

Wheeler describes "ways to do physics"

Gerry Wheeler is probably best known today for being the Executive Director of the National Science Teachers Association (NSTA). But he cotaught a physics lab as a student at Stony Brook University with the late Max Dresden, and he is also a past president of the American Association of Physics Teachers (AAPT). Thus, it was entirely fitting for Gerry to give the Max Dresden Lecture to AAPT at its summer meeting in Greensboro (NC) on 30 July 2007.

Wheeler began by citing how his title, "The Many Ways of Doing Physics," came from some of Dresden's fatherly advice: "If you love physics, there are many ways to do it (even as a politician)." Having chosen a nontraditional path of doing physics in his own career, Wheeler focused on public physicists and teaching physicists. He began by considering society's belief in being more scientific to be misplaced, given the pseudoscientific beliefs that society shows in polls. Examples of failures that Wheeler cited are global warming, evolution, and possibly stem cell research. He also ventured that there seems to be a complementary principle operating between truth and clarity. (A "complementarity principle" in quantum physics speaks of a "complementarity" between two quantities that cannot simultaneously exist: the more of one quantity, the less of the other, and vice versa.)

Wheeler attributed these failures to using the wrong model of having the wise person do the teaching. We feel that the key to solving problems in the world is understanding them. But, Wheeler went on, the public is not interested in making the required effort, as was the case with the hate mail he received from Laurie David's op-ed in *The New York Times* accusing the NSTA of being beholden to oil companies that had made contributions. (What had actually happened is that he had turned down the offer of David, as producer of *An Inconvenient Truth*, to send out a copy of the DVD to all NSTA members, lest it be perceived as an NSTA endorsement. Wheeler subsequently set up a blue ribbon commission including former National Academy of Sciences Bruce Alberts and Elizabeth Stage, who was the Clearinghouse's link to the development of the *National Science Education Standards*. This commission, Wheeler said, cleared NSTA of any corporate influence. Wheeler also credited Al Gore with getting people to think about global warming and feels that -- while Gore is mindful of the complementarity between truth and clarity -- he has most of the science right.)

Wheeler advocated bringing to the foreground the nature of science, our habits of mind, and how we know what we know, rather than factual information. A good time to do this, he said is 2009, the bicentennial year of Abraham Lincoln (founder of the National Academy of Sciences) and Charles Darwin (the father of evolution), which has been designated as the World Year of Science. (It is also the quadricentennial of Galileo's astronomical use of the telescope.)

In response to questions, Wheeler said he did not favor the tension between science and religion generated by Richard Dawkins and the book, *God Is Not Great*. The main issue to Wheeler is understanding what a theory is. He also recommended a book, *Teaching as a*

Subversive Activity, by Postman and Weingarten, and argued that students need to develop an active crap-detector in their heads.