

Mathematical Physics in Mathematics and Physics

The beauty and the mystery surrounding the interplay between mathematics and physics is captured by E. Wigner's famous expression, ``The unreasonable effectiveness of mathematics'. We don't know why, but physical laws are described by mathematics, and good mathematics sooner or later finds applications in physics, often in a surprising way. In this sense, mathematical physics is a very old subject-as Egyptian, Phoenician, or Greek history tells us. But mathematical physics is a very modern subject, as any working mathematician or physicist can witness. It is a challenging discipline that has to provide results of interest for both mathematics and physics. Ideas and motivations from both these sciences give it a vitality and freshness that is difficult to find anywhere else. One of the big physical revolutions in the twentieth century, quantum physics, opened a new magnificent era for this interplay. With the appearance of noncommutative analysis, the role of classical calculus has been taken by commutation relations, a subject still growing in an astonishing way. A good example where mathematical physics showed its power, beauty, and interdisciplinary character is the Doplicher-Haag-Roberts analysis of superselection sectors in the late 1960s. Not only did this theory explain the origin of statistics and classify it, but year after year, new connections have merged, for example with Tomita-Takesaki modular theory, Jones theory of subfactors, and Doplicher-Roberts abstract duality for compact groups. This volume contains the proceedings of the conference, ``Mathematical Physics in Mathematics and Physics', dedicated to Sergio Doplicher and John E. Roberts held in Siena, Italy. The articles offer current research in various fields of mathematical physics, primarily concerning quantum aspects of operator algebras.



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