

 WILEY Trading

# QUANTUM

USING PRINCIPLES FROM W.D. GANN  
& MODERN PHYSICS TO FORECAST  
FINANCIAL MARKETS

# TRADING

FABIO ORESTE



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# Quantum Trading

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# Quantum Trading

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*Using Principles from  
W.D. Gann and Modern Physics  
to Forecast Financial Markets*

**FABIO ORESTE**



**WILEY**

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# Preface

I have written this book for traders, both professionals and beginners, who would like to start a new adventure, a journey into the vast and unexplored land of Quantum Trading. It's a journey that could change your life forever.

This book could also be considered an exploration of phenomenology and quantum philosophy. Why philosophy and not science? Because the quantum viewpoint affects not only particle science but also contemporary psychology and the way we conceive of the relationship between observed objects and the observer. We will also examine how we think of and experience reality.

Great thinkers such as Max Planck, Carlos Castaneda's Don Juan, like Erwin Schrödinger, W. D. Gann, and Albert Einstein have more in common than you might suspect. This book aims to express rocket science concepts in layman's terms and apply them to your daily lives and trading; it's going to be a lot of fun. You will better understand how reality works and achieve amazing results in many areas of your life. Above all, you can make huge amounts of money using these concepts to trade the markets.

We will be applying these ideas to create a Quantum Trading system that provides a high percentage of winning trading signals. In the first few chapters, I describe my proprietary approach to financial trading based on Einstein's theory of relativity and quantum physics, and how to start a very profitable business with little capital, compared to other businesses.

You will be able to set up your own personal "trading firm" without formally incorporating a company. If you follow the rules in this book and always use stop-loss orders, then you will find yourself trading more successfully. Stop-loss orders prevent large, unexpected losses for each trade and allow for the possibility of only relatively small losses, according to your personal risk tolerance.

If you are an absolute beginner and don't know how to calculate the best stop-loss with respect to your trading capital, don't worry. It is explained in detail within later chapters.

This book is also written for professional traders who may have many years of experience, but are looking for something new in the enormous arsenal of technical analysis theories and tools. I have been successfully

using the Quantum Trading approach to manage my client's accounts for years, and I believe that other professional traders can use this theory to improve their performance, too.

The techniques presented here are based on a new approach to financial trading that I have developed during the past 15 years, and they are quite different from the classical technical analysis trading tools, even if they share some common ground.

You can apply Quantum Trading techniques to different time frames, such as weekly, daily, 60-minute charts, or 5-minute charts.

This book is not about methods of technical analysis that you are used to seeing. I am not going to speak about moving averages, oscillators, or the hundreds of indicators you already know about. Perhaps you are searching for something different, a more precise instrument that can indicate when the next top or bottom price could form.

Rather, this book is about quantum prices, time levels, and how the theory of relativity and quantum mechanics concepts can practically affect your favorite stock, commodity, or currency price. It is also about trading models that provide precise indications on trend turning points and how to predict the most likely prices and times for the major and intermediate reversal points.

We start our journey by borrowing some ideas from the theory of relativity and its implications in modeling space. We continue by examining electron behavior in the quantum world. Finally, we compare this notion with some of W. D. Gann's 100-year-old concepts about the market that are still relevant today.

We continue our journey by exploring fascinating lands, learning how quantum laws, according to scientist such as A. Goswami, can also affect our daily life. We review how this quantum approach can help us in obtaining a more meaningful life, freedom, and financial independence, and dramatically improve our life and the ability to get what is really important to us.

At the end of this process, you are going to discover many interesting and safe ways to make money in the financial markets using unconventional yet powerful trading techniques such as Quantum Price Lines (QPLs) and Time Algorithms (TAs).

If you continually improve yourself and reach for a higher and higher level of knowledge and awareness, you will exponentially increase your personal power and improve your energy level. You will experience a quantum leap in the quality of your life. Then wealth will come to you like a moth to a flame.

If you are ambitious and feel you have many goals still to reach in your life, then reading *Quantum Trading* can help you to improve your trading and change your life forever.

