

controversy about the HBT effect centered on two-particle correlations, however, and not on intensity correlations. The goal of my essay was to point out the interesting manifestations of two-particle correlations in atomic fluids.

Daniel Kleppner
(kleppner@mit.edu)

Massachusetts Institute of Technology
Cambridge

Important groundwork in opsin evolution studies

The report by Charles Day (PHYSICS TODAY, October 2008, page 20) highlights some important aspects of the study of opsin evolution. However, too much credit is given to Shozo Yokoyama's publication and work. Many people have studied the selective pressures on the sequence of amino acids that confers the molecule's function. For example, during his graduate work in the early 1990s, Wesley Toller realized the evolutionary implications and did the early studies on opsins found in squirrel fish that inhabit different depths in the ocean. Yokoyama's work cites and builds on Toller's early

graduate work. Yet Day's report does little to acknowledge the prior work and implies that Yokoyama was the first to realize the link between opsin sequence, function, and the selective pressures imposed by the environment. My intention is not to diminish Yokoyama's work but to give readers a better picture of the breadth of the field and the sources of some key discoveries.

Christian H. Fritsen
(chris.fritsen@dri.edu)
Desert Research Institute
Reno, Nevada

Volume's effect on volume

I agree with Erica Ryherd, who stated in her Quick Study on acoustical design (PHYSICS TODAY, August 2008, page 68) that small spaces can result in high sound levels that detract from the spaces' proper use. However, Ryherd repeats the mistaken belief held by many acoustical design practitioners that the volume of a space "directly influences" the overall sound energy in the space.

Ryherd uses classical diffuse field theory as the basis for the metrics—most notably reverberation time—in her discussion. That theory says that the

sound energy in an enclosure is influenced only by the power output of the source and the total sound absorption of the enclosure. She mentions that same absorption as an independent variable in her definition of reverberation time. The volume independence occurs essentially because the absorption of sound energy takes place only at the enclosure's boundaries.

Simply put, the two ways to reduce the sound level in a space are to either turn down the volume of the source or add absorption. The room's dimensions have nothing to do with it.

Jerry Hyde
(jerry@jerryhyde.com)
St. Helena, California

Ryherd replies: The aim of my Quick Study was to provide a basic overview of music-rehearsal-room design. Generally speaking, too small a room can lead to excessive sound levels. The relationship between volume and absorption is one of the many nuances that cannot be fully addressed in two pages. That is why the article highlights the importance of having a project team include an acoustical designer who can effectively optimize absorption, room layout, and other aspects of a space.

Erica Ryherd
Georgia Institute of Technology
Atlanta ■



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