

# **The Eighty Year Periodicity of Scientific Revolutions and What It Means for the Cold Fusion Field**

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## **Abstract**

About 19 years ago, I developed a theory of scientific revolutions and economic depressions that allowed predictions that have been accurate. This general theory allows one to understand how the new plasmoid paradigm may develop over the next 100 years, if science continues to develop in the eighty year pattern it has had for the last 600 years. During the next 20 years, younger people may accept the new paradigm and develop the physical theories. About 40 years from now, if the paradigm is accepted by society, inventors and technicians will begin to invent the paradigm's major inventions. Along with explaining the economic and scientific predictions of this theory, this paper describes the history of plasmoid research relating to the cf/LENR field. Of particular interest to people nowadays, twenty years ago this model accurately predicted the timing and characteristics of the economic depressionary period that is starting now. This model ties the economic long-wave cycle to scientific revolutions in physics.

## **Introduction**

The "Cold Fusion" field is a group of researchers who are researching many experimental anomalies that involve transmutation reactions, superconductivity phenomena, anomalous radiation or anomalously high energy atomic reactions, and ball lightning. The research started during the Kuhnian [1] crisis period in physics from about 1972 to 1992. Researchers started meeting together and publications were started in the cold fusion and ball lightning fields, and in the field of plasma (plasmoid) related astrophysics. During that time, researchers were discovering phenomena contradicting the 20th century Quantum Mechanics and Relativity paradigm, in many fields such as chemistry, astrophysics, nuclear physics, solid-state physics, and biology. Scientific revolutions in physics happen at about 80 year intervals and develop in a characteristic pattern [2] that allows understanding of what will happen in physics and the field of cold fusion in the future, if science continues to develop as it has in the past. Industrial revolutions generally start about 65 years after a physics paradigm formulation, and two kinds of economic depressions arise as the paradigm develops. In 1989, I developed a theory that ties the cycle of economic depressionary periods to scientific revolutions, and that explains why scientific revolutions and economic depressions occur periodically [2]. The theory enabled me to make predictions about the major events in scientific, industrial, and economic development, and so far, all the predictions have proved correct. Of particular interest to people nowadays may be that I predicted that there would be an economic boom during this decade, and that about 2009 there would be a depressionary period like that of 1929. In this article, I present this information

as experimental evidence that this theory has validity, describe a little of the history of plasmoid research that relates to our field, and briefly describe this theory once again.

## **Part 1: Predictions**

The economic predictions were about the transformation of industry during the 1990s and 2000s, that technological acceleration would start about the year 2000, that there would be an economic boom during the decade of the 2000s, and that an economic depressionary period would start about 2009 [2]. What economist predicted any of this a decade or two ago? All these events have happened. I predicted that major industries based on the quantum mechanics theory would develop and change the culture of the technology leading economy during the 1990s and the decade of the 2000s. This happened.

I predicted that a productivity growth surge would begin about the year 2000 in the most advanced economy, with growth rates doubling, similar to what happened about 1919 in the U.S., and continue to increase throughout the decade of the 2000s during an economic boom, as it did in the 1920s. Productivity growth doubled about the year 1998 and has been on the increase. Even though there was an attack in 2001 and wars, the US recorded an economic boom and emerged as the technological leading economy. Productivity growth rates are nearing the previous record rates of the 1950s and 1960s. In 2007, the stock market reached record highs, Americans were working record hours per week, and the unemployment rate was at a record low.

I predicted a depressionary period during which there would be a deep recession or a depression starting about 2009 that would be similar to the 1929 depression; that business and consumer debts would reach record highs during this decade, that there would be a surge of personal bankruptcies and mergers and corporate bankruptcies leading up to the depressionary period, that there would be a financial crisis which is happening now; and that unemployment and productivity growth rates would both increase, similar to the 1930s. This is happening too. Based on the past trend, I predict that the depressionary period will last about 8 or 10 years, and that productivity growth will secularly increase until a peak about three decades or so from now, unless there is a disaster or war. A deep recession or depression is starting now.

