

The Dupont Summit.

*The New Administration Tackles Science & Technology:
Priorities for Discovery and Advance*

12:30 - 2:00 pm
Plenary Session 9

TECHNOLOGICAL IMPERATIVES OF THE TRANSATLANTIC MARKET

henry@jhu.edu

Richard Conn Henry (Chair)

Professor of Physics & Astronomy, Johns Hopkins University

Michael Maibach

President, European-American Business Council

John Williamson

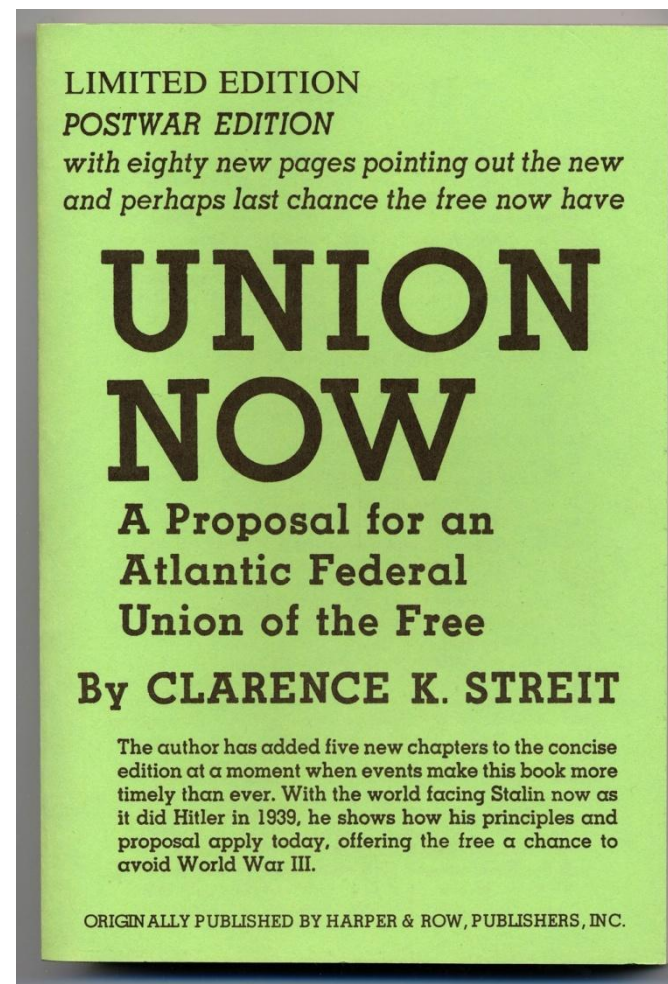
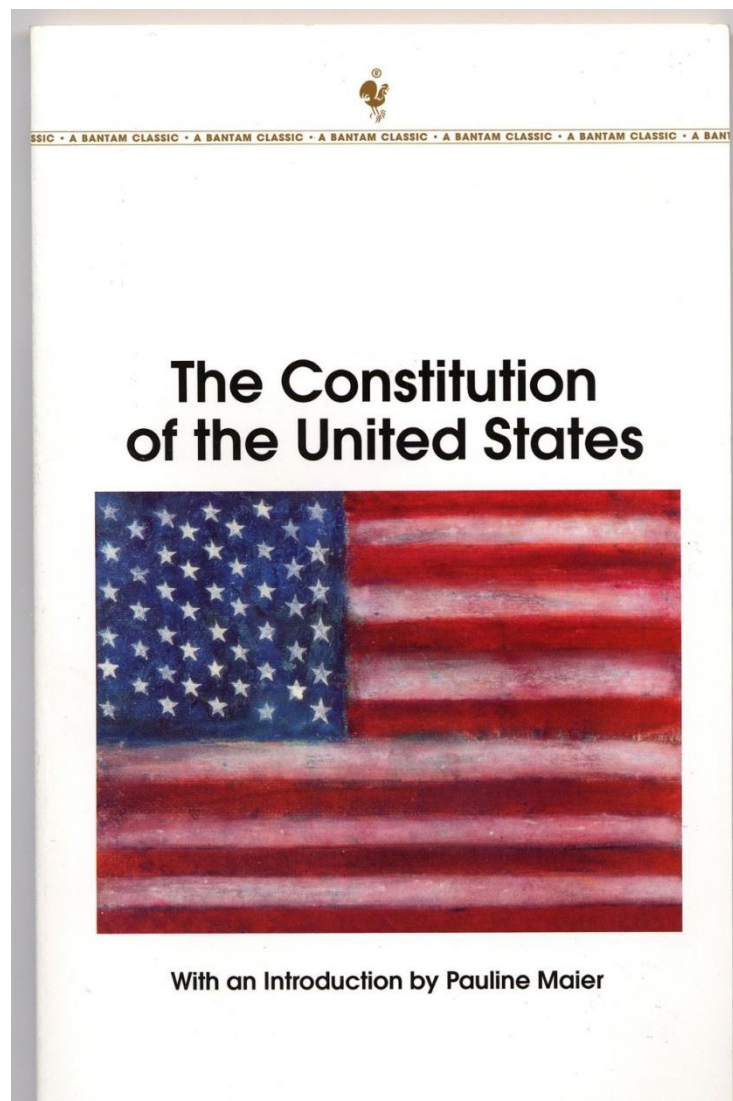
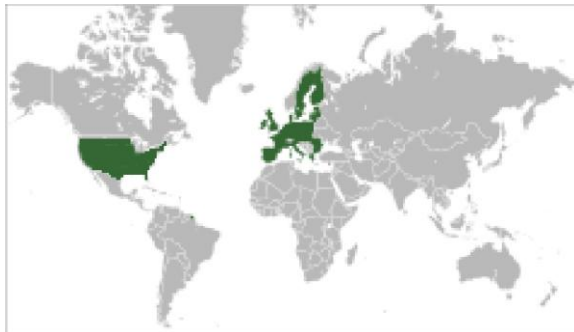
Senior Fellow, Peterson Institute for International Economics

