

The Ten Most Beautiful Experiments That Changed Science and Our Understanding of the World

Science is often seen as a cold and impersonal pursuit, but there is undeniable beauty in the pursuit of knowledge. This beauty can be found in the elegance of a mathematical equation, the simplicity of an experimental setup, or the unexpected results that can overturn long-held beliefs.

The following are 10 of the most beautiful experiments in science, experiments that have not only advanced our understanding of the world but have also captured the imagination of generations:



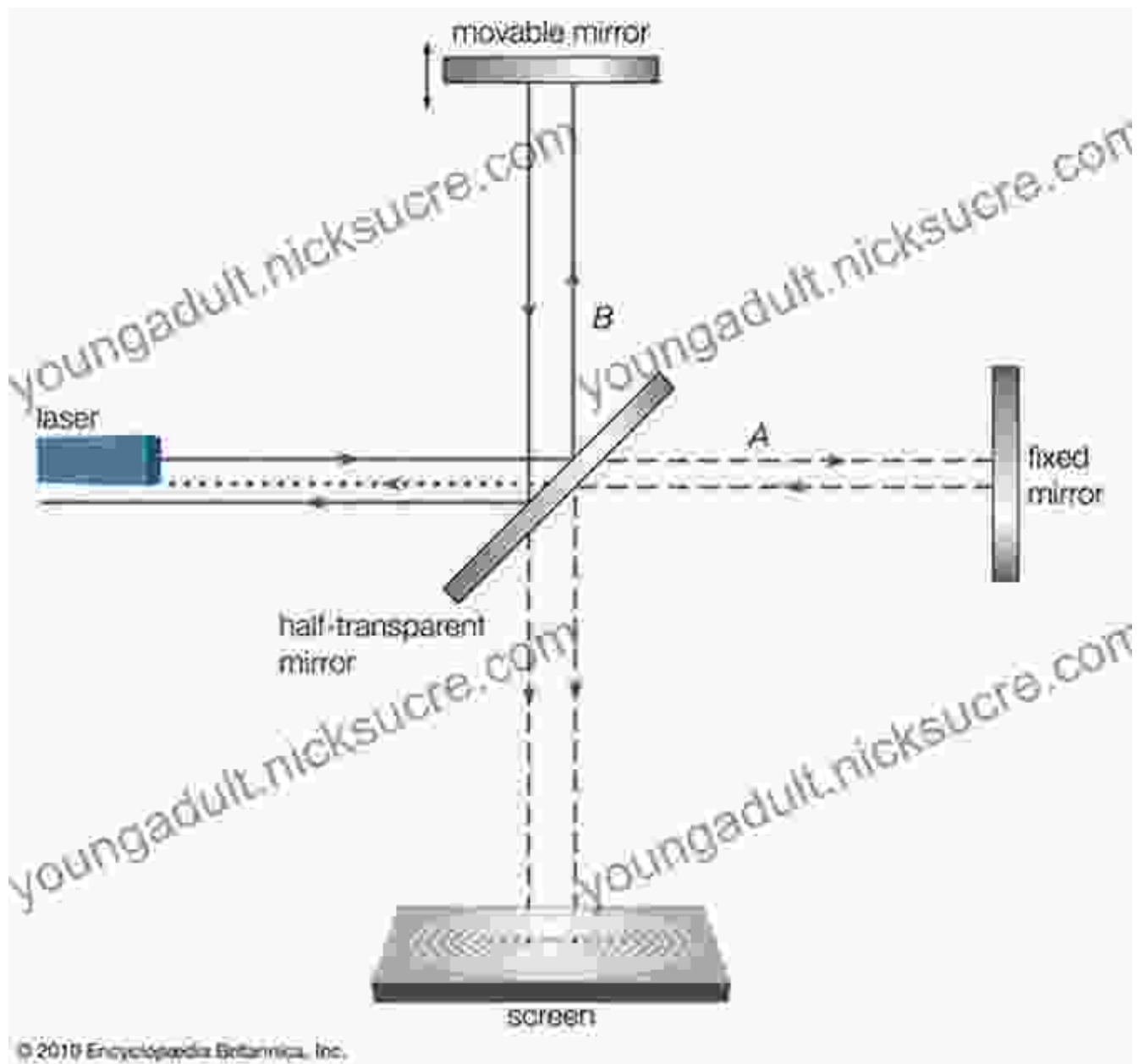
The Ten Most Beautiful Experiments by George Johnson