The scientific events I predicted in 1990 [2] was the formulation of a new theory for the new paradigm to resolve the anomalies of the crisis period of the 1970s and 1980s and the merger of the various fields of research of anomalies. I predicted that the formulator would be young or inexperienced. In 1992, I formulated a plasmoid theory [3]. I have not seen another theory similar to my theory, and no other theory resolves the various anomalies, or has given accurate predictions about the phenomena people would find. In particular, what theory of LENR explains the anomalous objects that are emitted? They obviously are associated with transmutation since so many groups, now about 9 or 10, have reported evidence of them in their experiments.

The various field of research of anomalies are merging. Now ball lightning is part of the cold fusion field. The Russian international conferences are jointly sponsored by the Russian Ball Lightning and Russian Cold Fusion committees. The joint International Symposiums on Ball Lightning and International Symposium on Unconventional Plasmas proceedings now include my articles [4] and other articles on the role of ball lightning or plasmoids in transmutation processes. Lipson and Miley publish articles about superconductivity associated with transmutation.

Finally, I predicted that though there might be the establishment of industry and businesses based on the anomalies and new physical ideas early on, most of the industries and inventions that are possible in this new paradigm will not be made until about 25 years after the paradigm's theory is well developed. I predicted that a group of theorists in the generation of young people who learn about the new paradigm while they were young would fully develop the paradigm theoretically about the year 2025. Who in our field has started a factory or has a money making invention? No one. Who predicted this a decade or two ago? It is not that no inventions are possible in the early years of this field, but in general, how can people develop new industries without a clear understanding of the physics involved? In the 19th century, years after the discovery of the electromagnetic effect, the telegraph industry was begun by inventors who changed their Fluid theories in response to experimental evidence. The telegraph industry was an important industry even before Maxwell developed Classical Field theory. But it was small compared to the industrial revolution of the late 1800s.

## **Part 2: Theory**

The scientific method, two major constraints on scientists, the time required for a theoretical formulator's ideas to be published and accepted by a younger generation, and the human scientifically productive life-cycle, together with the driving impetus, orders the work of generations and causes the periodic development of science and industry. My theory of scientific revolutions [2] is based on three major principles that have been valid for at least 500 years. These principles are that 1) people who already apprehend a physics paradigm can not change their ideas to be productive in another paradigm 2) people who are theoretical developers are not good technicians or experimenters, and 3) there is some impetus, maybe just desire to achieve and produce, that keeps people developing physics and technology as rapidly as they are able to do so. These principles of the history of science and the scientific method of successive theoretical development and experimentation, produces a generational pattern of scientific development of scientific revolutions at 80 year intervals.

In the history of physics, we see that scientific knowledge is an outcome of the repeated process of formulating theories and finding anomalies that contradict the theories. This is how people learn scientifically. Thomas Kuhn [1] describe how there are epochs of the dominance of a physical theory, and how young or inexperienced people formulate new theories at the end of ten or twenty year long crisis periods. I believe that those who already accept an older theory do not accept a new theory so as to make theoretical contributions to it.

Copernicus formulated a paradigm for physics and astronomy in 1506 that involved impetus as the cause for fall. Following Copernicus, Gilbert, Galileo and Kepler in 1582, 1593, and 1595 more or less independently developed similar major hypotheses that fall was due to magnetism, and that bodies had a tendency to rest. Then Newton defined gravity in 1664. He thought that atoms had the force of gravity. In 1745, Franklin introduced rational fluid theories for heat and electricity, and he may have also introduced the hypothesis of the magnetic fluid. In 1820, Faraday introduced the basic ideas of field theory incorporating a point-atom idea like that of Boscovich. He provided the experimental, and much of the theoretical, foundation upon which James Clerk Maxwell developed classical electromagnetic field theory during the 1860s. He taught that heat was due to the motion of atoms. In 1905, Einstein formulated the basic concepts of both Quantum Mechanics and Relativity theory. He introduced the hypotheses that matter and energy are equivalent and may interconvert and that matter is quantized, laying the basis for

quantum mechanics, and he introduced the concept of space-time and that the speed of light is constant which is the basis of the 20th century understanding of gravity and time. Bohr and others developed the atomic model of a central nucleus surrounded by a cloud of revolving electrons. This idea was very different than the atomic structure of Classical Field theory.

