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Letters

A call for action

In "Querying the constancy of Planck's constant" (SN: 2/2/91, p.70), Ivars Peterson refers to Planck's constant as an amount of energy. Planck himself confessed that he had wanted to believe it to be so but finally resigned himself to the knowledge that this fundamental quantity could not be energy, but had to be *action* — not so much ergs but erg-seconds. This may have been the first, but it was certainly not the last, epistemological challenge raised to classical physics by the quantum theory.

So it was a quantum of action — not energy — gained or lost by atoms that accounted for the blackbody radiation phenomenon. Thus, while Planck was perplexed by this affront to the preeminence of energy, he finally accepted it in order to gain the greater value of his theory. The rest is history, as they say.

But wait! If "action" is the indispensable attribute of this fundamental property of nature, how is it that "energy" continues to be used as a surrogate for action almost everywhere else in physics? Of course, "energy"

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Cover: At the Whipple Observatory near Amado, Ariz., a 10-meter telescope detects the visible light produced when some of the highest energy particles known — photons called gamma rays that come from the depths of our own galaxy and beyond — plow into Earth's atmosphere. Using this telescope and other ground-based instruments, researchers seek the source of these gamma rays, believed to be the seat of some of the most violent events in the universe. (Photo: Whipple Observatory)

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works beautifully in dealing with almost all of our macroscopic experience, in the same manner as Newton's mechanics suffices almost always without Einstein's relativistic adjustments. However, we should never forget these "almosts."

Mr. Peterson might consider the possibility suggested by Planck's reluctant admission — namely, that "action" is more fundamental to physical theory than energy. This is no longer a controversial idea. We not only have the quantum theory; we also know that the energy conservation principle can be derived from the principle of least action but not the reverse. Whatever further advancements a reformulation of physics in terms of action might bring, we should at least recognize that the proper definition of the quantum constant is in terms of "action."

*Alvin Loui Jr.
Physical Engineer
San Pedro, Calif.*

Childhood hurts

I am surprised that health care workers

haven't recognized that children experience pain more severely than adults ("Pediatric Pain," SN: 2/2/91, p.74), since I assume that most, if not all, have experienced a period of childhood. I recall feeling more pain as a child than I do now. A bruised shin, for example, was a major event, and I remembered just where every bruise came from. As an adult, I often find bruises but don't remember where I got them.

There is another change in my response to pain as an adult, which could be misinterpreted as an increase in response to pain. As a child, an injury that produced constant pain, such as a bad sprain, made me want to sleep. As an adult, I would be kept awake by a similar injury.

Children's senses of hearing, sight, taste and smell are known to be more acute than those of adults, so one might also expect their sense of pain to be more acute. Children also have a stronger reaction to the threat of pain, which serves as a survival mechanism while they are learning the dangers in their environment. This is called "fussing" by adults.

*Ellen Shurtleff
Medford, Ore.*



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