

Zeitschrift: Helvetica Physica Acta
Band: 70 (1997)
Heft: 5

Buchbesprechung: Structure of dynamical systems : a symplectic view of physics [J.-M. Souriau]
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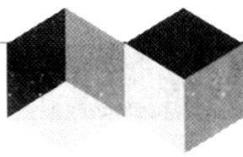
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MATHEMATICAL PHYSICS • DIFFERENTIAL GEOMETRY • QUANTUM MECHANICS

PM 149 • Progress in Mathematics

J.-M. Souriau, Université de Provence

Structure of Dynamical Systems A Symplectic View of Physics

Translated: **C.H. Cushman-de Vries**

Translation Editors: **R.H. Cushman**, *Universiteit Utrecht, The Netherlands /*
G.M. Tuynman, *Université des Sciences et Techniques de Lille, France*

1997. Approx. 400 pages. Hardcover
Approx. DM 148.–/öS 1081.–/sFr.128.–
ISBN 3-7643-3695-1

This book is addressed to graduate students and researchers in mathematics who are interested in mathematical and theoretical physics, symplectic geometry, mechanics, and (geometric) quantization. The aim of the book is to treat all three basic theories of physics namely, classical mechanics, statistical mechanics, and quantum mechanics from the same perspective, that of symplectic geometry, thus showing the unifying power of the symplectic geometric approach. Reading this book will give the reader a deep understanding of the interrelationships between the three basic theories of physics.

The first two chapters provide the necessary mathematical background in differential geometry, Lie groups, and symplectic geometry. In Chapter 3 a coherent symplectic description of Galilean and relativistic mechanics is given, culminating in the classification of elementary particles (relativistic and non-relativistic, with or without spin, with or without mass). In Chapter 4 statistical mechanics is put into symplectic form, finishing with a symplectic description of the kinetic theory of gases and the computation of specific heats. Finally in Chapter 5 the author presents his theory of geometric quantization. Highlights of this chapter are the derivation of the various wave equations and the construction of the Fock space.

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