Fabio Oreste

## CHAPTER 1

# The Birth of Quantum Trading

*How Einstein's Theories  
and Quantum Particles Affect  
Your Daily Trading*

**I**t was April 14, 2000, and the market was about to close. I had just placed a selling order on all of the put options I had bought a few days before and cashed in my profit. I stared in disbelief one last time at the prices on my screen. I couldn't believe my eyes! I was excited because the S&P 500 was plummeting, losing more than 180 points from the historical top in a few days, and the put I had bought had earned 128 percent. I had waited a long time, recalculating almost every day the most likely price level for a reversal and waiting for the moment when the S&P 500 price would meet with the maximum curvature point of the P-Space, the new trading tool I had been developing during the past years. From another point of view, this would have been the point at which the quantum entanglement would be relevant.

Quantum entanglement is a property of the quantum mechanical state of a system that contains two or more objects. Specifically, the objects that make up the system are connected in a way that cannot adequately describe the quantum state of a constituent of the system without full mention of its counterparts, even if the individual objects are spatially separated.

I had been waiting for this quantum correlation between P-space and the S&P 500 price for a long time. In those days I had not yet developed the software that now allows me to visualize in a few seconds the points most likely for a reversal on the chart. To calculate everything by hand, I needed a lot of time.

The week before I had warned my clients to close all of their long positions on stocks and take profits. Most of them were astonished and asked

me, “Why do I have to sell when the stock exchange continues to rise and I’m making money?”

“Stock prices are likely to drop significantly soon,” I explained, “and before we see such price levels again, many years will pass.” At that time they surely thought I was crazy, but in hindsight I was proved correct. If you study my Quantum Trading techniques you will discover why.

I wanted to go out and get some fresh air, despite the fact that it was raining, when the phone rang.

“Hey, Fabio, have you seen the S&P 500? It seems you were right. It reached the levels you forecasted. Try not to disappear tonight because we need to celebrate! I saw how much the puts you bought for my managed account are worth now, and we made a fortune. All of us will come over to your house around eight-thirty tonight. We’ll bring the champagne and dessert, and you’ll cook the risotto. We need to talk. You have to explain to me how your theory works again. By the way, does your theory also work for currencies?”

“Yes, it also applies to currencies, and to everything else traded on the stock exchange. Your plan sounds great. See you at eight-thirty,” I responded to Dave, a friend of many years and also one of my best clients. I left my house and walked briskly through the pouring rain. I needed to decompress after such an intense trading day. The raindrops beat down sharply on my head, helping me to reflect.

Take a look at Figure 1.1. On April 10, 2000, I bought put options on the S&P 500 expecting a big drop for stocks and the entire index because



**FIGURE 1.1** S&P 500 Future: Major Top Forecasted in 2000 Using QPLs

two major Quantum Price Lines (QPLs) were simultaneously touched by the index price at point A on the same day.

This is a very rare event and when it happens the market is ready for a big movement within a few days. Instead of the put option we could have sold short a future contract on an S&P 500 to take advantage of the significant drop following the contact of the price and the two QPLs. The two QPLs indicate the point of maximum curvature of the S&P500 P-space which, when reached by the price at point A, indicates a strong reversal pattern. How did we calculate them? We discover the answer in the next few chapters.

Walking down the street, I was happy because I had finally proved to myself that my trading theories, based on Einstein's space-time discoveries and on the behavior of an electron leaping from one energy level to another, were working well and were profitable. After years of study and observation I had finally developed two complementary trading models that worked very well together. Physicists were still split on the supremacy of quantum mechanics over Einstein's theory of relativity, and many contradictions were still in place in the standard model of quantum physics because the Higgs boson has not yet been found. Even though Einstein didn't believe in quantum physics, my trading model uses both Einstein's theory and quantum mechanical approaches, successfully harmonizing both ideas for trading purposes.

The models that I had elaborated for trading were only partly drawn from physics. I had developed these trading models in an autonomous way beginning with the assumption that the entire universe is connected by a gigantic entanglement—or interconnection—governing not only the subatomic particles behavior, but also other complex and immaterial relationships, such as financial transactions.

