

Golden physicist listed as a top brain

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GOLDEN — Here's a new category to go alongside the college football polls and David Letterman's Top 10 list in a rankings-crazy culture: World's Top Physicists.

Alex Zunger of the National Renewable Energy Laboratory in Golden has been listed in the top 0.008% of more than 500,000 physicists by the Institute for Scientific Information.

Philadelphia-based ISI ranked Zunger as the seventh most influential theoretical physicist in the world, and 39th most influential physicist overall.

Unimpressed? Consider that Stephen W. Hawking, author of the best-selling *A Brief History of Time* and the cosmologist who now occupies Issac Newton's academic chair at England's Cambridge University, isn't even in the same galaxy as Zunger — at least according to the ISI's calculation.

Hawking is ranked at 313th.



Zunger

Zunger who emigrated to the United States from Israel in 1976, has long been considered an original thinker, especially when it comes to imagining new materials for high-tech industry that might work better than the stuff nature has provided for the past 4.5 billion years.

Even Zunger is surprised at the furor surrounding the rankings. Last week, he logged on to his computer and received 100 e-mail messages from around the globe in 10 minutes. The virtual deluge hasn't slowed.

"I'm just surprised by the incredible volume," Zunger said Tuesday. "The Japanese seem to be especially interested."

The ISI rankings are based on citations — the number of times that other researchers give credit to a scientist's research in their own published studies.

English majors call them footnotes.

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Colleagues rely often on physicist

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Zunger's work was cited 7,989 times in the past 15 1/2 years, ISE reports.

By considering such a large time span, the group reasoned, its rankings would represent a scientist's enduring contribution. Otherwise, someone who has recently published a single hot research paper might skew the results.

Citations have become the new currency in research circles in the five years since ISE started performing its complex statistical analysis to develop the rankings.

Previously, scientists were rewarded based on the number of research papers they published in scholarly journals. This "publish or perish" pressure resulted in a range of academic charades that persist today, including splitting one discovery into three or four papers, and bloating the authors' lists on papers with the names of colleagues.

Zunger has written more than 300 scientific papers — a hefty total. But his "citation impact ratio" — the average number of citations per paper — is 500%, of the expected average in his field.

"I think there is less pressure to publish a lot now, and more pressure to publish well thought-out papers" that will garner more citations, Zunger said.

Zunger's work with his seven-person research team concentrates on condensed matter theory of real materials. They develop the formulas that would combine elements in different ways to create new materials that don't exist in nature, but have superior optical and mechanical properties.

They think for a living and do the math. Other research groups try to actually make the materials and test their properties. Eventually, the best new materials are incorporated into more efficient solar energy cells or faster computer chips.

"When you come up with something completely new, people want to make it and study it," he said. "And they have to cite your research."

So if Zunger is the 39th-ranked physicist overall, who is No. 1?

Ed Witten of Princeton, known among physics insiders as The Pope.

Witten has chalked up 23,235 citations since 1981. He specializes in super-string theory, which suggests that the subatomic particles that make up the universe actually are tiny strings that vibrate in anywhere from a few to 25 dimensions of space and time.

"If there is anything abstruse it's string theory," Zunger said. "It's wonderful to find out that Ed is the most-cited, since what is doing is so abstract."