The theoretical formulator teaches his ideas, and after a period of time, younger people of the next generation accept his ideas. When they reach the age of about 40 they mature in their scientific careers, and help to fully develop the theory of the paradigm. However, they are unable themselves to experimentally discover the anomalies to their own theories. This is done by experimenters in the next generation. A 10 or 20 year crisis period then ensues. Inventors in this third generation develop major inventions, and industries begin. By this time, in the past three centuries, most of the work-force who are beginning their careers during an industrial revolution accepted the new paradigms, and they build the new paradigm industries. By the time they reach middle age, the competitive emphasis switches from product to process innovation. [2] This is the technological acceleration stage of the industrial life-cycle. There is a productivity growth spurt, followed about nine or ten years later by the beginning of an economic depression, during which automation and the formation of oligopolies, the financial crisis, the foreclosures and bankruptcies and the drop in consumption demand decreases employment. About 30 years after the end of the technological acceleration depressionary period, there has been depressionary periods during the industrial revolutions. In marked contrast, these depressions are associated with the closure of old paradigm industries and exhibit record low productivity growth rates. Though the new industries grow rapidly and are highly productive, they are so small in the beginning they don't add much to productivity growth. The advanced economies face trade competition from technological follower economies that catch up during the industrial revolutions. More information about the theory and scientific and economic history are available on my website and in an online book.

### **Part 3: Plasmoid History**

In the 1950s and 1960s, Winston Bostick and others conducted electrical discharge experiments and found that the plasma was organized in the shape of galaxies or in geometrical shapes such as rings. Bostick coined the term "plasmoid," and he showed that it was useful to conceive of galaxies and the Universe in general as plasmoids. Some astrophysicists including Alfven who won a Nobel Prize in physics, developed a plasma (or plasmoid based) model of the Universe. Bostick and others tried to model atomic particles as plasmoids also, though this work is largely unknown and ignored. Shoulders and some others followed up on this work and found striking anomalies associated with plasmoids such as that the plasmoids can bore through various materials and move in an anomalous manner, making sharp turns without curvature. Shoulders said that he and Bostick communicated and Bostick came to see that plasmoids are composed of smaller things. These smaller things Shoulders calls by various names such as EVs, NEVs, and charged clusters.

In 1989, I started to study the anomalies of the just past crisis period indepthly, especially ball lightning and cold fusion. The two phenomena struck me as being similar in that there was evidence of excess energy and transmutation and other anomalies that were similar. In 1992, while reading an early transmutation article by Matsumoto in which he describes finding peculiar traces that he was going to publish in another article, I assumed that very small ball lightning might be involved in cold fusion experiments. I didn't know anything about Shoulder's or

Bostick's research, as far as I remember, and had not yet seen any of Matsumoto's traces. When I told Matsumoto about this idea, he accepted it. He started to research natural microscopic ball lightning and published at least two articles about evidence of these during an earthquake and a volcanic eruption.

Plasmoids are often composed of smaller plasmoids arranged like a string of beads or like a necklace or in geometrical figures like quadrilaterals or spheres. However, there is not enough experimental information to determine plasmoid structure yet, I believe. Though many researchers have reported finding these kinds of objects involved in their transmutation experiments, notably Matsumoto, Shoulders, Savvatimova, Urutskoev et al. and their associates, Iviolov, and Adamenko and his group, there is still not enough evidence to understand the structure and properties of plasmoids. How do they make tracks on nuclear emulsions and plastics, but travel through glass, paper as Urutskoev reported, and experimental containers? How do they travel through glass? How do some bore a hole as they pass through, and some leave no impression or trace? Plasmoids have anomalous magnetic, radiation, transmutation, and gravitational effects. Now some of the Russian and French researchers (in particular, Urutskoev, Adamenko, Ivoilov, Lochak, Vysotskii, and Lehn) are saying that these objects are monopoles according to the theory of Lochak. But it is obvious that these microscopic objects behave like larger macroscopic ball lightning. An article about the traces discovered by researchers in this decade was recently published [4]. My basic ideas about plasmoids and the anomalies of the crisis period in physics such as ball lightning phenomena, transmutation phenomena and superconductivity are mostly described in a paper I wrote in 1992 [3] and in two articles in the ICCF13 [5] and ICCF14 [6] conference proceedings.

## References

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