I was also inspired by W. D. Gann's statement about the close relationship between atoms, electrons, and stock price behavior. Gann was one of the most legendary traders in the history of Wall Street. My way to calculate QPLs is partially based on Gann's confidential work, although the concept of P-space, based on the equivalence between Einstein's light deflection and price deflection phenomena, is completely new and unknown by previous traders and authors, including W. D. Gann. Furthermore, I rigorously propose a quantum scale for QPL calculation, based on Leibniz's original chart of 64 codes on which binary code is based, refusing to use a linear approach, and this is another new concept in trading. Two to the power of  $n$  is the number of ways that the bits in a binary integer of length  $n$  can be arranged. We use them to calculate our QPL's price orbital, the same way they are used to measure computer memory, processor power, and computer disk drives.

The trading of stocks, bonds, currencies, and commodities takes place in our everyday reality, a relatively reliable world that apparently doesn't seem affected by the paradoxical laws postulated by Albert Einstein's relativity theory and Niels Bohr, Max Planck, and Erwin Schrödinger's quantum mechanics. What happens in our daily life can be elegantly explained by classical physics, which is full of reassuring certainties about linear models ruling space, time, and other things, such as locality, on which we base our representation of three-dimensional reality. For example, it is very easy for classical physics to measure the mass, strength, and velocity of an object, such as a bullet, and precisely predict its trajectory through space. Unfortunately, these certainties cannot explain nonlinear models like the ones ruling stocks, commodities, Forex (FX), and financial markets in general.

According to what I had discovered, the prices of stocks, or anything else traded on the different exchanges, were not only influenced by news about profits, GDP, the Fed's minutes, mergers and acquisitions (M&A), write-downs, interest rates, inflation, consumer confidence, or other fundamental data, but also by nonlinear entanglements based on the theory of relativity and quantum physics. Using trading models based on these theories, we can understand the financial securities price behavior. My trading models are based on the entanglement formed between different categories that operate in a multidimensional, mathematical space that is curved because of the presence of objects with a specific mass, which I call P-Space.

It seems that the same day unexpected news affecting the financial market is released, provoking a top or a bottom, my Quantum Trading models show that the price has reached the maximum curvature point of specific space-time in which the price of a financial security moves, that is, the P-Space.

I used two different sets of concepts to develop my Quantum Trading view: one from Einstein's Theory of Relativity and the other from Quantum Mechanics. Apparently these two visions of the universe are incompatible, but my trading based on these concepts worked very well and I was making money.

On the other hand, by studying Nobel Prize-winner David Bohm's theories, one could find some clues to harmonize these two irreconcilable views of the universe.

I had left behind even dear old technical analysis, with its arsenal of oscillators and indicators, which was unable to forecast the final top of a big movement, or the major bottom in the markets, despite many attempts.

It's not as if technical analysis was not interesting for me. In fact I had studied it passionately for years. Yet I was looking for a "Theory of Everything" to explain the financial market's movements using consistent



and elegant models. For instance, technical analysis wasn't able to explain why a double bottom sometimes is a very strong support and the price bounces, but other times it is easily broken and price collapses.

Instead, the models I had developed, inspired by physics, were able to forecast if a major or intermediate top or bottom would be likely to occur at a certain time using the quantum level of the orbitals of price—very similar to an atomic orbital—and calculating the points of maximum curvature.

Correctly forecasting the time and price of the turning point of a stock index is a dream for every trader because it means you could make a fortune if you know where the bottom or the top is located.

The best part of this approach is that Quantum Trading models can calculate these turning points weeks or even months in advance with high probabilities of success. You just need to wait until the price reaches the QPL you have already drawn on the chart far in advance. When the QPL price level is reached, you are likely to see a significant reversal, as shown in Figure 1.2.

You could have sold short HP stock on the QPL resistance at point A and closed the long position on the QPL support. HP stock wasn't able to break the QPL resistance level.

This means that if you had sold HP short on the QPL resistance you would have made money because the price dropped. If the price would have broken the QPL resistance then it would have continued to rise until the next available QPL. By putting a stop-loss order one dollar higher than the QPL resistant price you would have exited the short position and you



**FIGURE 1.2** Hewlett Packard Stock: 2010 Top

could open a long position at the stop-loss level, buying double the amount of stock you previously sold short. This is called “stop and reverse” and all experienced traders are very familiar with it.

If you wonder if I have really found the Holy Grail of trading, I have to clarify a very important point. In quantum physics, we speak in terms of probabilities that the electron can be found at a certain position using the probability wave function. In the same way, in my Quantum Trading models I speak of the high probability that a significant reversal can occur, or a minor probability that pushes the price toward a higher orbital level, exactly like an electron’s quantum leap.

