Japanese professors to receive prestigious physics prize in Manchester

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The prestigious European Physical Society (EPS) High Energy and Particle Physics Prize will be awarded to two Japanese academics at a major conference at The University of Manchester.

Professor Makoto Kobayashi of the KEK Laboratory in Tsukuba, Japan, and Professor Toshihide Maskawa of the University of Kyoto will receive the prize, awarded by the EPS High Energy Particle Physics Division, at the EPS conference on High Energy Particle Physics on Monday 23 July 2007.

Professor Kobayashi and Professor Maskawa laid the theoretical foundations to our modern understanding of how the laws of physics differ for matter and anti-matter. Experimental evidence for such differences (called CP violation) was first reported in 1964 (work which lead to the award of the 1980 Nobel Prize in Physics to James Cronin and Val Fitch).

Understanding CP violation took on an added importance when it was pointed out by the Soviet physicist Andrei Sakharov in 1967 that it was a key element in understanding how the matter in the Universe could have arisen, however in the laws of physics known at the time the origin of CP violation was a complete mystery.

A possible solution to the mystery was pointed out by Kobayashi and Maskawa in 1973, when they noted that “mixing” between different states of quarks (as first proposed by Nicola Cabibbo in 1963) could

naturally explain the CP violation so far observed – but only if there were six types of quarks rather than the three known at the time.

This bold suggestion has been verified by experiments with the subsequent discovery of 3 new types of quarks, and then by the recent observations by the Belle and BABAR experiments of CP violation in the decays of B mesons at precisely the level predicted by the theory of Kobayashi and Maskawa.

The mixing between the six types of quarks, described by a matrix called the Cabibbo-Kobayashi-Maskawa matrix in honour of its originators, is routinely observed and its description is a key element of the Standard Model of particle physics which forms the basis of our modern understanding of particle physics.

The work of Kobayashi and Maskawa is therefore a central plank of particle physics, and the EPS HEPP Division is honoured to present them with the 2007 EPS High Energy and Particle Physics Prize.

Professor David Wark, of Imperial College London, Chair of the Division, said “The work of Kobayashi and Maskawa has led to a tremendously fruitful experimental programme including dozens of experiments all over the world, and in the process has catalysed much of the advance in our field over the last 30 years.”

Professor Per Osland, a member of the committee from the University of Bergen said: “The profound significance of the additional flavours of quarks would not have been appreciated without the work by Kobayashi and Maskawa.”

Professor Roger Barlow, from The School of Physics and Astronomy at The University of Manchester added: “It is amazing how a short paper on the mathematical properties of matrices led to the large-scale

concrete and steel construction of so many successful particle physics accelerators and experiments."

Source: University of Manchester