Parabola Volume 49, Issue 3 (2013)

Editorial

Dear Readers

The Nobel Prize in Physics this year was awarded jointly to Francois Englert and Peter W. Higgs "for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles". In physical terms their theory postulates that there is a field of energy permeating the universe and this field provides resistance to the motion of fundamental particles, such as quarks and electrons, thus giving them mass.

The Nobel Prize winners published their pioneering papers on spontaneous symmetry breaking and mass in the flagship journal of the American Physical Society, *Physical Review Letters* in 1964. The two fundamental papers are; "Broken Symmetry and the Mass of Gauge Vector Mesons" by Francois Englert and Robert Brout published in *Physical Review Letters*, **Vol 13**, No 9 (1964), and "Broken Symmetries and the Masses of Gauge Bosons" by Peter Higgs, published in *Physical Review Letters*, **Vol 13**, No 16 (1964). The physical theories are represented using advanced mathematics of partial differential equations, complex analysis, group theory, field theory and tensor analysis. The symmetry breaking mechanism that enables a gauge field to acquire mass is a mathematical mechanism.

There is no Nobel Prize for mathematics but there is no doubt that the award of the Nobel Prize in this case was to research in mathematical physics; the development of rigorous mathematical methods that can be used in the formulation of physical theories. Unfortunately there was little celebration of mathematical physics in the popular media, which instead championed the idea of "God particles" (Higgs Bosons) and the hardware that verifies the predictions of the theory (the Large Hadron Collider at CERN). But the mathematics community is not blameless here. The work gets almost no recognition in *MathSciNet*; the data base maintained by the American Mathematical Society for keeping track of research in the mathematical sciences. The fundamental articles referred to above by Francois Englert and Peter Higgs have been referenced in *MathSciNet*, but that data base only records (22/10/13) seven citations to Englebert's article and ten citations to Higg's article. By contrast the Scientific Data base Web of Science (22/10/13) records one thousand one hundred and seven citations for Englert's article and one thousand and seventy eight citations for Higg's article. Google Scholar records (22/10/13) two thousand eight hundred and thirty and three thousand one hundred and forty one citations respectively.

The Nobel Prize in Economics this year was awarded jointly to Eugene F. Fama, Lars Peter Hansen and Robert J. Shiller for their "empirical analysis of asset prices". The award of the Nobel Prize in this case was to research in Mathematical Economics; the development of mathematical methods to represent theories in economics. Citations to the seminal papers are very poorly captured by *MathSciNet*, even though the

results are very mathematical; building on advanced knowledge of the mathematics of measure theory, stochastic processes, orthogonal functions, random matrices, probability theory and optimization. As an example, Lars Peter Hansen's paper "Large sample properties of generalized method of moments estimators" published in *Econometrica* **Vol 50** No 4 (1982) has one hundred and thirty five citations in *MathSciNet*, two thousand seven hundred and ninety three citations in Web of Science and eight thousand one hundred and fifty five citations in Google Scholar (23/10/13).

If we as mathematicians do not celebrate interdisciplinary mathematics, including mathematical physics and mathematical economics, as being mathematics then we are doing a very great disservice to the discipline and the community.

Editor

Bruce Henry