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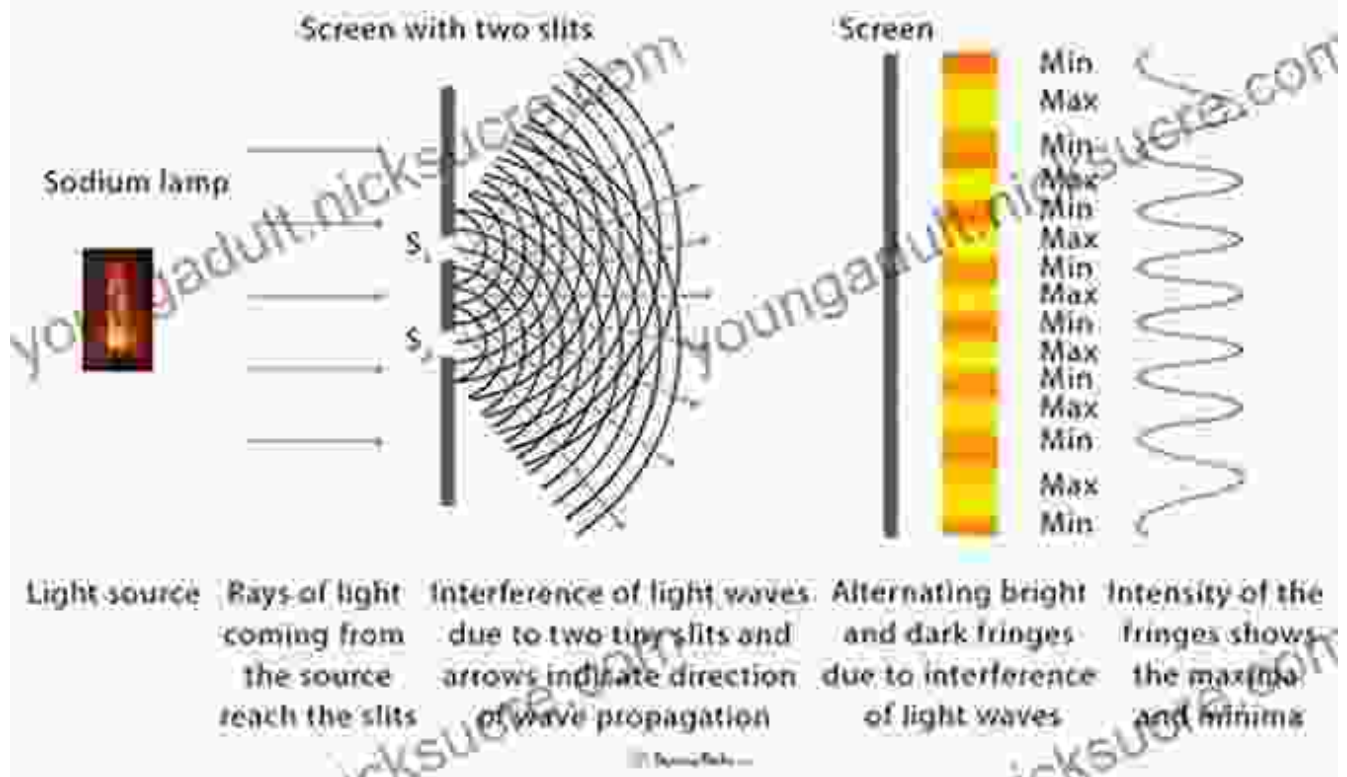


