

# COMPREHENDING AND DECODING **THE COSMOS**

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*Discovering Solutions To Over A Dozen  
Cosmic Mysteries By Utilizing Dark Matter  
Relationism, Cosmology, And Astrophysics*

**JEROME DREXLER**

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*COMPREHENDING AND DECODING THE COSMOS:  
Discovering Solutions To Over A Dozen Cosmic Mysteries By  
Utilizing Dark Matter Relationism, Cosmology, And Astrophysics*

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*This book is dedicated to Sylvia, my wife, friend,  
and lifelong partner.*

*“Leave the beaten track occasionally and dive into the woods.  
Every time you do so you will find something you have never seen  
before. Follow it up, explore all around it, and before you know  
it, you will have something to think about to occupy your mind.  
All really big discoveries are the result of thought.”*

*~ Alexander Graham Bell ~*

*“It is dangerous to be right in matters on which the established  
authorities are wrong.”*

*~ Voltaire ~*



## **PREFACE**

One hundred years ago, Albert Einstein announced the Special Theory of Relativity, which predicted and explained that a proton traveling near the speed of light could have a relativistic mass a thousand, a million, or even a billion times greater than the mass of a proton at rest. Therefore, the gravitational strength of the multitudinous galaxy-orbiting relativistic protons moving in the cosmos could create extremely large gravity-related tidal forces on nearby matter.

Ever since astronomer Fritz Zwicky discovered the presence of dark matter (DM) in the Coma cluster of galaxies in 1933 and astronomer Vera Rubin confirmed the existence of dark matter halos around galaxies in 1977, cosmologists and astrophysicists have been trying to identify the dark matter particles.

In 1984, scientists developed a Cold Dark Matter (CDM) theory based upon a theoretical uncharged, slow moving particle, they called the Weakly Interacting Massive Particle (WIMP). More recently, it was determined that the

theoretical WIMP dark matter particles would require a mass of 35 to 10,000 times greater than the mass of a proton at rest in order to exhibit the observed gravity-related forces of dark matter halos. However, searches for the theoretical WIMP particles during the past 20 years have all come up empty handed.

For this reason, and knowing that the relativistic proton easily could meet the mass requirement of the mysterious dark matter particles and that relativistic cosmic ray protons are widely observed, I have endeavored to bring the relativistic proton dark matter theory/cosmology to the attention of dark matter astronomers, astrophysicists, and cosmologists as well as to NASA, the National Science Foundation (NSF), and the U.S. Department of Energy (DOE) through two recent publications. My earlier astrophysics/cosmology book, *“How Dark Matter Created Dark Energy And The Sun,”* was published in December 2003; and on April 22, 2005, my 19-page follow-up paper was posted on the Cornell University Library’s arXiv.gov website as e-Print No. astro-ph/0504512. This paper is entitled, “Identifying Dark Matter Through The Constraints Imposed by Fourteen Astronomically Based ‘Cosmic

Constituents” and is available at <http://arxiv.org/ftp/astro-ph/papers/0504/0504512.pdf>.

The principal objective of this book is found in its main title, “*Comprehending And Decoding The Cosmos.*” The subtitle describes the concepts and goals of the book, namely, “*Discovering Solutions To Over A Dozen Cosmic Mysteries By Utilizing Dark Matter Relationism, Cosmology, And Astrophysics.*” *Dark matter relationism* is epitomized in my use of cosmic mysteries and *relationism* to tentatively identify dark matter and then to confirm its validity by using this same dark matter candidate to provide plausible explanations for additional cosmic mysteries, including some previously *not known to be related to dark matter.*

On June 22, 2003, Jerimiah P. Ostriker of the Department of Astrophysical Sciences and Paul J. Steinhardt of the Department of Physics at Princeton University published a paper in the journal *Science* entitled, “New Light on Dark Matter.” In a sense, this book responds to the final paragraph of their conclusion section, which reads:

We have sketched out the kinds of astronomical tests that could be done to narrow the search [for dark matter],

but if history teaches us anything it is that the next important clues will come from a surprising direction. Some observation or calculation will be made that will reorient our inquiries and, if this happens as has happened so often in the past, we will realize that the important evidence has been sitting unnoticed under our noses for decades.

