figure 2 as it appears today in the museum, no evidence of the explosion exists. The museum is open to the public. See http://www.haiger-loch.de/keller/EKELLER.htm.

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Born Coined the Term

In the article by Gerald Holton (PHYSICS TODAY, July 2000), the photograph caption on page 39, stating that Werner Heisenberg named the new physics "quantum mechanics," is misleading.

The expression "quantum mechanics" was first used in the scientific literature by Max Born in a 1924 article in which he discussed "the formal passage from classical mechanics to a quantum mechanics."[1]

When Heisenberg wrote his famous paper[2] that laid the foundations of the new theory, he used Born's expression; the term was common in articles by Born, Pascual Jordan, Heisenberg, Wolfgang Pauli, and Paul Dirac that appeared immediately afterward. In particular, Born and Jordan's paper that introduces the subject of matrix mechanics bears the title "On Quantum Mechanics."[3]

These statements are based on Bartel Leendert van der Waerden's well-known book on the history of quantum mechanics,[4] which includes English translation of the principal works.

References

1. M. Born, *Zeitschrift für Phys.* **26**, 379 (1924).
2. W. Heisenberg, *Zeitschrift für Phys.* **33**, 879 (1925).
3. M. Born, P. Jordan, *Zeitschrift für Phys.* **34**, 858 (1925).
4. B. L. van der Waerden, *Sources of Quantum Mechanics*, Dover Publications, New York (1967).

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Education Must Capture Student Enthusiasm

The success of the play *Copenhagen* demonstrates once again the public's potential enthusiasm for physics and related societal topics.

Now cut to physics education, where introductory courses dwell on classical mechanics and electromagnetism with at most a superficial introduction to special relativity and "old" (pre-1925) quantum physics. We seldom hint that Newton's laws are only low-energy approximations to the quantum-relativistic principles that seem to describe the universe, that Newtonian mechanics is not valid for most phenomena, and that an enormous conceptual gulf exists between a Newtonian clockwork mechanism and contemporary physics.

Do physics students experience the depth and excitement elicited by *Copenhagen*? I think not. Do they sense the wonder of the uncertainty principle, or do they, at best, merely run through yet another formulaic calculation involving symbols called delta-x and delta-p? Do they ever hear anything about, say, quantum entanglement, a phenomenon that has perplexed physicists since the 1930s, that is comparable in significance to quantum uncertainty, and about which significant new results have appeared regularly since the 1960s? Even in courses for nonscientists, in which there is no constraint to cover the encyclopedic minutia of Newtonian mechanics, we fill our students' brains with watered-down versions of the "real" physics courses that are based on the manipulation of classical formulas.

We are living in what should be the golden age of physics education. Physics has never been so exciting. We've been given the Big Bang, dark matter, quantum entanglement, and much more. A smash Broadway hit is even based on the subtleties of physics, and of its social implications. We are not required to throw this excitement away when we enter the classroom. Small enrollments, student antipathy to anything titled "physics," and lukewarm public support need not be our fate. By replacing formulaic manipulation with conceptual understanding, and above all by focusing on modern concepts and societal connections, teachers can capture the latent enthusiasm for ideas that is so evident in the success of *Copenhagen*.

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Pantazis Mouroulis (PHYSICS TODAY, November 2000, page 78) writes that teaching "the Big Bang to college sophomores is a bad idea." He goes on to say "Real science courses should be taught only when students have the background to appreciate