<<超弦理论>>

图书基本信息

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前言

In celebration of the opening of the Center of Mathematical Sciences at Zhejiang University, we held the 2002 String Theory International Conference from August 12th to August 15th at the new Center. The attendance of more than ten prominent mathematicians such as S.Hawking, D.Gross, and E.Witten was a huge sensation in China. These eminent mathematicians, in addition to S-T. Yau and A. Strominger, had the honor of meeting the former President Jiang Zemin previously in Beijing.The topic of this conference, string theory, has been a burning science interest for the Chinese people, especially for young scholars. Due to the great interest of the Chinese community, and the high quality of academic research presented, the 2002 String Theory Conference may be said to be the most successful conference which has taken place in the history of science in China.String theory is a model of fundamental physics whose building blocks are one-dimensional extended objects （strings） rather than zero-dimensional points （particles）. Interest in string theory is driven largely by the hope that it will evolve to be the ultimate "Theory of Everything". Work on string theory has led to advances in many branches of mathematics. This rapidly developing subject is one of the mainstream topics of mathematics in the 21st century.We hope this proceedings will further promote the research of string theory and its related mathematical topics in China.During the organization of this conference, we received the strong support of Zhejiang University, the National Science Foundation, Professor Fanghua Lin, Professor Jianshu Li, Professor Chengbo Yue, and Professor Sen Hu. In addition, Professor Lo Yang and Professor Hongwei Xu contributed greately towards the success of the conference. Here, we would like to take this opportunity to acknowledge them, and show our gratefulness for their efforts.

内容概要

Mathematics is a rapidly developing field where ideas and methods from many different subjects are interchanged and applied abundantly. One example is String Theory, which has raised many mathematical questions and has motivated the development of surprising new mathematical theories. String Theory has helped to solve many long-standing problems in mathematics, particularly in algebraic geometry.

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章节摘录

插图：Remarkably enough, in many of the theories in the M-theory network, spacetime has more than the four dimensions we experience. Are these extra dimensions real? I must admit I have been reluctant to believe in extra dimensions, but the M-theory network fits together so beautifully, and has so many unexpected correspondences, that I feel to ignore it would be like claiming that God put fossils in the rocks to trick Darwin into believing in evolution.In some theories in the network, spacetime has ten dimensions, while in others, it has eleven. This is yet another indication of the fact that spacetime and its dimension are not absolute, theory-independent quantities, but derived concepts that depend on the particular mathematical model. So how is it that spacetime appears four-dimensional to us, but is ten or eleven dimensional in M-theory? Why don't we observe another six or seven dimensions? The conventional answer to this question, which was generally accepted until recently, was that the extra dimensions were all curled up in a space of small size, leaving four dimensions that are nearly flat. It is like a human hair: if you look at it from a distance, it looks like a one dimensional line, but if you look at it under a magnifying glass, you see the thickness and that the hair is really three-dimensional. In the case of spacetime, a sufficiently powerful magnifying should reveal curled-up extra dimensions, if they exist. In fact, we can probe spacetime to short distances using high energy particles produced by big particle accelerators like the large hadron collider being built in Geneva. So far at least, we have not detected evidence for dimensions beyond four. If this picture is correct, the extra dimensions would have to be curled up smaller than a billion-billionth of a centimeter.

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