

# What's the Grand Design?

By Marcia Bartusiak

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### THE MIND OF GOD

*The Scientific Basis for a Rational World.*

By Paul Davies.

Illustrated. 254 pp. New York:

Simon & Schuster. \$22.

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**T**HE most commemorated passage in "A Brief History of Time" by Stephen Hawking comes at the very end: "If we do discover a complete theory [of physics], it should in time be understandable in broad principle by everyone, not just a few scientists. Then we shall all, philosophers, scientists and just ordinary people, be able to take part in the discussion of why it is that we and the universe exist. If we find the answer to that, it would be the ultimate triumph of human reason — for then we would truly know the mind of God."

But would we really? Using Mr. Hawking's quotation as his springboard, Paul Davies, a professor of mathematical physics at the University of Adelaide in

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Australia and a seasoned popularizer of science, sets out to examine whether rational inquiry — the engine that drives the scientific enterprise — can unequivocally lead us to ultimate knowledge, an understanding of the very nature of our creation. Joining the growing ranks of scientists who are coming to explore such provocative questions — most recently Roger Penrose in "The Emperor's New Mind" and John Barrow in "Theories of Everything" — Mr. Davies pursues his own metaphysical quest. In "The Mind of God," he seeks the underlying rules by which the universe runs.

It is not really surprising that physicists are exploring issues once reserved for religious scholars. Science today, more so than ever, is encroaching into territories previously entrusted to theology alone. In fact, it is the essence of the game. To ancient thinkers, all natural phenomena, from earthquakes and volcano eruptions to the stately movement of the planets, were controlled by a motley crew of gods. But over time scientists have been deftly replacing these supernatural agents with physical law.

"The power of science to explain things is so dazzling I found it easy to believe that, given the resources, all the secrets of the universe might be revealed," Mr. Davies writes. But "what lies at the bottom of this magnificent explanatory scheme? What holds it all up? Is there an ultimate level, and if so where did *that* come from?"

Such questions seem more urgent now that scien-

tists believe they can describe the first microsecond of creation. Their equations are telling them that the big bang was the beginning of both space and time, a view that, Mr. Davies says, was anticipated by St. Augustine in the fifth century A.D. when he wrote that the world was made "with time and not in time."

Contemplating a time before time is rather awkward. Yet the lure of the eternal continues to tug at our finite minds, making us wonder what may have happened before that titanic, primordial explosion that gave birth to our physical universe. Mr. Davies thinks that notion is an echo of Plato, who believed that eternal forms, a realm of pure being, had to exist amid the ever-changing chaos of our surroundings. For many, the chief immutable form was, is and will always be God — "a sort of pyrotechnic engineer," Mr. Davies notes, "lighting the blue touch-paper to ignite the big bang, and then sitting back to watch the show."

But is such a prime mover or grand designer required if quantum physicists can imagine entire universes appearing out of nothingness, akin to the way certain atomic particles have been known, from time to time, to materialize out of the vacuum? "Given the laws of physics, the universe can create itself," Mr. Davies writes. "Or, stated more correctly, the existence of a universe without an external first cause need no longer be regarded as conflicting with the laws of physics."

As a modern-day Platonist, Mr. Davies believes

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that transcendent laws — a cosmic code, if you will — do exist that can explain why the universe is the way it is. Matter and energy, following these mathematical rules, strive to organize into complex states, including conscious beings like us.

And, with our consciousness, we continue to press our queries: Where did those laws come from? Why do they have the form they have? Could they have been otherwise? Is the universe, as philosophers have long put it, "necessary," containing the reason for its existence within itself, or "contingent," dependent on something beyond itself?

**M**R. DAVIES, writing in his familiar crisp and personable style, convinces us that such questions are more than theological pastimes. He shows us how scientists, like the ancient philosophers before them, continue to struggle with reconciling the eternal and the ephemeral.

For insight, Mr. Davies turns to the great Austrian-American mathematician Kurt Gödel, who in 1931 demonstrated that at the deepest level of mathematics there's always a given, a statement that cannot be proved true. Although an avowed atheist, Mr. Davies is still certain (some might call this a faith) that the universe is more than a purposeless accident. He rejects the existentialist view that we are all bit players in an indifferent cosmic drama. "Science suggests that the existence of conscious organisms is a *fundamental* feature of the universe," he contends. "We have been written into the laws of nature in a deep and, I believe, meaningful way." Yet Gödel's theorem could be telling us that incontrovertible proof of this belief will be forever elusive. Ultimate answers, going outside the universe to discern its ruling axioms, could be beyond the scope of science.

Be prepared to take a few fascinating detours along the way to this realization. Continuing the discussions begun in two of his earlier works, "God and the New Physics" and "The Cosmic Blueprint," Mr. Davies expounds on a vast range of topics in "The Mind of God" — from mathematical theory, quantum cosmology and multi-universes to complexity in nature, cellular automata and even

mysticism. A brief section explaining what makes a scientific law a law is excellent; Mr. Davies is a passionate defender of the scientific method.

The reader doesn't always have to agree with the author to learn from his eclectic and well-researched presentation. Personally, I am not as enamored of "cosmic coincidences" as Mr. Davies seems to be. That's the idea that our cosmos must be special, for it would be turned topsy-turvy — the conditions for life (as we know it) made impossible — if certain physical constants, such as the value of the strong nuclear force, were altered by the tiniest amount. And the probabilistic nature of quantum mechanics, inherent in its famous uncertainty principle, is, in my estimation, far overused in introducing "free will" into the universe. But then, such choices are "largely a matter of taste rather than

*Today, scientists, like theologians before them, are trying to understand how the universe got to be the way it is.*

scientific judgment," as Mr. Davies puts it. Where logic fails, faith steps in.

"In the end," Mr. Davies concludes, "a rational explanation for the world in the sense of a closed and complete system of logical truths is almost certainly impossible. We are barred from ultimate knowledge, from ultimate explanation, by the very rules of reasoning that prompt us to seek such an explanation in the first place." This lack of a definitive understanding is frustrating, as if we had scaled a high mountain only to find the long-sought view blocked by immense skyscrapers. But Mr. Davies's journey up to the mountaintop is both stimulating and enlightening. □