Richard Rosecrance

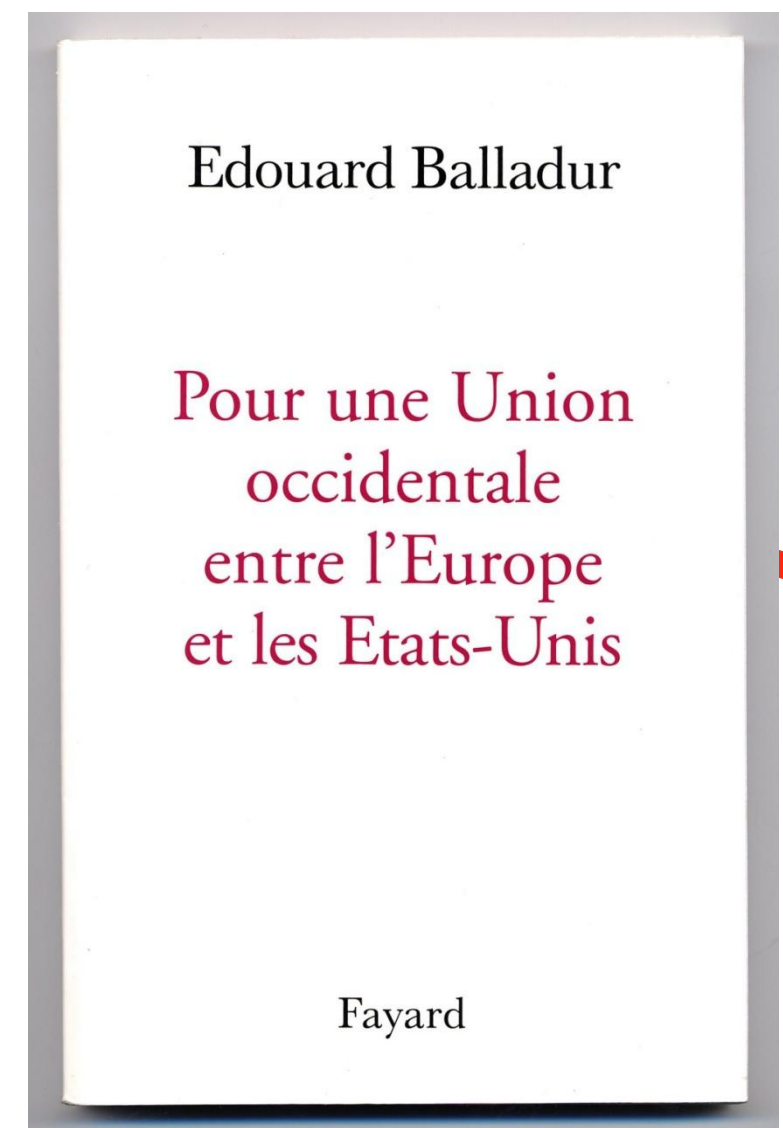
Professor, John F. Kennedy School of Government, Harvard