This book, “*Comprehending And Decoding The Cosmos,*” deviates significantly from mainstream cosmological and astrophysical theories. My seven years as a Member of the Technical staff at Bell Laboratories taught me to think outside the box and to become a prolific inventor, utilizing applied physics. Alexander Graham Bell’s philosophy on invention, displayed on an engraved bronze plaque at Bell Labs, left a lasting impression on me:

*Leave the beaten track occasionally and dive into the  
woods. Every time you do so you will find something  
you have never seen before.  
Follow it up, explore all around it, and before you know it,  
you will have something to think about  
to occupy your mind.  
All really big discoveries are the result of thought.*

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# **COMPREHENDING AND DECODING THE COSMOS**

**DISCOVERING SOLUTIONS TO OVER A DOZEN COSMIC  
MYSTERIES BY UTILIZING DARK MATTER RELATIONISM,  
COSMOLOGY, AND ASTROPHYSICS**

## **INTRODUCTION**

The author believes that the galaxy-orbiting relativistic proton appears to have the necessary characteristics of the long-sought dark matter (DM) particles, which are estimated by most scientists to comprise 80% to 85% of the total mass of the Universe. Relativistic protons do have the required mass and the required difficulty of detection and can transform themselves into hydrogen, the principal matter of galaxies, by creating and combining with electrons.

Therefore, they are capable of forming (1) galaxies and their dark matter halos, (2) galaxy clusters and their dark matter halos, (3) the long, large, filamentary dark matter that crisscrosses the cosmos, and (4) also may be capable of igniting the hydrogen fusion reaction in newborn stars.

However, for this proton-based dark matter theory to become widely accepted, there also should be astronomical evidence of multitudinous relativistic protons within the spherical dark matter halo surrounding the Milky Way (and the Earth). The author believes that the cosmic ray relativistic protons bombarding Earth every day, uniformly from all directions, go a long way toward providing such astronomical evidence.

The author estimates that the number of relativistic protons orbiting the Milky Way within the dark matter halo is roughly about 11 orders of magnitude greater than the number of cosmic ray protons plunging into all the star systems of the Milky Way each year. This estimate assumes that perhaps about 10% of the relativistic proton dark matter of the Universe was converted into ordinary hydrogen during the past 10 billion years.

Mankind has not previously explained dark matter, the accelerating expansion of the Universe, the “knees” and “ankle” of the cosmic ray proton energy distribution graph, the low star formation rates of low surface brightness (LSB) dwarf galaxies, the ignition of hydrogen fusion reactions in the first generation stars, or the departing locations of Earthbound high-energy cosmic ray protons.

A new research hypothesis has been developed by the author based upon finding astronomically based “Cosmic DM Mysteries” (Cosmic Dark-Matter-Related Mysteries) of the Universe that may be created or influenced by or have a special relationship with the dark matter halos around galaxies and galaxy clusters. Cosmic DM Mysteries have to do with mysteries or unexplained phenomena regarding celestial bodies or cosmic matter such as their shape, mass distribution, particle abundance ratios, dimensions, density, location, maturity, acceleration, velocity, linear or angular momentum, particle energies, star rotation curves, hydrogen fusion reactions, particle energy distributions, particle transformations, star ignition, and star formation rates.

Since dark matter represents 80% to 85% of the mass of the Universe, it should not be surprising that it would have an influence on or a relationship with a number of the above-indicated types of Cosmic DM Mysteries. To date, the vast majority of research conducted on dark matter by others has had to do with trying to identify the particles that comprise dark matter or to determine their gravitational effect on galaxy star rotation curves. This primarily inward-looking approach to identify the particle composition of a medium is

known as *reductionism*, which is a procedure or theory that reduces or attempts to reduce complex data or phenomena to simple elements or terms.

Reductionism does not always work in physics. Many times simple entities or particles can form complex forms or combinations that have characteristics seemingly unrelated to the characteristics of the original simple entities. A hurricane is one well-known example of complex behavior whose characteristics cannot be predicted by an analysis of all the known simple entities involved in its makeup. Thus, the reductionism approach does not explain or predict the nature of a hurricane.

An alternative to reductionism is an outward-looking, cosmological-like approach that the author has developed and designated *relationism*, where a phenomenon such as the dark matter can be analyzed and categorized in terms of the Cosmic DM Mysteries that may have a relationship with dark matter. That is, in matters of the Universe, reductionism is primarily an inward-looking particle physics approach, and relationism is primarily an outward-looking, cosmological approach. *Dark matter relationism* is epitomized in the author's use of cosmic mysteries and

*relationism* to identify a DM candidate and then to confirm its validity by using this same DM candidate to provide plausible explanations for additional cosmic mysteries, including some *not known to be related to dark matter*.

In Part I of this book, a list of 14 relevant and plausible Cosmic DM Mysteries of the Universe is presented, which had been developed by the author in late 2004. These Cosmic DM Mysteries were then used to establish a list of constraints regarding the nature and characteristics of the long-sought dark matter particles. By this means, a dark matter candidate was then discovered that best conformed to the constraints established by the 14 Cosmic DM Mysteries, in conjunction with the *relationism* approach.