1. The Michelson-Morley experiment



2. The double-slit experiment

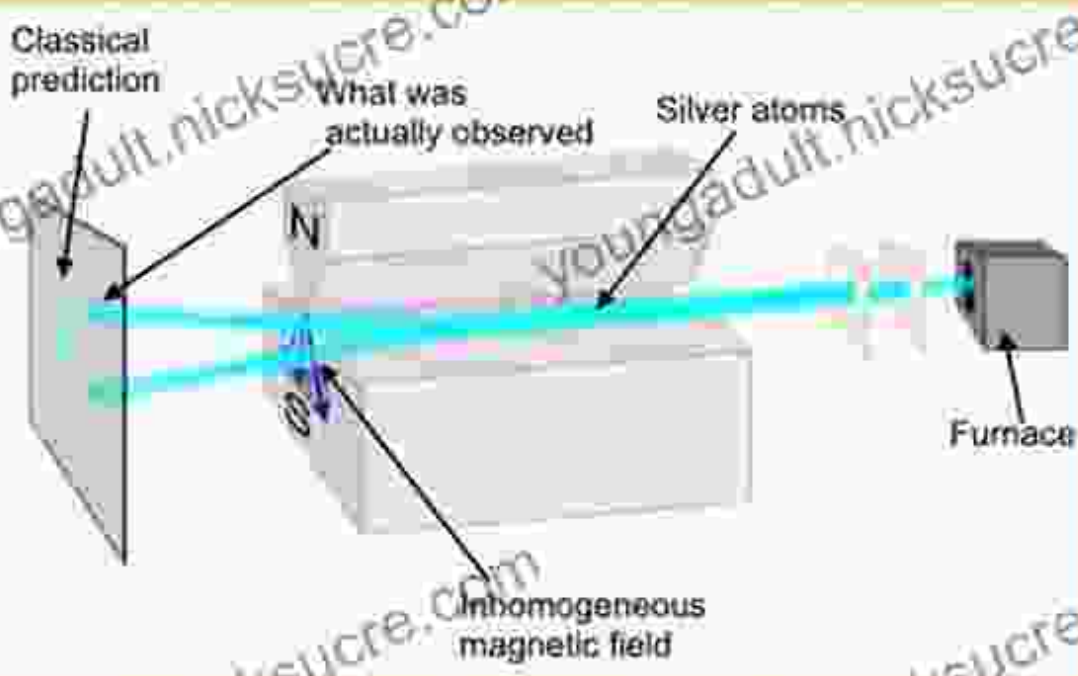
Double-Slit Experiment



3. The Stern-Gerlach experiment

