

Nobel Prize Case Study: Arnold Sommerfeld

Arnold Sommerfeld was a German theoretical physicist who made several significant contributions to the discipline in the late 1800s through the early 1900s. After earning his doctorate from the University of Königsberg in 1891, he moved to the University of Göttingen, where he taught classes on mathematics and theoretical physics. In 1906, he became the director of the Institute of Theoretical Physics at the University of Munich, where he succeeded Ludwig Boltzmann and gained international recognition.



Arnold Sommerfeld

Sommerfeld developed his own version of Niels Bohr's famous atomic model by incorporating elliptical orbits in addition to circular paths for electrons to follow, combining classical physics and the newly emerging quantum theory. Additionally, Sommerfeld introduced the *fine-structure constant* ($\alpha = 1/137$), which characterizes the strength of an electromagnetic interaction between elementary charged particles.

Read the following excerpt and answer the Discussion Questions below:

"Of all the physicists who've been spurned by the Nobel committee over the years (or at least through 1965), one defies categorization. Arnold Sommerfeld, named on a record 84 nominations, shared ballots with the likes of Erwin Schrödinger, Niels Bohr, and Irène Joliot-Curie. But the quantum theorist was also the sole nominee on 26 nominations and a joint nominee on 25 others that included no future laureates.

As lore has it, the knock against Sommerfeld was that he had no single, great achievement that the committee could point to, even though his collective body of work stacked up to those of contemporaries who won the prize. Though Sommerfeld himself never won, the branches of his academic tree are weighted with Nobel gold: Four of his graduate students, and at least two of his students' students, went on to become laureates.

The road to the Nobel Prize is paved with the careers of people like Sommerfeld, Oort, and Germer—gifted physicists who, subject to the whims and quirks of the prize committee, narrowly missed out on their discipline's crowning achievement. So come Nobel Day, once everyone has toasted the newly minted laureates, let's hope they'll also raise a glass to the overlooked and left out: the Nobel also-rans." – Ashley G. Smart, "How to almost win the Nobel Prize," *Physics Today*

Discussion Questions

- (1) How many times was Arnold Sommerfeld nominated for the Nobel Prize? _____
- (2) Summarize two arguments for why Arnold Sommerfeld should have been awarded a Nobel Prize.
- (3) Summarize one argument that could explain why Arnold Sommerfeld did not receive a Nobel Prize.
- (4) In 1949, Sommerfeld was awarded the Oersted Medal for his excellence in physics teaching. In response, he wrote that teaching "was one of the things that had given him most pleasure in the whole of his scientific career."¹ Do you think this recognition sufficiently acknowledges his contributions to physics? Why or why not?

¹ "Sommerfeld: the Eternal Nobel Candidate," Augusto Beléndez, *BBVA Open Mind*.