

# Health Physicists: A Breed Apart

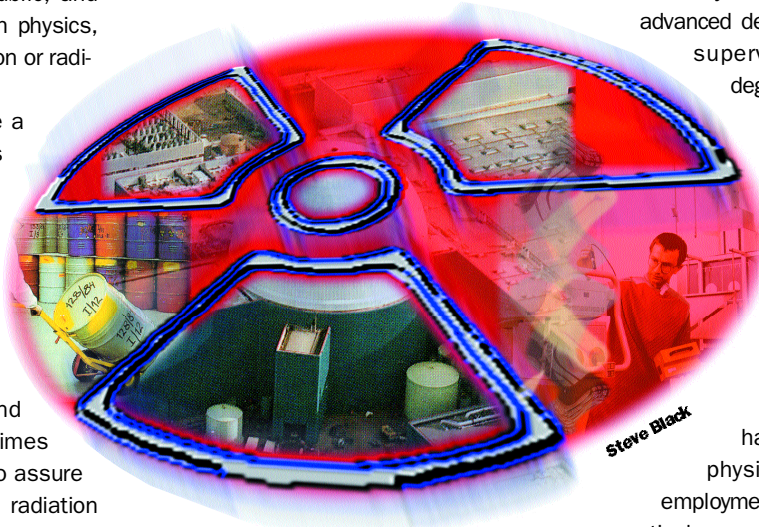
There exists a field of endeavor that is truly detached from mainstream physics but was born from its achievements of the 20th century. Its focus is protecting traditional physicists, other scientists, the public, and the environment. The field is health physics, sometimes called radiation protection or radiation safety.

Health physicists (HPs) truly are a breed apart. Though many toil as nuclear-radiation specialists in traditional physics establishments such as university and government-run accelerators, they are separated from research physicists by the nature of their work. HPs are largely safety specialists knowledgeable in the science and regulations of ionizing and sometimes nonionizing radiation. Their job is to assure that radioactive contamination and radiation exposures are kept as low as reasonably achievable. In so doing, they must interact with physicists, chemists, biologists, engineers, and anyone who works with ionizing radiation, usually beginning at the initial planning stages of their work.

The perceived loss of time and money due to concerns about radiation safety often causes friction between researchers, workers, and managers and those they sometimes disparage as the “radiation police.” HPs must not only hold the line against those who would forgo some aspects of safety in favor of maintaining a research or production schedule, but they must also deal with the controversial nature of radiation. Known to physicists as a manifestation of a fundamental nuclear force, radiation is viewed by those who work with it as either a useful tool or a controllable nuisance. This is not the general attitude of the public, which regards radiation with fear and wants it tightly controlled, whether it is used in industry, medicine, or research.

HPs must also contend with the legal aspects of radiation. Companies and institutions can face serious consequences—and HPs the loss of their jobs—if they flagrantly violate regulations of the Nuclear Regulatory Commission (NRC) or a state’s equivalent agency, if one exists. One only has to look at the size of

the Code of Federal Regulations, Title 10, Chapter I, which has about 1,450 pages of NRC rules and requirements, to grasp the burden on HPs and their institutions.



## A distinct discipline

HPs clearly differ from traditional physicists, although there is some overlap. For example, physicists from any field accept that senior managers will judge their work. But most physicists do not have outside regulators closely scrutinizing their activities the way HPs do. Companies vary in the extent to which upper management gets involved in radiation issues. Most rely on their HPs to research regulations, fill out license and permit applications for use of radioactive materials, report personnel exposures, and escort NRC or state inspectors around the plant. Then the HP is judged by how well he or she manages these and other related activities, the outcomes of which are determined by outside agencies.

Are HPs different kinds of physicists? They are applied scientists and legal affairs experts who must possess the skills of a good manager and the tact of a diplomat to lead their own staffs and to obtain compliance from the managers and staff of other departments.

You might think that HPs are not hidden because they have physicist in their job title. It is more complicated than that, as is the job itself. The term health physicist is not always used. “Radiation safety officer” is another

term that is at least as common.

Further, health physicist is a misnomer. One doesn’t have to be a physicist to be an HP, although a knowledge of physics is necessary. I know many HPs who have undergraduate and advanced degrees in physics. However, my supervisor has an undergraduate degree in biology. He obtained the necessary physics in graduate school while pursuing his advanced degrees in environmental health science. I, on the other hand, have a bachelor’s degree in physics (and advanced degrees in environmental health science). His knowledge of chemistry and biology

has served him better than my physics education in our place of employment. We work for a large pharmaceutical research corporation, where we are surrounded by chemists and molecular biologists. His understanding of procedures in the biomedical research laboratory makes it easy for him to spot potential hazards in this type of workplace. Perhaps I would have an easier time than him working at an accelerator or nuclear power reactor.

To work as an HP, you first need to pursue an education that provides a strong understanding of ionizing radiation, including its natural occurrences, man-made production, measurement, and interactions with biological systems. Then you find employment in a reactor facility, medical center, genetic research institute, X-ray light source, or other site where ionizing radiation is present. When you get there, you have to relearn your profession because there is a particular science, engineering, and set of regulations for each institution.


As an HP, you can specialize in many sub-fields or be a jack-of-all-trades, as I am. In the first two months of this year, I worked on projects that required meteorological calculations; a knowledge of Department of Transportation regulations; measurements to certify that a former laboratory in which radioactive materials were used could be returned to general use; and assessment of a new type of radiation dosimeter. No single discipline can

prepare you adequately for this kind of job diversity. Physics provides the chassis and shock absorbers necessary for the ride. But you also need the options afforded by biology, chemistry, and engineering to make health physics a truly viable and useful vehicle.

## Hidden from AIP

It has always bothered me that the American Institute of Physics (AIP) does not include health physics—as it does medical physics (an allied but distinct field in which radiation is used to treat disease)—among its member disciplines. Health physics emerged from an enterprise that involved prominent physicists: the Manhattan Project, in which the atom bomb was developed. Yet, HPs are not members of the professional physics community—at least not in the way medical physicists are. This is probably true for several reasons. As I mentioned before, not all HPs have a physics degree. Also, health physics is a broad field encompassing many disciplines, such as environmental science, that physicists may not perceive to be physics-related.

Sometimes, however, it is hard to tell why health physics is not included as an AIP member discipline. After all, I make radioactivity measurements all the time. I calibrate radiation detectors and I use software to compile and analyze data. All of these are tasks performed by physicists, medical physicists included. Some of my health physics colleagues design radiation shielding, perform neutron- and photon-propagation studies using sophisticated computer codes, build detectors for special uses, and even teach in their specialty areas. Sounds like physics to me. HPs, of course, also do things that may not seem like physics.

As physicists, the 6,000 members of the Health Physics Society (founded in 1956) remain a breed apart. The physics community does not include us. We are hidden physicists even within physics. Yet despite our separation, even segregation, HPs are out protecting the workplace and flying the physics flag. 

### **B I O G R A P H Y**

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