In physics an atomic orbital is a mathematical function that describes the wavelike behavior of either one electron or a pair of electrons in an atom. Quantum physicists use this function to calculate the probability of spotting any electron of an atom in any specific place around the atom’s nucleus. These functions can form a three-dimensional graph of the likely location of an electron. Specifically, atomic orbitals are the possible quantum states of a single electron in the collection of electrons around a single atom.

In the same way, we use QPLs as if they were atomic orbitals to understand the behavior of financial securities prices.

If they tell you that you can use all of these physics concepts to forecast the next top or bottom of your favorite stocks, you would probably think it is just a fairy tale, but when using the Quantum Trading models for a significant period of time, the results will probably help change your mind.

I am not asking you to believe me up front, but rather to follow me chapter by chapter and then experience the results for yourself.

## **A LESSON IN ELEMENTARY PHYSICS**

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Around 2,500 years ago in India, Buddha said, “Do not believe unless your experience can prove it,” a beautiful example of structural skepticism that should be applied to everyday life.

If your knowledge of physics is rudimentary, relax. I will use simple terminology in the pages that follow. I will attempt to communicate all of the concepts that usually require complex equations in a simple way without using “rocket science” notation.

I have included some very simple mathematical equations in order to meet formal criteria requirements. At most, I will sprinkle some simple formulas here and there, but nothing complicated.

All the charts here could be visualized in a three-dimensional way, but this surpasses the limits offered by a book.

Many years ago, I did not speak to anyone about my discoveries other than a few friends with whom I had shared travels, studies, and adventures. Certainly colleagues in my field would have thought I was crazy or doubted my masters degree in Business and Finance, which I earned from Luiss University in Rome.

Moreover, at that time I was missing some elements that would have made my model more elegant, ridding it of some contradictions that I was not yet able to solve, and that I came across only a few years later, thanks to string theory.

Nevertheless, my short S&P 500 trade mentioned earlier in this chapter and based on this theory was placed very close to the historical top of 2000 and was a powerful reversal point for the index before a big plunge.

The high profits I earned from my S&P 500 trade in only a few days had just materialized into my account. This, more than anything, boosted my confidence in my Quantum Trading models.

Absorbed by these thoughts, I arrived at the store; I had to shop for ingredients before my friends came to dinner in a few hours as well as pick up Monika, my girlfriend, who had just finished a photo shoot in the Caribbean. Everyone expected risotto for dinner and I was more than happy to cook for them.

After my friends arrived I occupied myself with preparing the risotto, but I did not use the *risotto al Barbaresco* recipe I intended to use. Dave had been sent truffles from Italy and brought them to my house so that I could put them on the top of the risotto instead of using Barbaresco wine to cook and aromatize the rice. My friend considered me a very demanding gourmet and the risotto I cooked that time was very satisfying because the ingredients were really terrific. The truffles David brought were picked only the day before and were very fragrant and tasty.

Dave is a really great guy! Smart and interesting, he was at the time a very successful real estate entrepreneur and a good friend who traveled to Europe and Asia with me. In Europe we liked to search for the finest dishes and best wines. We would visit many different vineyards and restaurants in our quest to find the best. In Asia we traveled together through the most stimulating places in Tibet, India, Nepal, and China to study ancient Eastern philosophies and the science of the mind.

Einstein, Bohr, and Planck were all interested in studying Taoism and the Abhidharma and Veda philosophy and cosmology. These ancient philosophies contain many interesting concepts that relate to the subatomic world, and the wisdom contained in these systems seems to be the precursor of modern science and physics.

David Bohm, a Nobel Prize-winning scientist, spent many years formulating a higher order of physics and was close to discovering a solution that would make the theory of relativity and quantum mechanics compatible.

For many years he studied Vedanta, one of the most important philosophical schools of ancient India.

Dave offered to go with my butler to the cellar and personally choose the vintage of Barbaresco to accompany the meal. When he returned I was battered with questions.