The author then shows in Part II of this book that this same dark matter candidate, the galaxy-orbiting relativistic proton, provides plausible explanations for the accelerating expansion of the Universe, both the “knees” and “ankle” of the cosmic ray energy distribution graph, the low star formation rates of LSB dwarf galaxies, the ignition of hydrogen fusion reactions in the first generation stars, the source of magnetic fields in spiral galaxies, how dust particles could facilitate hydrogen fusion in stars, and the

four departing locations within the Local Group and Virgo Supercluster for Earthbound high-energy cosmic ray protons.

Note what was achieved. Using the relationism/cosmology approach, a dark matter *candidate* was tentatively identified. This dark matter *candidate* was then used to try to explain 14 different cosmological or astrophysical phenomena represented by the 14 Cosmic DM Mysteries initially utilized. If a dark matter *candidate* successfully provides plausible explanations for the nature and characteristics of the 14 Cosmic DM Mysteries, a significant step toward dark matter identification has been achieved.

In Part III of this book, the relativistic proton dark matter candidate is subjected to a rigorous set of 11 additional tests using 11 more Cosmic DM Mysteries. They represent 11 additional cosmological or astrophysical mysteries or unexplained phenomena reported primarily during 2005 by astronomers. Can the same dark matter *candidate* and its associated cosmology that explained the initial 14 Cosmic DM Mysteries also explain the last 11? In achieving this goal, a total of 25 Cosmic DM Mysteries may have been laid bare, thereby providing a decoding of a portion of the “DNA” of the cosmos.

***Among These 25 Cosmic DM Mysteries, New And Plausible Explanations Are Provided In This Book For The Following 15 Well-Known Astrophysical Or Cosmological Phenomena That Had Not Been Adequately Explained Previously:***

1. The “knees” and “ankle” of the cosmic ray proton energy distribution graph at the Earth.
2. The low star formation rates (SFRs) of low surface brightness dwarf galaxies; the higher SFRs for spiral galaxies; and the much higher SFRs for large, massive spiral galaxies for limited periods of time.
3. The ignition of hydrogen fusion reactions in the first generation stars.
4. An accelerating expansion of the Universe.
5. The source of magnetic fields in spiral galaxies.
6. How dust particles facilitate or expedite hydrogen fusion reactions in stars.
7. The empirical Schmidt law correlating star formation rate and the average molecular hydrogen density on the surfaces of isolated spiral galaxies.
8. Strongly self-interacting dark matter particles in halos of dwarf and LSB galaxies in contrast to weaker self-interacting dark matter particles in the halos of galaxy clusters, implying the existence of two types, forms, or modes of dark matter particles.

9. The extremely high star formation rates of starburst galaxies created by the merging of spiral galaxy clusters.
10. The blue and blue-white stars, as young as one million years old, in the spiral arms of mature spiral galaxies, which also contain five-billion-year-old red stars in their nuclei.
11. The process of two galaxy clusters merging that results in a source of ultra-high energy protons called ultra-high energy cosmic rays, or UHECRs.
12. The various departing locations of Earthbound cosmic ray protons with energy levels at or below  $5 \times 10^{19}$  eV.
13. That dark matter halos are almost spherically shaped, while their enclosed spiral galaxies are disk shaped.
14. That starburst galaxies usually exhibit new blue star formation primarily in their galaxy nuclei while spiral galaxies exhibit new blue star formation in their spiral arms.
15. The growth of the spiral galaxy disk of the Andromeda galaxy (M31) by a factor of three, by accretion.

The above phenomena were selected because they are better known by astronomers, and explanations proposed for them previously, if any, are not widely accepted. Most of these 15 phenomena are *not* normally associated with dark matter.

***Why Another Dark Matter Approach Is Necessary:***

Many cosmologists believe that cold dark matter seems to explain the development of the large-scale structure of the Universe better than does warm dark matter. They also believe that warm dark matter seems to explain the formation of galaxies better than does cold dark matter.

This dilemma faced by the cosmologists today probably was created by three unnecessary constraints that pioneering cosmologists apparently placed on the dark matter particles; namely, that the dark matter particles have no coulomb charge, are not influenced by magnetic fields, and cannot be transformed into normal baryonic matter.

Drexler's relativistic proton dark matter theory/cosmology avoids these three "unnecessary" constraints and provides plausible explanations for the 15 well-known, but unexplained, astrophysical or cosmological phenomena listed on the previous two pages. Drexler invites the proponents of cold and warm dark matter to offer their explanations for these 15 Cosmic DM Mysteries.