Marcus Schaper

Visiting Professor, Political Science, Reed College



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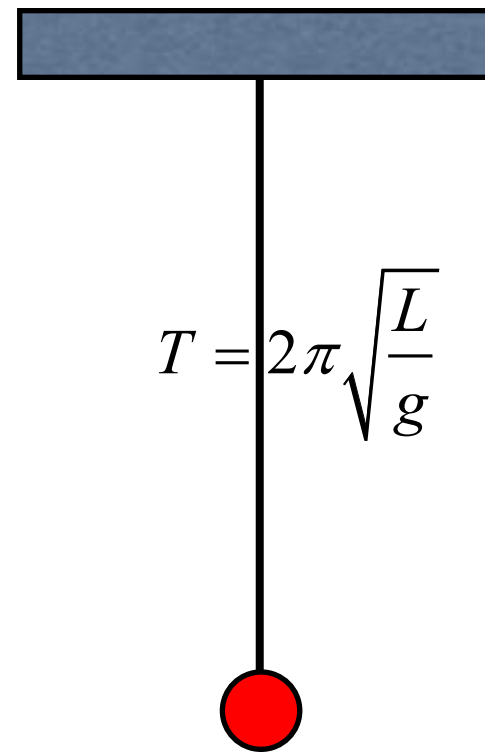
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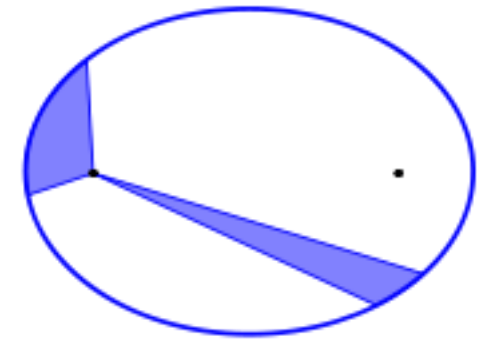
Market Size and Regulatory Harmonization



