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Inside the brain

I was intrigued by the title of an article in your last issue ("A magnetic microscope for the brain," Briefs, August/September). A device for imaging fields in the brain with the resolution (2 mm) claimed in the article would indeed be enormously useful. However, the method described seems to allow only imaging of a dilute gas. Imaging of the opaque tissue of the brain by this method seems impossible. Of course, one could image the fringing fields outside the brain, but this has been done for a long time, and the inversion problem of extracting a spatially resolved image of the brain has proven intractable. Am I missing something, or is the use of the word "brain" in the article title pure hyperbole?

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[*Michael Romalis replies*: The magnetometer will indeed be used to image the fringing fields outside the brain, similar to the SQUID magnetometers currently used for this purpose. The problem of inverting the magnetic field distribution to obtain the distribution of currents in the brain is indeed not trivial and cannot be solved uniquely. However, with certain assumptions, one can localize the regions of brain activity quite accurately, as described, for example, in "Magnetoencephalography—a noninvasive brain imaging method with 1 ms time resolution," Del Gratta, G. L. et al. *Rep. Prog. Phys.* 2001, *64*, 1759–1814. The atomic magnetometer should be able to improve on these techniques by making maps of the fringing fields with much higher resolution and sensitivity.]

High-tech success

I read "Steps to High-Tech Success" by John Preston (August/September, pp. 24–26) with interest and agree with the ideas about protecting intellectual property. In my experience, new ideas create tremendous greed in people, like a gold rush. Often, the number of individuals or companies claiming they invented the innovative product surpasses the original number of inventors. Inventors provide—in good faith or by inadequate contracts—their intellectual property, without getting adequate recognition, to sharks. The severity of this crime differs from country to country, depending on individual laws against copying or re-engineering innovations.

In Europe, court battles are won by rich and powerful companies, because inventors are usually financially exhausted by R&D, patent, and other expenses and cannot pay high retainer fees to a lawyer. This percentage fee depends on the value of the battle, which your counterpart always puts at a high level. To apply for a method in Japanese patent offices is extremely difficult and is often refused or can be achieved only by years of legal fighting. Without this protection, the most careful product description still leaves the door open for a legal infringement of your patent by a technicality.

In the United States, inventors can share the result of legal battles with their lawyers through a contingency fee, instead of paying up-front as demanded by law in other coun-

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tries. Such contingency fights can last a lifetime, as demonstrated by the inventor of the intermittent windshield wiper, with his case against the Big Three car manufacturers.

Sometimes the biggest domestic and international corporations use simple, but dishonest, methods to gain the inventor's knowledge, such as verbal promises from staff members or corporate officers that, if you present your secrets with all details and sign the contracts, then the big checks will follow. This way, you will lose all the pain of bringing your new idea to market, as well as any chance of making money with your innovation.

However, despite some missing ingredients, like tax incentives for risk takers, the United States offers the best culture and the most encouragement for entrepreneurs to step forward and help create a future with superior innovations to improve our standard of living. Only new ideas, more attractive products, and improved processes can create new jobs, improve reliability, stimulate the stagnating economy, and fight poverty in the long term.

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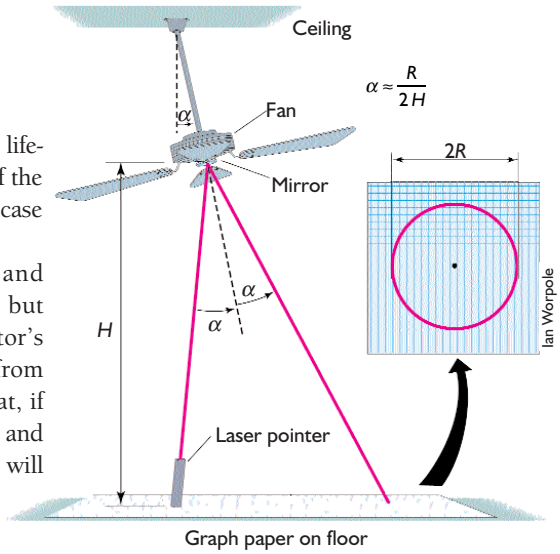
Fan vibrations

I thought some of your readers might be interested in an economical laser-based technique I devised for measuring the vibrations of ceiling fans. Seven years ago, I worked for a large company that produced air-circulating and ventilating fans. An important engineering task was balancing the fan-blade assemblies to avoid vibration. I was asked by the quality control engineer to develop a procedure for measuring the angular deflection of ceiling fans caused by the blade imbalance. In the case of table or pedestal fans, I could use an accelerometer attached to the fan's stand. However, the maximum speed of rotation of the ceiling fans didn't exceed 240 rpm, and our accelerometers didn't operate at such low frequencies. In any case, it was not clear how to secure cables from the rotating blades. I suggested we purchase or rent a



laser vibrometer, but the instrumentation "emergency" fund was limited to about $50 at that time. It proved enough to purchase a simple laser pointer and a cheap magnet-backed mirror for the test setup shown in the diagram. The mirror was attached to the steel motor cover. The laser pointer was installed on the floor to radiate its red light beam on the mirror, which circulated around the vertical axis due to vibration. The laser beam reflected by the mirror on the floor "drew" a magnified moving red-color circle of the fan's angular deviation on graph paper. The angle of the fan deflection, α, from the vertical was calculated by using the formula $\alpha \simeq R/2H$, where R is the radius of the circle and H is the height of the fan core relative to the floor. The quality engineer was satisfied and demonstrated this effective and economical application of photonics to our management and clients.

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Correction

In the Books department of the August/September issue, the correct ISBN for *Applications of Synchrotron Radiation in Low-Temperature Geochemistry and Environmental Science* is 0-939950-61-8.

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