“Now, explain to me, Fabio, what Einstein’s studies of space-time and quantum physics really have to do with the stock exchange?” asked Dave, happy that two more bottles of wine were on the table. “I knew you were crazy, but fortunately I made the same trade you placed with my managed account with my personal account and it’s made me a small fortune. I’m starting to think that you got your hands on something really big considering how much we gained from the last trade made with your precise forecasts from three weeks ago.” Dave liked to occasionally trade Forex and S&P 500 futures on his own, using some basic technical analysis tools in addition to the account I managed for him.

“Well, it’s a long story and I don’t want to bore the others. . . . We’ll talk another time,” I responded, knowing Dave would not give up so easily.

“No, no. We absolutely have to know how Quantum Trading works,” Dave insisted.

“Now we’re curious and you have to explain everything,” added Elena, my best friend. She was usually very interested in my travels and studies. “So let’s eat the Sacher cake I baked today, open a bottle of champagne, and make a toast to your trading system,” concluded Elena, smiling happily.

We quickly agreed to Elena’s suggestion. The Sacher cake was exquisite, especially since it is difficult to find true Sacher cakes outside of Austria. Fortunately Elena’s grandma was from Vienna and was an amazing cook.

“Okay, okay! We’ll start at the beginning and move step by step,” I conceded to my friends. In reality, I was happy to talk about my trading models. We toasted, and while I was appreciating the apricot marmalade layer of the Sacher cake, I thought that celebrating with old friends that evening at home had made it all worth it.

“What I have discovered is that the price of a stock or a security can be seen either as a light particle, called a photon by scientists, or as an electron. First, Newton’s classic physics, Riemann’s curvature tensor, and Einstein’s theories of relativity leading us to the concept of the curvature of space help us to understand some aspects of a security’s price behavior. Second, quantum physics allow us to better understand the characteristics of stocks, commodities, and currencies price behaviors.

“If we want to understand how Quantum Trading works, we need to refresh our memories of some of the basic concepts developed by the founders of classic and quantum physics.

“Everything actually begins in England with Isaac Newton, the father of classical physics and one of the most influential people in human history. He was an absolute genius who worked on his theories for years, adding to the scientific knowledge of his time by exploring the laws that govern both our everyday reality as well as our solar system. He had explored all of the sciences and considered mathematics insufficient to explain his findings. As a result he and Gottfried Leibniz developed a new type of mathematics: differential calculus.

“Newton was not known for many years by his contemporaries because he preferred to devote himself to research at the expense of his social life. It was only in 1687 after publishing his masterpiece, *Philosophiae Naturalis Principia Mathematica* (Mathematical Principles of Natural Philosophy), that he gained success and fame all over Europe. For the next two centuries this book would be considered the most important scientific treatise ever written.

“Following the publication of his treatise, he became a real celebrity. Two years later he was elected to Parliament, and in 1703 he became president of the Royal Society. In 1705 Queen Anna knighted him as Sir Isaac Newton, the first scientist to receive that honor.”

“Ah, okay, now I remember,” said a tipsy Barbara, Dave’s long-time girlfriend. “Newton was the one who shot the apple that fell on his son’s head with a bow and arrow.”

“No, Barbara, you’ve mixed up William Tell, the Swiss hero, with Newton, the scientist,” explained Dave.

“Well, actually, she’s not far off because Newton was inspired to formulate his theory of gravity by observing the fall of an apple from a tree,” I added, laughing.

“But didn’t he also study alchemy? It seems that following his death they found numerous writings and research on this topic. Is it true?” asked Elena.

“Yes, that’s true. Imagine that even though he is universally considered the real father of modern science, he wrote more pages on alchemy, occult sciences, and theology than physics or mathematical subjects. But that’s another story that will take us too far off topic, so let’s get back to classical physics.”

“His first big discovery was the theory of Universal Gravitation and the movement of planets. According to Newton, all celestial bodies are attracted to each other. The source of gravity instantly passes from one point to another of the universe and keeps the planets in our solar system fixed in their orbits while preventing us from floating away. His idea of the universe is as a perfect mathematical place, very similar to a giant cosmic clock, where every mechanism unwinds in a precise and predictable way. It’s a mechanical universe based on the principle of cause and effect where

it is possible to represent and measure exactly the movement of objects. It's a universe ruled by an absolute deterministic order in which paradox, contradiction, and indetermination are unknown."

"What do you mean by absolute order?" asked Monika.