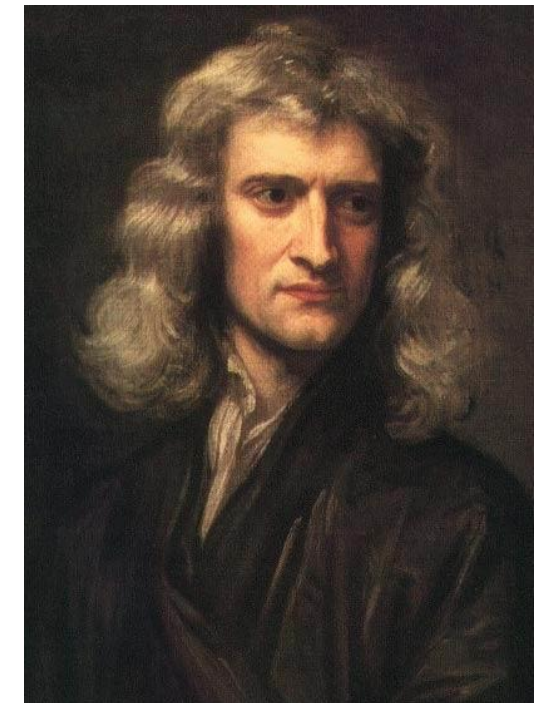
2630 BCE



1602 CE



1609 CE



1925

$$\square \quad i\hbar \frac{\partial \Psi}{\partial t} = -\frac{\hbar^2}{2m} \frac{\partial^2 \Psi}{\partial x^2} + V \Psi$$

Quantum
Mechanics

Heisenberg, Schrödinger,
Dirac

$$F = ma \quad F = G \frac{Mm}{r^2}$$

1687



PHYSICS

Measurements Are the Only Reality, Say Quantum Tests

Hamlet would run a few lines short in a quantum-mechanical theater, where “to be or not to be” is not the question at all. The standard interpretation of quantum mechanics says that a physical quantity—such as an electron’s spin or a photon’s polarization—doesn’t have a reality, or “being,” until an experiment measures its value. “To measure,” that is the question. It doesn’t sit well with Einstein, who believed unmeasured quantities must have a definite state, even though we don’t know what that state is. And Einstein’s “common sense,” as he called it, was so much common sense, that it was the basis of the “local realism” hypothesis put forth by Einstein, Boris Podolsky, and Nathan Rosen (EPR) in 1935. Einstein and his colleagues argued that physical quantities whose value could be predicted with certainty before they were measured must have an “element of reality” that exists independent of measurement.

Now, some physicists are pinning their hopes on the quantum “reality” that quantum “reality” is as bizarre as Einstein feared. But two experiments are coming closer than ever to settling the debate. One, led by Leonard Mandel at the University of Rochester in New York, provided the most intuitively direct test of the “local realism” hypothesis put forth by Einstein, Boris Podolsky, and Nathan Rosen (EPR) in 1935. Einstein and his colleagues argued that physical quantities whose value could be predicted with certainty before they were measured must have an “element of reality” that exists independent of measurement.



JAMES MONTANUS/UNIV. OF ROCHESTER

Quantum interrogator. Rochester’s David Branning at a laser table used to probe the nature of quantum reality.