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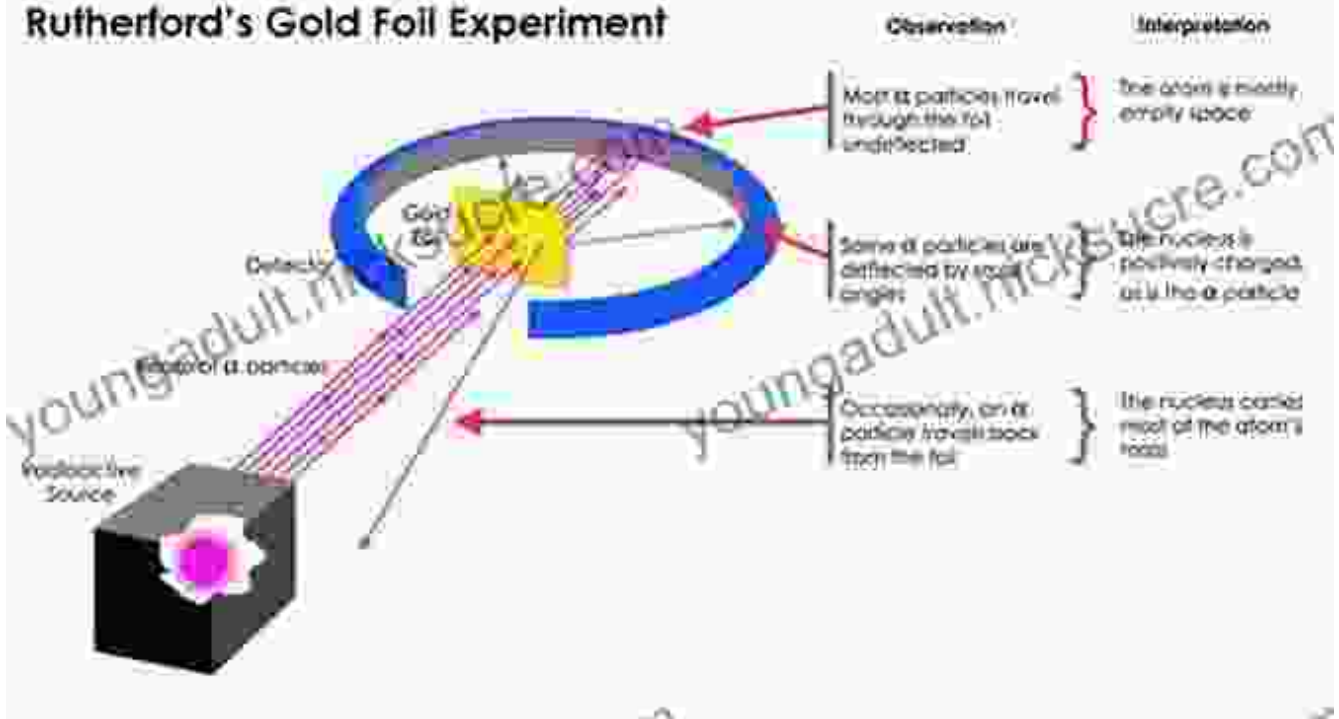
Quantum Mechanics: The Stern-Gerlach Experiment (1921)