"Newton, to instill order on chaos, proposed a concept of absolute space and time. For this reason everything was simple: It was possible to unequivocally identify motion and time because absolute space always remained the same: immobile and without a need to relate or refer itself to any other external object fixed of moving. Absolute time works in the same way as absolute space."

"Well, why is it not always so?" interrupted Monika. "If I take a flight from New York to San Francisco and it takes five hours from take-off to landing, aren't these five hours the same for everyone? The clock ticks and time passes in the same way for those traveling in the air as it does for those on the ground."

"This is one of the crucial points in the theory of relativity. For Einstein, time is not absolute and does not tick in the same way for everyone. After Newton it took three centuries before Albert Einstein proved that space is not a three-dimensional entity separate from time. Space and time form a continuum. The closer an object's movement is to the speed of light, the more time slows down for them. Do you recall the paradox of the Einstein twins?"

"I think I know the story," Elena quickly responded. "The first twin remains on Earth while the second travels in a spaceship that moves at the speed of light. After many terrestrial years, the second twin returns to Earth and finds his brother crooked and aged with gray hair, while he is still young. It's a paradox because the twins should be the same age, given that they were born minutes apart."

"Yes, it's just like that. The first twin remained on the earth and for him time passed 'normally,' while for the second one in the spaceship, time passed very slowly and almost stopped compared to time on Earth, because he was traveling at the speed of light," added Dave.

"In fact in 1911 Einstein asserted that 'if a living organism, after an arbitrarily long flight at a speed approximately equal to the speed of light, could return to his place of origin, he would only be slightly altered while his corresponding remaining organisms would have already given birth to new generations.'

"The point is that even if the twins were born more or less at the same time and were the same age, for the one on the spaceship time passed slower in comparison to the one on Earth. Einstein concludes that it is important to evaluate the passage of time of an object on the basis of its speed with respect to that of another observer. In this way, the

concept of absolute time was destroyed and the “relative space-time” concept remained.

“I used the idea of ‘relative space-time’ as the base from which I developed my P-Space theory. I use it to calculate the most probable time and price for a reversal in the financial markets,” I explained.

“Among the various consequences of this revolutionary hypothesis is that the passing of time varied according to the state of motion—or state of rest—of the observer, depending on the velocity with which the latter moved.

“It’s exactly to explain that point that Einstein suggested the famous “Twins Paradox” we have just spoken about, even if it’s not a true paradox, since it is completely explained in the context of the two postulates of the theory of special relativity. There are two twins, initially in the same place and with two identical clocks that are synchronized. One of the two twins remains on Earth, while the other leaves for an interstellar journey on board a spaceship, whose elevated velocity reaches 80 percent that of light. On his return to Earth, his clock indicates that 30 years (of “real” time) have passed since his departure, while the clock of his twin, left on Earth, indicates 50 years have passed since the departure of the spaceship.

“Since the astronaut twin does not perform a uniform motion, but has to accelerate or decelerate to carry out the departure and return, the situation is no longer symmetrical: the astronaut will have, in effect, lived less than the twin brother left on Earth.

“But why do you need to know all this stuff if you want to make money trading the financial market with your system?” asked Barbara.

“If you begin to see things in this way and try to apply these concepts to stock, commodity, and FX trading, you can revolutionize your way of interpreting financial phenomena and start seeing them in a different light.”

“So all of this plays a role in your trading system and the money you both earned, with which my dear Dave will buy me that wonderful Bulgari diamond ring that I saw last week?” exclaimed Barbara.

Dave coughed and his face immediately turned red. He knew that taking Barbara to the Bulgari shop would cost him a fortune. In that moment it seemed he regretted telling Barbara how much he had earned that week with the help of my algorithms.

“Barbara is right,” I said, enjoying her dazzling smile.

Dave quickly snapped back, saying that given how I was agreeing with her, I could be the one to accompany her to the Bulgari shop and use my credit card instead of his.

“No, Dave,” I said. “I was referring to the fact that Barbara was right in saying that, until now, I have only spoken about relative time and I’ve not yet arrived at the crucial point.



“The point is that according to Einstein, even space is not uniform, the opposite of what Newton assumed.”