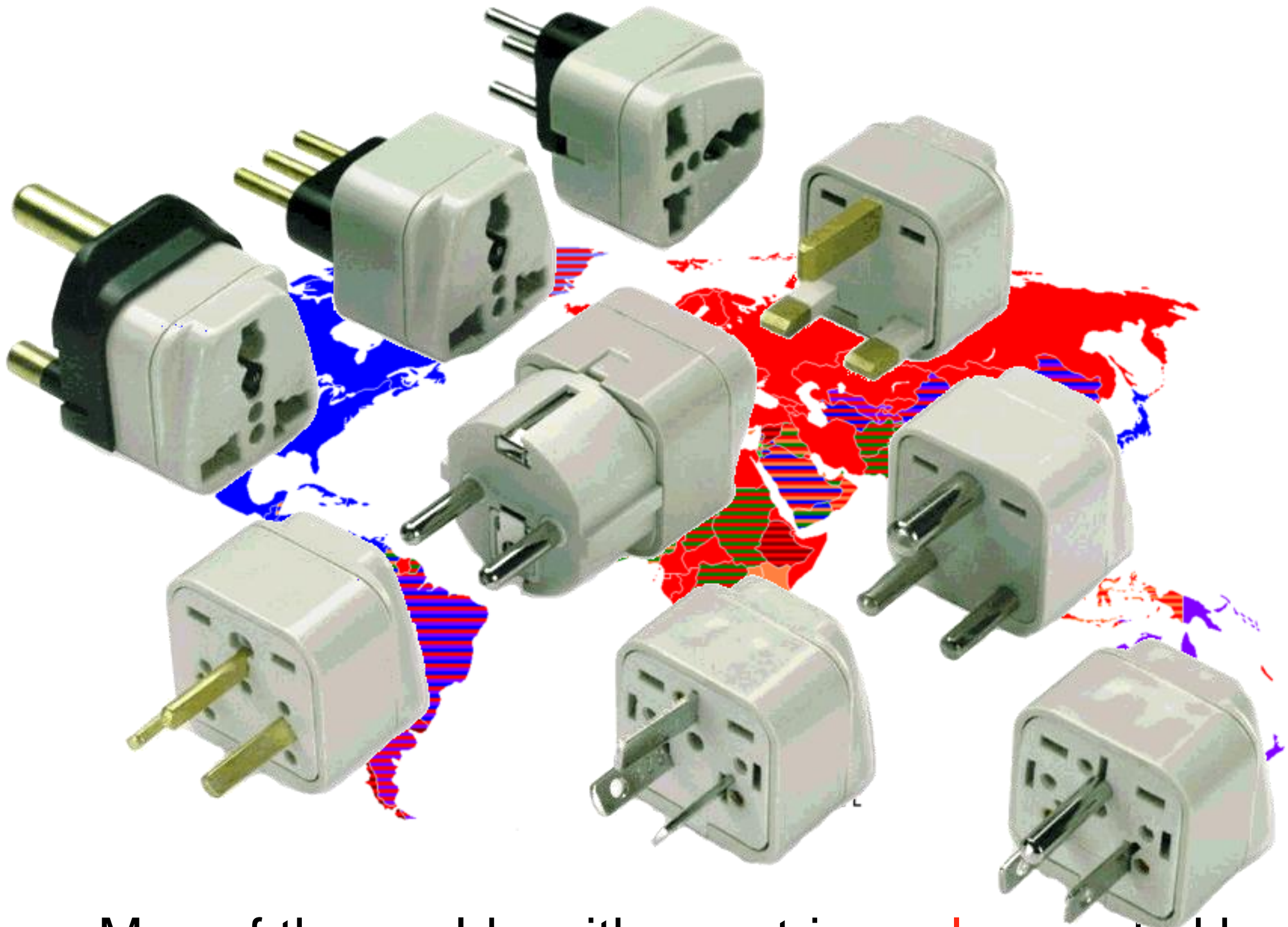
But several planned experiments, designed to build on the new results, could soon close the loopholes once and for all.

These disagreements over the nature of existence date back to the titanic debates between Einstein and physicist Niels Bohr in the 1930s. By then, the majority school of thought, led by Bohr, had concluded that

