

# TROUBLE IN PARADISE

There is nothing new to be discovered in physics now. All that remains is more and more precise measurement.

William Thomson, Lord Kelvin (1900)

Convincing evidence that the automobile of today is as far perfected as the materials of construction and mechanical ingenuity will allow, is afforded by the fact that the cars shown in the two annual exhibitions this year exhibit no novelties of a radical character as compared with the cars of the preceding year.

Scientific American (1910)

The most elegant theories could be shattered by a single inconvenient fact.

Tom Clancy (1993)

Once again, physicists believe the physical world has been explained, and that no further revolutions lie ahead.

Michael Crichton (1999)

NICOLA: You need to write something new. Something real.

DAN: Like what?

NICOLA: Like this, like everything that's happening right now. Not a silly detective story. Something real.

Dennis Potter (2003)

It seems strange at first, working in an office. It's in a gritty neighborhood, on the third floor of a clean but slightly grotty building with respectable pretensions. But within a week or two it feels like home. Soon strange new habits coalesce into a new routine. Already there are one or two panhandlers I flip change to when nobody's watching. Been there, done that, is my motto. Now *I've* got the job and the clean shirt. Now the pretensions are mine. And best of all I get to write all kinds of stuff and say I did it my way. Most people wouldn't know that that's Paul Anka. For him maybe it was nothing more than a hack writing job—though for Sinatra it became *his* song. But for me the writing's always therapeutic. Long evenings on a beach some like to take a toke or sing songs to the surf. On any beach, on any night, I'd sooner sit near light and read and write. Today I'm in an office and alone. Why does this feel even better? Kerouac's tip for what's right for writing comes to mind: 'Scribbled secret notebooks, and wild typewritten pages, for your own joy....'

As the 19<sup>th</sup> century gives way to the 20<sup>th</sup>, the popular as well as the inside take

on science is self-congratulatory. In many lands that follow the Julian calendar the century has brought the best of worlds. At its epicenter the British Empire is the leading power. Peace breaks out, prices fall and populations grow. Cities come of age. A new level of prosperity looms into view, built on the success of science. Little wonder that the book of knowledge is now widely seen as written, all but closed. Kelvin speaks for a consensus. By 1900 physics in particular is seen as finished. Mankind knows everything worth knowing of it, it is thought (and said) by many, but for perhaps a few details. The universe is understood.

No doubt, some say, a few discrepancies remain and could be ironed out, but for physics there is nothing earth-shaking left to be done. There is in all the world no hint of the new revolution in thought and action that will soon overthrow most of its accomplishments and raise entirely new ones in their place, giving birth to almost everything that by 2000 will comprise the engine of the world. It is the calm before an intellectual storm. In this calm the idea that Newton's mechanics (on the movement of mass) and Lorentz's electrodynamics (on the movement of charge)—the pillars of three hundred years' achievement in physics—are about to become chapters in *history* is widely unthinkable and universally unthought.

Little noticed, three harbingers of storm are in the air. The first relates to Scottish physicist James Maxwell's wave theory of light. A detail, a mere fragment of this consummately successful theory predicts that light shining on a surface should make it give off electrons and that higher-frequency (that is, higher-energy) light waves should make *more* electrons, whose energy should stay the same. But that's *not* what is found: higher frequency light produces the same number of electrons, not more of them, and their energy is higher, not the same.

The second one also has ties to light. Theory says the speed of light depends on motions of observers. Experiments find no change in its speed.

As the calendar shows double zero few brows frown at these two technicalities.

But there is a third harbinger of storm: A 21-year-old stateless Ashkenazi-Jewish immigrant in Switzerland is about to graduate from the Federal Polytechnic Institute in Zürich and, having failed to find work as a teacher, takes a job evaluating patent applications. It is a job that will allow him time to think. The world is about to change forever.