“In fact, in the general theory of relativity, Einstein specifies that mass is a form of energy and that the force of gravity, due to the presence of mass in space, has the capacity to curve space. The implications of this concept are numerous, but it is really this property of the curvature of space that led me to the idea of creating a virtual mathematical space in which the price of a share moves similarly to a particle of light, a photon. When the price moves and eventually reaches a point of curvature, it deviates from its trend and inverts, creating a top and a bottom.”

“Explain yourself better,” said Dave, “I studied technical analysis a little bit, but I’m unable to see any resemblance. What is the relationship between the curvature of your mathematical, virtual space in which the price of stock moves and marks a major reversal of the trend?”

“Bernhard Riemann’s approach to topography is very enlightening and can help us understand the entire process. Applying Riemann’s idea of the curvature tensor to the space where the price of a stock moves helps us reach a deeper understanding of my trading theory. Try to picture the price of a stock as a ball in constant motion on a rugged terrain full of *cavities* and *bumps*. At times the ball ascends a bump, which corresponds to an uptrend. When the ball reaches the peak of the bump it corresponds to the highest price of the stock, or the top in its chart. Once it arrives at the peak it begins to descend, sliding down toward the valley, which corresponds to a downtrend. Then you may see it roll on the flat plain, and this corresponds to a lateral trend. When it descends to the lowest point of the cavity, this corresponds to a bottom in its chart. Still in motion, the ball returns and ascends. It’s a matter of topography.

“The ball is the price of a stock that rises and falls. Do you understand now?”

“Yes, now it’s a bit clearer. But didn’t you say that in your model the price was like a particle of light?”

“Einstein probably made a similar reasoning to figure out the phenomenon of the deflection of light in the presence of masses that curve space. In fact, he used Riemann’s geometry and curvature tensor, the basis of modern topography, to finally express his theory through a definitive formal model.

Despite the fact that he had already discovered the core of his theory on light, space, and time a few years previously, Einstein could not progress with his theories for years until Marcel Grossmann suggested to him to consider the revolutionary Riemann studies and his curvature tensor. Einstein didn’t know Riemann’s geometry until that moment. Grossmann suggested that Einstein would need a space-time



model possessing not only the flat, Euclidean properties of special relativity, but a space-time possessing non-Euclidian properties, like Riemann's geometry.

One of space-time's main features is that, while it appears curved on a grand scale, it appears flat on smaller scales. That is exactly what happens if someone stands on a football field and looks around: the Earth will appear flat. The first consequence is that for the description of events confined to local regions of space-time, special relativity remains valid. But things appear differently for large regions over which the curvature of space-time becomes significant and visible. In the same way the football field looks flat to a football player, but America looks curved if observed by an astronaut. So, it's easy to understand that the larger the radius of a sphere, the smaller its curvature. In the same way, the larger the radius of a sphere, the greater the area surrounding any point that appears to be flat, if observed locally.

"Einstein, in his book *Relativity*, came to a very important conclusion: The distribution of matter in the universe determines the amount to which space-time is curved: The greater the density of matter in a region, the higher the curvature of space-time. Thus space-time is distorted more around the Sun than the Earth because the Sun has the larger mass. This means that gravity no longer exists as such; it is transformed into the curvature of space-time."

"Can you please clarify what you said about the deflection of light, given that it's so crucial to your theory?" asked Elena.

"Of course," I replied. "Let's imagine Newtonian space for a moment. It's uniform and, for the sake of explanation, we will represent it with two dimensions (see Figure 1.3), even though it always exists in three dimensions. We can compare this space with a tablecloth that forms a flat plain. Let's hold the tablecloth in the air and take a steel ball that represents the sun and place it in the middle of this space (see Figure 1.4).

"According to Einstein, due to heavy mass, space is distorted just like our stretched-out tablecloth is distorted when it is indented by the steel ball. The end result is that space, in our case the tablecloth, now curves" (refer back to Figure 1.4).

"This leads us to two considerations. Regarding gravity, the first effect of the curvature of space is that it supplies us with the line of minimum resistance on which the planets move around the sun. Regarding the movement of light, which is crucial for understanding our trading model, particles of light, originating from a distant source and passing close to the sun, deviate from their rectilinear path. This happens because the gravity of the mass of the sun curves the space in which the particles of light travel. In this way the particles of light are deflected—and the price of a stock follows a similar pattern" (see Figure 1.5).