BOOK REVIEW

Primideale in Einhüllenden auflösbarer Lie-algebren, by Walter Borho,
Peter Gabriel and Rudolph Rentschler, Springer-Verlag, Berlin,
182 pp., $7.00

For a proper appreciation of this work, it should be kept in mind that
Lie algebras have a significance reaching beyond the domain of algebra,
because they play such an important role in the theory of Lie groups.
Thus, classical Lie algebra theory is strongly dominated by the fact that
the finite-dimensional analytic representations of a simply connected
analytic group are identifiable with the finite-dimensional representations
of its Lie algebra. In the theory of infinite-dimensional representations,
the connection with Lie algebra representations is somewhat tenuous,
but it is nevertheless at the core of the major advances made in that theory
during the last 30 years.

Although the theory presented here is purely algebraic, it bears the stamp
of Lie group theory. Its origin lies in Kirillov's classification of the irre-
ducible unitary representations of simply connected nilpotent real analytic
groups (1961). Kirillov's methods and results were extended toward the
solvable case through a variety of intermediate stages. The most important
references for these developments are: L. Auslander and B. Kostant,
Polarization and unitary representations of solvable Lie groups, Invent.
Math. **14** (1971), 255–354, and the monograph (Société Mathématique
de France) *Représentations des groupes de Lie résolubles* by P. Bernat,
N. Conze, M. Duflo, M. Lévy-Nahas, M. Rais, P. Renouard, and M.
Vergne (Dunod, Paris, 1972). The main result is that the irreducible unitary
representations of the solvable groups of type I can all be obtained as
induced representations from 1-dimensional representations of suitable
subgroups (this generalization of Kirillov's result is due to L. Auslander
and B. Kostant).

In a series of papers, beginning in 1963, J. Dixmier developed the cor-
responding technique for the study of the universal enveloping algebra
of a solvable (complex) Lie algebra. Dixmier's results were completed
only quite recently, notably by K. Duflo (1970) and R. Rentschler (1973),
and the present book is the first self-contained (and improved) exposition
of the full theory, for the solvable case. A natural companion work,
containing also the very different theory for the semisimple case, is