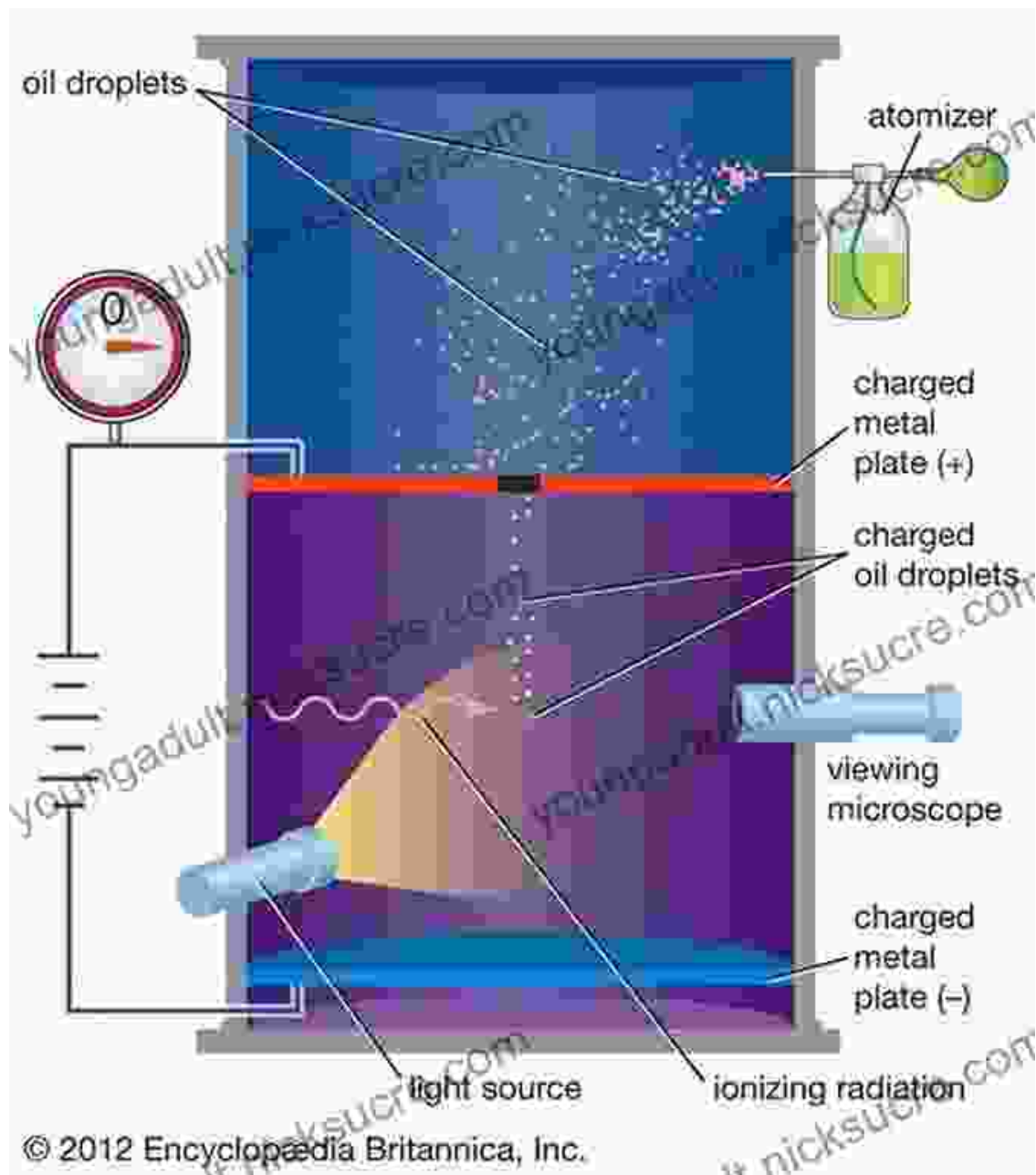
a silver atom has an unpaired electron
(and a charged particle is deflected by a magnetic field)

