2008 Nobel physics prize has UH ties

A Hawaii team helped validate a Japan duo's subatomic particle idea

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The University of Hawaii-Manoa Physics Department played a big supporting role in the research that won the 2008 Nobel Prize for Physics, says Stephen Olsen, department chair.

The prize was divided between the team of Makoto Kobayashi and Toshihide Masukawa, both of Japan, and Yoichiro Nambu of Chicago.

The three scientists helped define the concept of "broken symmetry," influencing the standard model used by physicists to describe interactions between the tiniest particles in the universe, the Stockholm-based Nobel Foundation said. Kobayashi and Masukawa were cited "for the discovery of the origin of the broken symmetry which predicts the existence of at least three families of quarks in nature."

In a paper published in an obscure journal in 1973, the two Japanese scientists proposed an explanation of why certain subatomic particles do not break down in a symmetrical fashion.

The theory was validated by the UH High Energy Physics Group with measurements in 2001 by the Belle Experiment, a detector at the Japan High Energy Physics Laboratory (called KEK), Olsen said.

"Hawaii has been a major player in the Belle Experiment from its original conception in the early 1990s until now," he said. "The theory was some 25 years ago but nobody had done a definitive experiment to prove it was right. That was our experiment, our results in 2001, which showed their theory was right on."

Olsen said he made the first public announcement of the Belle results relevant to the Kobayashi-Masukawa premise at an international meeting in Rome in July 2001. UH physics professor Thomas Browder submitted a paper on the results to Physical Review Letters with all scientists on the team as co-authors.

The Belle team, formed in 1993, includes 400 scientists from 11 countries with Olsen an original co-spokesperson until Browder succeeded him in 2004.

"We've been waiting for this for years and years," Browder said. "This is really fantastic validation of what we've been working on the last decade."

In physics, symmetry is a notion that applies to the broad family of subatomic particles. Kobayashi and Masukawa explained a flaw in the symmetry between matter and anti-matter.

"It was a pretty abstract idea," Olsen said. "They hadn't tried to see if it would work with what was known at the time."

UH physics professor Sandip Pakvasa and Hirotaka Sugawara, then a visiting UH professor, got the Kobayashi-Masukawa paper and applied it to experimental measurements then available, Olsen said.

A 1976 paper by Pakvasa-Sugawara of their findings alerted physicists to the Kobayashi-Masukawa paper and stimulated theoretical and experimental activity worldwide. A small error in their citation - using the initial "F" instead of "T" for Toshihide Masukawa - showed how widely their paper was read.

"A lot of papers that came out had the same mistake so we know they relied on Pakvasa's paper," Olsen said.

Olsen said the Nobel Prize could have come anytime after the Belle Experiment proved the theory in 2001, but the timing actually is "very very good" now because of preparations for the next big experiment in Japan, a collider called the Super B factory.

The project is expected to start construction by the end of 2009 and begin operations at KEK in 2012. Browder said, adding that the Nobel Prize announcement should help push the project in Japan.

Others in the UH Belle group are faculty members Michael Jones, Michael Peters and Gary Varner; postdoctoral researchers Li Jin and Herbert Friedmesser and graduate students Kurtis Nishimura, Jamal Rorie and Himaansu Sahoo.

They hope to participate in the new collider at the same level as the Belle Experiment, with a significant part of an annual $1.5 million Department of Energy grant to the department, Browder said.