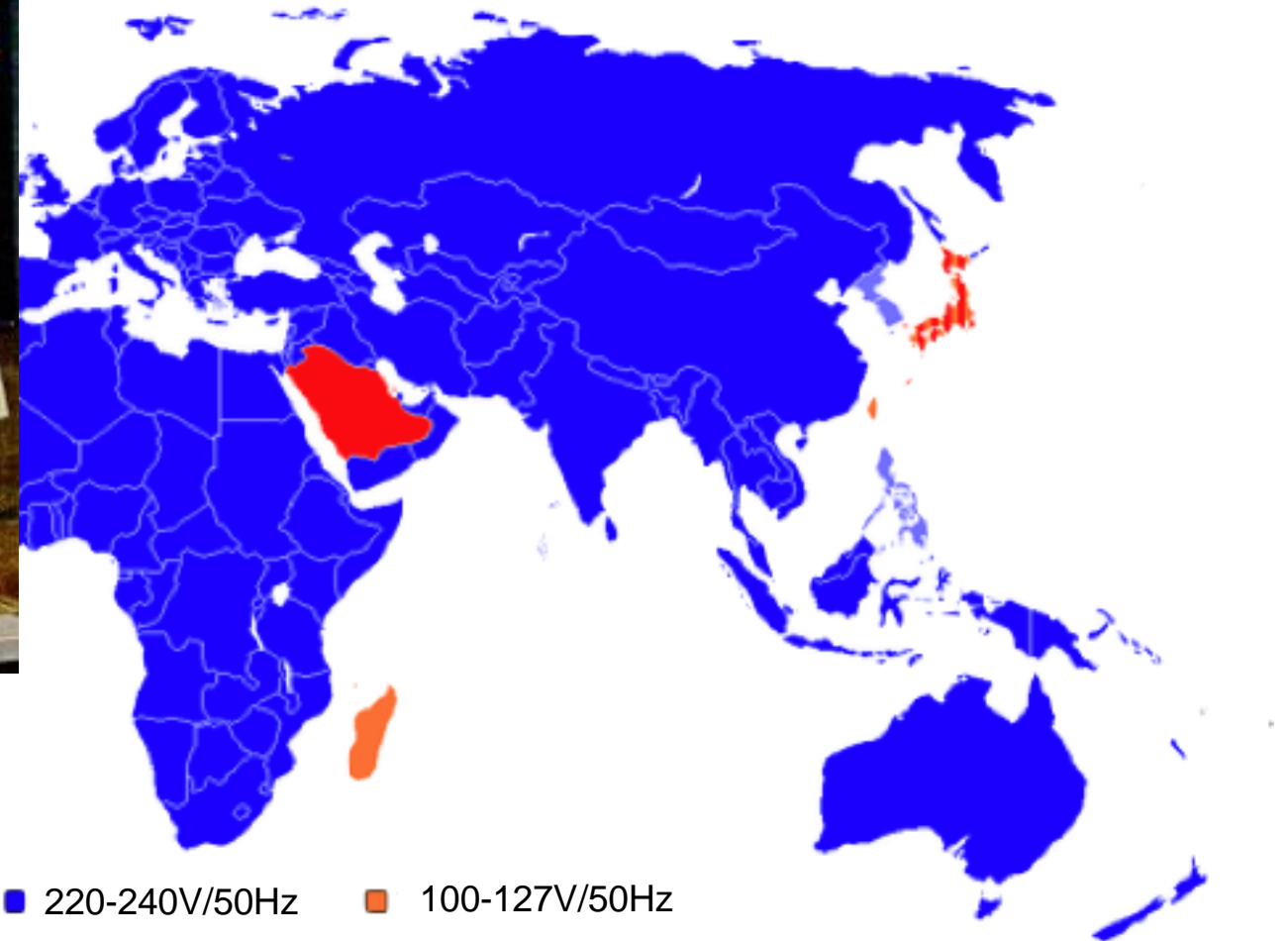
Pump
laser



TORGERSON ET AL

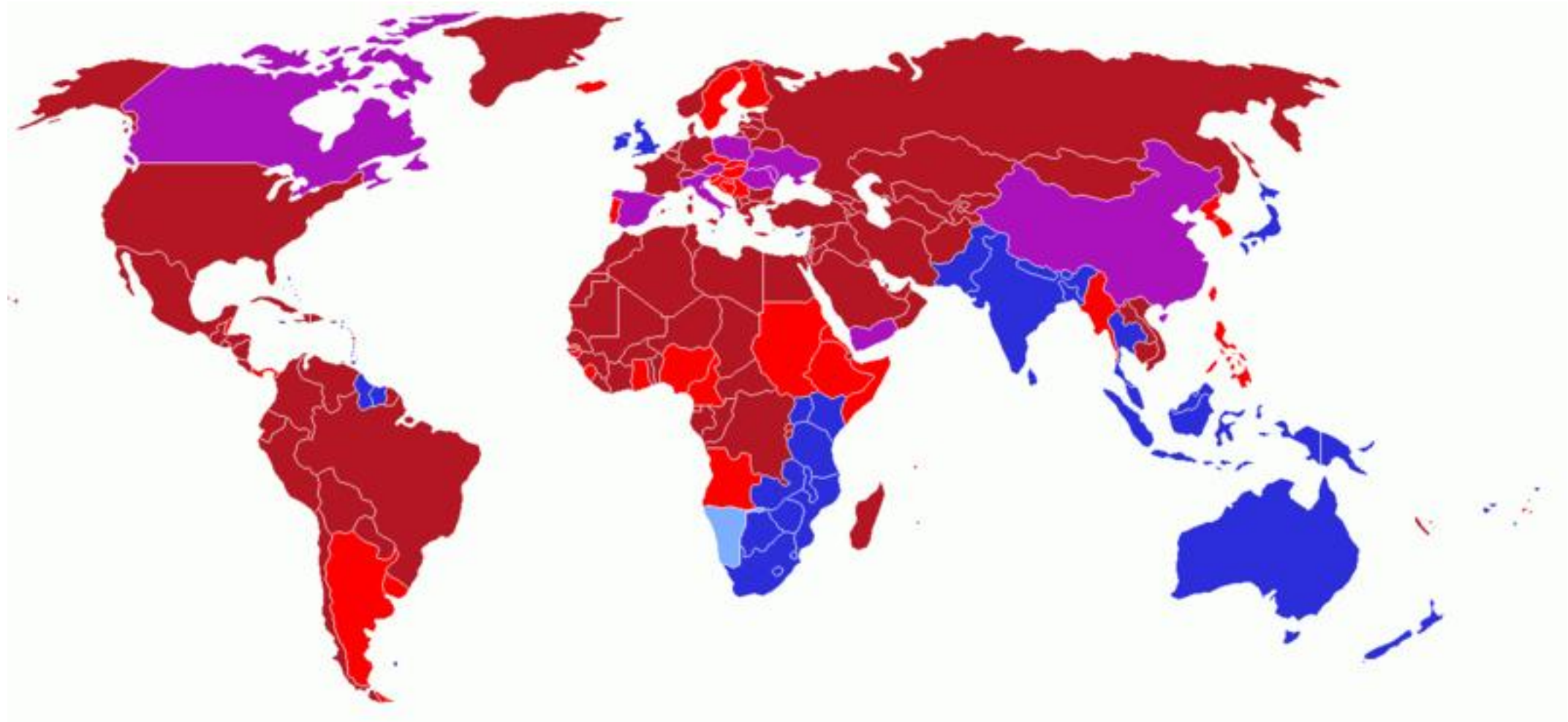


Map of the world - with countries **colour** coded by electrical plug type they use.



- | | |
|-----------------|-----------------|
| ■ 220-240V/50Hz | ■ 100-127V/50Hz |
| ■ 220-240V/60Hz | ■ 100-127V/60Hz |

Map of the countries of the world - **colored** by the nominal voltage and frequency they use



This map shows which countries drive on the left and which drive on the right.

Dark blue: countries that use left-hand traffic but were formerly British colonies (e.g., India, Australia, New Zealand, South Africa, and Canada).
 Light blue: countries that use left-hand traffic but were not formerly British colonies (e.g., Japan, the Philippines, and the Republic of China).
 Purple: countries that use right-hand traffic but were formerly British colonies (e.g., Egypt, Sudan, and Iraq).
 Light red: countries that use left-hand traffic.
 Dark red: countries that use right-hand traffic.



Left-hand traffic

Right-hand traffic (ex-colonies).
 Left-hand traffic

Right-hand traffic

Left-hand traffic





Countries that do not use the International Metric
System

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