürdigen Lehrer Philipp v. Jolly wegen der Bedingungen und Aussichten meines Studiums mir Rat erholte, schilderte mir dieser die Physik als eine hochentwickelte, nahezu voll ausgereifte Wissenschaft, die nunmehr, nachdem ihr durch die Entdeckung des Prinzips der Erhaltung der Energie gewissermaßen die Krone aufgesetzt sei, wohl bald ihre endgültige stabile Form angenommen haben würde. Wohl gäbe es vielleicht in einem oder dem anderen Winkel noch ein Stäubchen oder ein Bläschen zu prüfen und einzuordnen, aber das System als Ganzes stehe ziemlich gesichert da, und die theoretische Physik nähere sich merklich demjenigen Grade der Vollendung, wie ihn etwa die Geometrie schon seit Jahrhunderten besitze. Das war vor fünfzig Jahren die Anschauung eines auf der Höhe der Zeit stehenden Physikers.”

English Translation of Passage

“As I began my university studies I asked my venerable teacher Philipp von Jolly for advice regarding the conditions and prospects of my chosen field of study. He described physics to me as a highly developed, nearly fully matured science, that through the crowning achievement of the discovery of the principle of conservation of energy it will arguably soon take its final stable form. It may yet keep going in one corner or another, scrutinizing or putting in order a jot here and a tittle there, but the system as a whole is secured, and theoretical physics is noticeably approaching its completion to the same degree as geometry did centuries ago. That was the view fifty years ago of a respected physicist at the time.”

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Reference

Planck, Max (1933). *Wege zur Physikalischen Erkenntnis: Reden und Vorträge*. Leipzig: Verlag von S. Hirzel.