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>PHYSICS NEWS UPDATE
>The American Institute of Physics Bulletin of Physics News
>Number 349 December 3, 1997
>by Phillip F. Schewe and Ben Stein
>
>MOST INTENSE MANMADE SOUND.  The production of sound
>waves with 1600 times more energy per unit volume than
>previously achieved has been announced by researchers at this
>week's meeting of the Acoustical Society of America in San Diego,
>opening up possible new uses for sound in science and technology.
>Sound waves, patterns of compression and expansion in a gas such
>as air, are often created and studied in closed or semi-closed
>containers called cavities.  In the past, attempts to make such sound
>waves louder (by adding more sound energy into the cavity) would
>fail beyond a certain point because additional energy would merely
>lead to the formation of a shock wave which would quickly
>dissipate the energy as heat.  Until the late 1980s, researchers
>thought shock-wave formation was inevitable.  In a new technique
>called "resonant macrosonic synthesis," Tim Lucas and colleagues
>at MacroSonix Corporation in Virginia have built cavities with
>special shapes (horns, bulbs, cones) each tailored to promote certain
>distinct modes of sound vibration which combine in such a way as
>to inhibit the creation of shock waves, allowing sound waves of
>unprecedented energy density to build up.  Filling the containers
>with gas, and vibrating them to generate sound waves inside, the
>researchers produced sound waves with oscillating pressures up to
>500 pounds per square inch. The first technological application for
>these powerful sound waves will be in an "acoustic compressor"
>which uses sound rather than moving parts to compress gas inside
>refrigerators and air conditioners. (Images at
>www.aip.org/physnews/graphics)
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>A PHOTONIC HALL EFFECT AND PHOTONIC
>MAGNETORESISTANCE, the optical analogs of phenomena
>usually associated with  electrons moving in solids, have been
>observed in an experiment involving light beams diffusing through
>powders (Physics World, November 1997).  When electrons

>flowing through a material are subjected to a magnetic field, the
>electrons will feel a new force (the Lorentz force) and be deflected
>in a direction perpendicular both to their original direction and to
>the field. Photons are not charged and so do not feel the Lorentz
>force directly. But the field can establish a nonuniform index of
>refraction in a powdery medium consisting of cerium-fluoride
>particles with a definite handedness. When circularly polarized light
>enters this medium it gets deflected. This magnetically induced
>transverse diffusion of light was observed by scientists in Grenoble,
>France (Nature, 2 May 1996). A year later the same scientists
>reported that the transmission of light through a powder of
>europium-fluoride particles was proportional to the strength of an
>applied magnetic field---in effect the photonic equivalent of
>magnetoresistance (Sparenberg et al., Physical Review Letters, 28
>July 1997).
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>SULPHUR SUPERCONDUCTIVITY. Squeezed in a diamond
>anvil press, sulphur undergoes a number of changes, including a
>transition from insulator to conductor at a pressure of 90
giga-Pascals
>(1 GPa is about 10,000 atmospheres). Scientists from the
>Institute of High Pressure Physics in Troitsk, Russia and the
>Carnegie Institution in Washington, DC have squeezed harder still
>and made sulphur into a superconductor. Above 162 GPa the
>superconducting transition temperature went up to 17 K, the highest
>for any elemental solid. (Struzhkin et al., Nature, 27 November
>1997.)
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