4. The Rutherford scattering experiment

Rutherford's Gold Foil Experiment

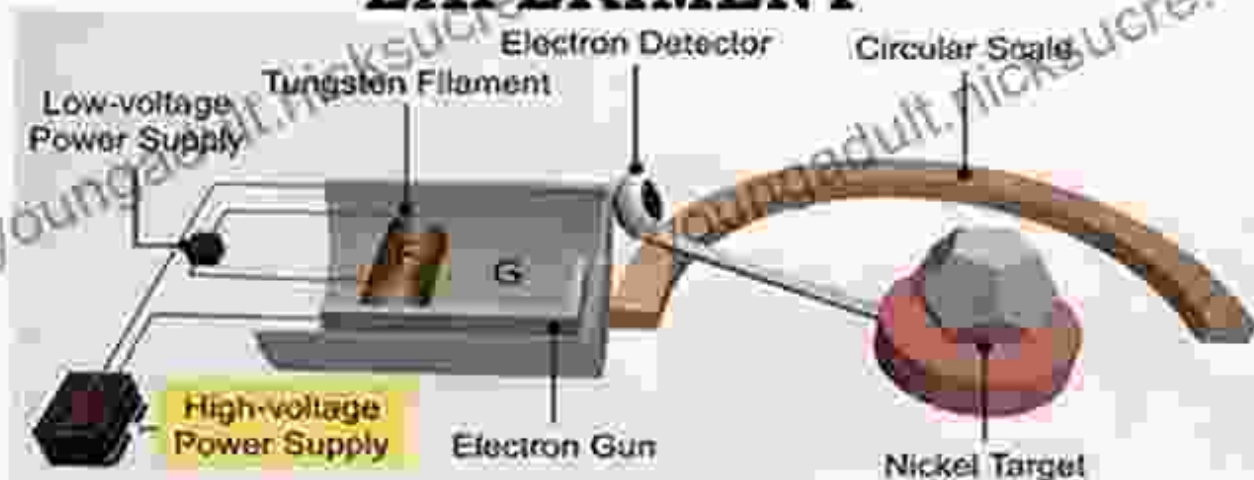


5. The Millikan oil drop experiment



6. The Davisson-Germer experiment

DAVISSON & GERMER EXPERIMENT



7. The Heisenberg uncertainty principle

Heisenberg Uncertainty Principle

According to Heisenberg's Uncertainty principle, Position and momentum of an electron cannot be determined simultaneously with absolute accuracy.*

Atomic Structure

Equation

$$\Delta x \cdot \Delta p \geq \frac{h}{4\pi}$$

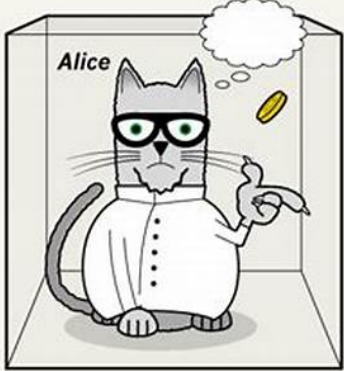
$$\Delta x \cdot m \Delta v \geq \frac{h}{4\pi}$$

$$\Delta x \cdot \Delta v \geq \frac{h}{4\pi m}$$

8. The Schrödinger's cat thought experiment

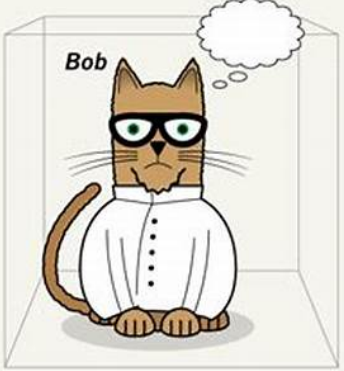
NEW CATS IN TOWN

Physicists have devised a variation of the iconic Schrödinger's cat thought experiment that involves several players who understand quantum theory. But surprisingly, using the standard interpretation of quantum mechanics, the observers sometimes seem to come to different conclusions about a particular event — suggesting that the interpretation contradicts itself for complex systems.



Alice

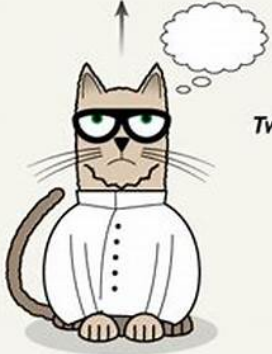
Alice tosses a coin and, using her knowledge of quantum physics, sends a quantum message to Bob.




Bob

Using his knowledge of quantum theory, Bob can detect Alice's message and guess the result of her coin toss.

