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NEW DEVELOPMENTS IN THE THEORY OF MAGNETIC MONOPOLES

P. Goddard

Department of Applied Mathematics and Theoretical Physics
University of Cambridge, U.K.

D.I. Olive

CERN -- Geneva

and

Department of Physics, Imperial College, London *)

ABSTRACT

An account is given of the new insight into the theory of magnetic monopoles originating from the work of 't Hooft and Polyakov. Their magnetic monopole, associated with the conventional electromagnetic gauge group U(1), occurs as a finite energy smooth soliton solution to an SU(2) gauge theory. A precise picture of its internal structure, the values of its magnetic charge and its mass are obtained. These new developments bring together previously unrelated fields of study, namely the Dirac monopole (with point structure) and the Sine-Gordon soliton in two-dimensional space-time.

Properties of more general monopoles, associated with large gauge groups now thought to be relevant in physics, are discussed. Particular attention is paid to topological properties. Based on this new viewpoint, conjectures can be made about a future quantum theory of monopoles.

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*) present address.

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