

RESEARCH LEADER

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Vision: Medical magnetic resonance imaging machines can become far smaller, less expensive and therefore more versatile.



Alexander Pines



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NUCLEAR MAGNETIC RESONANCE (NMR) and magnetic resonance imaging (MRI) machines rely on intense magnetic fields—fields so strong they can reel in metal objects from across the room. The powerful field—around one tesla, or 30,000 times the earth's magnetic field—teases apart shifts in the NMR response of atoms in the molecules of a person's body. In March researchers at U.C. Berkeley published results of NMR experiments

that used fields as low as a few microteslas. Chemical shifts are indistinguishable in such ultraweak fields, but a second effect, called J coupling between atoms, is detectable. Rhodesian-born NMR pioneer Alexander Pines and English superconductor expert John Clarke led the collaboration. Although significant obstacles remain, the new technique could lead to inexpensive low-field MRI machines for doctors or even handheld body analyzers like those seen in *Star Trek*.