Two observers



↑

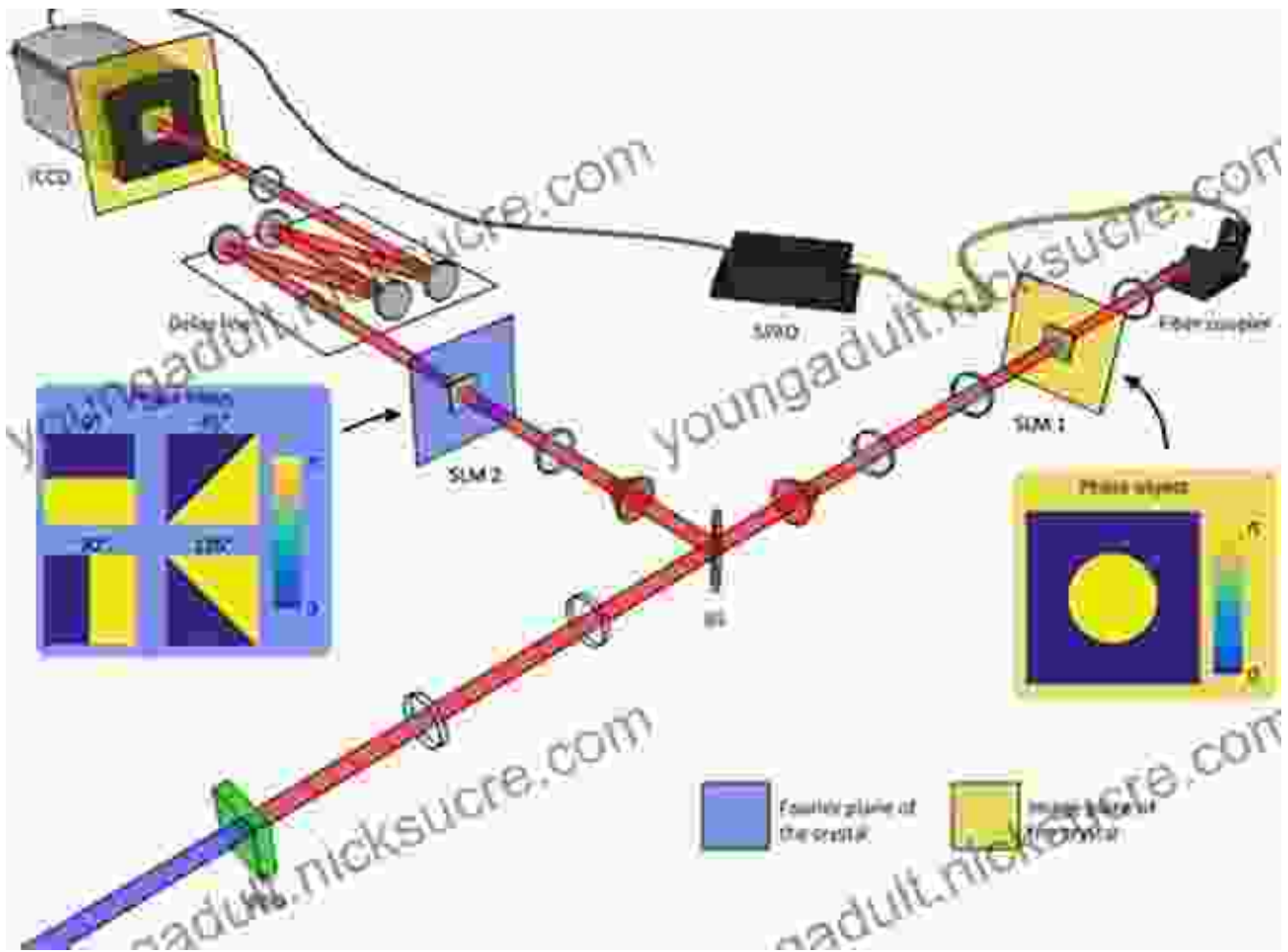


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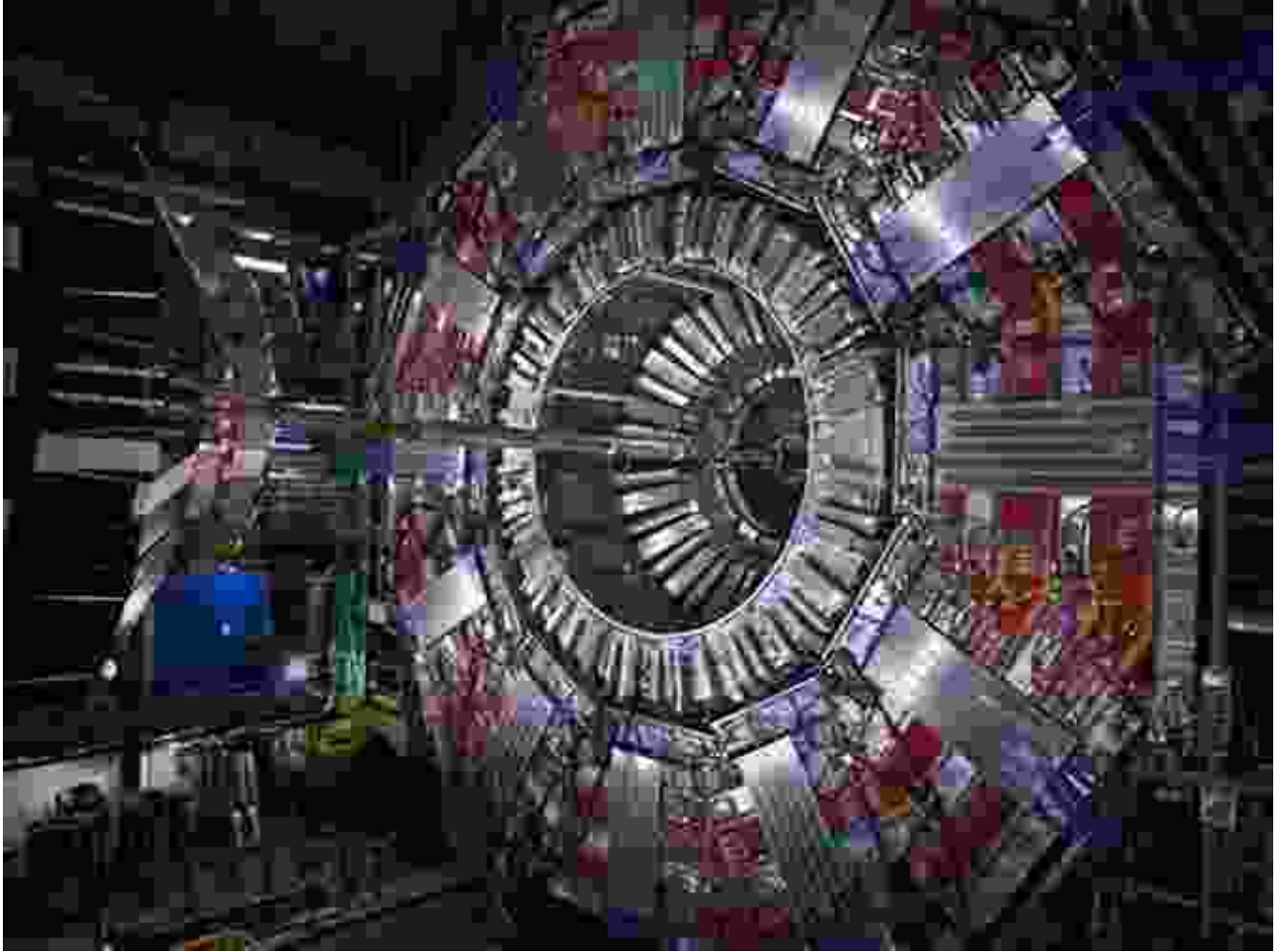
When the two observers open their boxes, in some situations they can conclude with certainty how the coin landed — but their conclusions are different. This means that the standard interpretation of quantum theory gives an inconsistent description of reality.

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9. The Bell test experiment



10. The Large Hadron Collider



These are just a few of the many beautiful experiments that have been conducted in science. These experiments have not only advanced our understanding of the world but have also captured the imagination of generations. They are a testament to the power of science and the human spirit.



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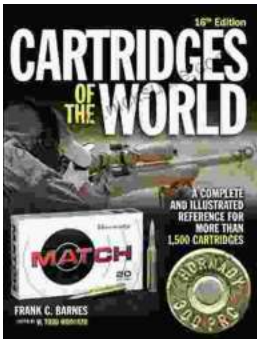
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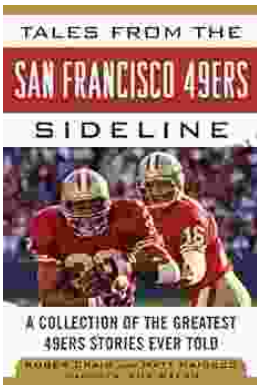
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