Seeking Answers From Cold Fusion Review

As a physics teacher who is uncertain how to answer students' questions about cold fusion, I welcome the upcoming US Department of Energy investigation of recent claims in this controversial area. I agree with Toni Feder (PHYSICS TODAY, April 2004, page 27) that "skepticism about the credibility and reproducibility of cold fusion remains widespread."

I have some questions I'd like to see the DOE investigators answer. Is it true that unexpected emission of neutrons, protons, tritons, and alpha particles (at rates significantly above the background) has been observed in several cold fusion experiments? Has accumulation of helium-4, at the rate of about one atom per 24 MeV of excess heat, been confirmed by many scientists, as reported by electrochemist Michael McKubre in Feder's story? Have highly abnormal isotopic ratios been found in some cold fusion setups? Is there any indication that leading cold fusion scientists are incompetent or that their data are fraudulent? Is the research methodology that cold fusion scientists use different from that used in other areas of physical science? Answers to these questions will help me decide what to think about cold fusion and what to tell students about it.

Speculations about practical applications of new findings should be de-emphasized at this time. They will emerge naturally when basic scientific claims are recognized as valid and when researchers in cold fusion are no longer treated as if they were con artists and charlatans. The "chilling effect" mentioned by Randall Hekman in the PHYSICS TODAY story prevents young scientists from entering the area of cold fusion research. I also agree with chemist Allen Bard that being able to reproduce experimental results is not good enough; it is only a preliminary step. But wasn't poor reproducibility the central point of criticism when cold fusion was first investigated 15 years ago? In my opinion, experimental claims should not be disqualified solely on reproducibility; validation should depend on credentials of researchers and, above all, on methodologies they used in particular experiments.

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Questionable Questions in Analysis and Synthesis

In "Analysis and Synthesis IV: Limits and Supplements" (PHYSICS TODAY, January 2004, page 10), Frank Wilczek describes the question "Why is the Solar System as it is?" as "discredited." But to do so is to discredit the many fields of physics—including geophysics and planetology—that dare to address phenomena that are not "universal" or "clean." Although our own solar system has a history that is perhaps accidental and idiosyncratic, it is nonetheless the "limited slice of the world" in which all of us live. A deeper understanding of the system's admittedly messy history is essential if we are to address intelligently such issues as global change and resource management. And on a philosophical level, knowing the particular happenstances of our history is as important to our humanity as knowing the story of one's own family or culture. To study that deep history is no less creditable or scientific than to seek transcendent explanations for worlds to which we have no access.

There are so many messy, intellectually challenging questions to which the legions of brilliant, un- and underemployed physicists might fruitfully turn their thoughts. I am saddened to see such lines of inquiry devalued.

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Frank Wilczek says that the question of precisely when a radioactive nucleus will decay has been "rendered questionable by quantum mechanics." Apparently, most physicists take that for granted. However, using quantum mechanics as the reason we physicists can't solve complex subatomic problems is simply too convenient. We can just as easily think of classical, deterministic problems that exhibit the same statistical characteristics as subatomic problems do. As an example, I offer a *gedanken* experiment: the radioactive wiffle ball.

Take a baseball-sized wiffle ball, place a BB inside, and shake it vigorously. After a time, the excited wiffle ball will emit a BB and thus become stable. Repeat the experiment thousands of times, and you will observe that radioactive wiffle balls have a half-life. Should an outside