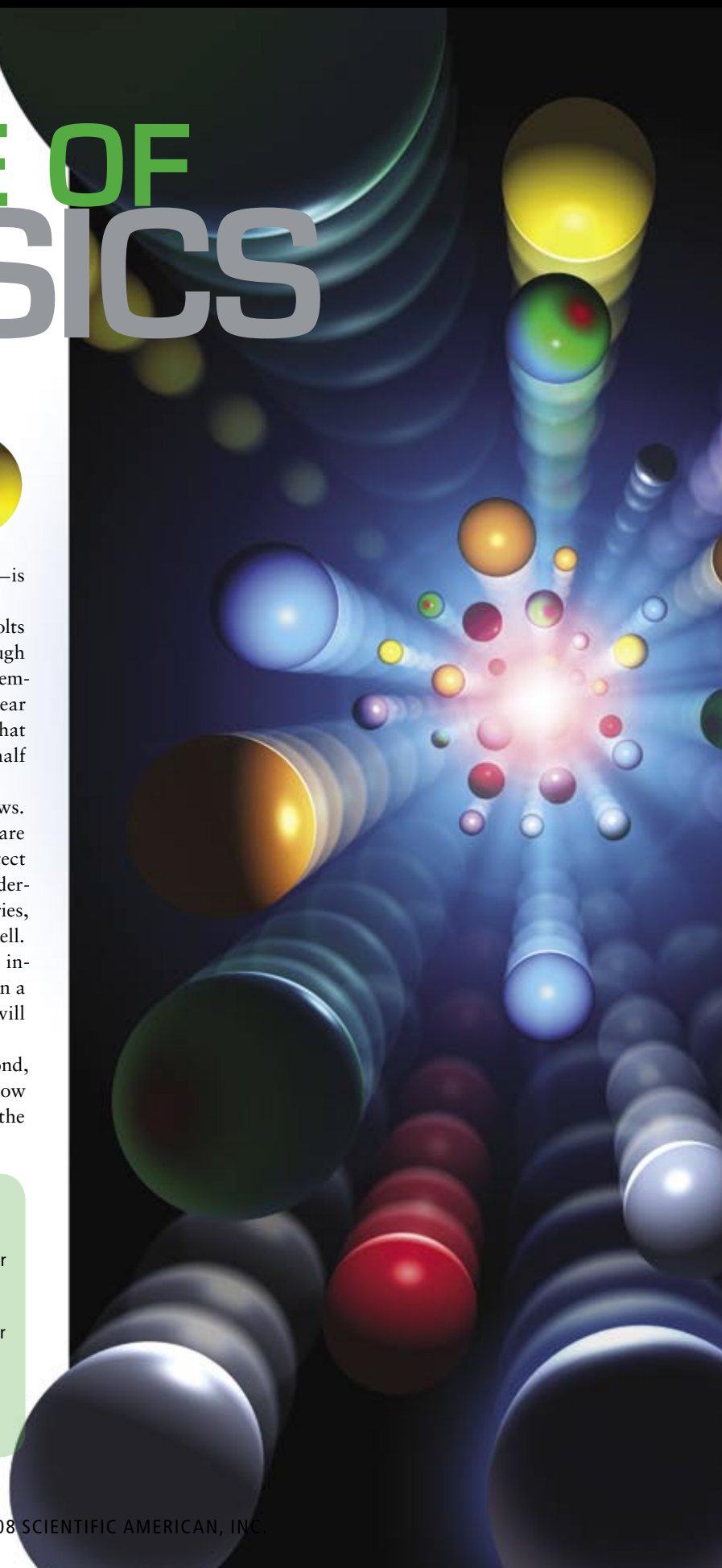
THE FUTURE OF PHYSICS



EDITORS' INTRODUCTION

They call it the terascale. It is the realm of physics that comes into view when two elementary particles smash together with a combined energy of around a trillion electron volts, or one tera-electron-volt. The machine that will take us to the terascale—the ring-shaped Large Hadron Collider (LHC) at CERN—is now nearing completion.

To ascend through the energy scales from electron volts to the terascale is to travel from the familiar world through a series of distinct landscapes: from the domains of chemistry and solid-state electronics (electron volts) to nuclear reactions (millions of electron volts) to the territory that particle physicists have been investigating for the past half a century (billions of electron volts).

What lies in wait for us at the terascale? No one knows.

But radically new phenomena of one kind or another are just about guaranteed to occur. Scientists hope to detect long-sought particles that could help complete our understanding of the nature of matter. More bizarre discoveries, such as signs of additional dimensions, may unfold as well.

Physicists are also drawing up plans for a machine intended to succeed and complement the LHC more than a decade hence, adding precision to the rough maps that will be deciphered from the LHC's data.

At the end of this "journey" to the terascale and beyond, we will for the first time know what we are made of and how the place where we briefly live operates at bottom. Like the completed LHC itself, we will have come full circle.

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