[Go] D. Goss, *The algebraist's upper half-plane*, Bull. Amer. Math. Soc. (N.S.) **2** (1980), 391–415.

[H] F. Herrlich, *Nichtarchimedische Teichmüllertheorie*, Habilitationsschrift Bochum, 1985.

[Ma] Yu. Manin, *p-adic automorphic forms*, J. Soviet Math. **5** (1976), 279–333.

[M1] D. Mumford, *An analytic construction of degenerating curves over complete local rings*, Compositio Math. **24** (1972), 129–174.

[M2] ______, *An analytic construction of degenerating abelian varieties over complete rings*, Compositio Math. **24** (1972), 239–272.

[M3] ______, *An algebraic surface with K ample*, $(K^2) = 9$, $p_g = q = 0$, Amer. J. Math. **101** (1979), 233–244.

[MD] Yu Manin and V. Drinfel'd, *Periods of p-adic Schottky groups*, J. Reine Angew. Math. **262/263** (1973), 239–247.

[P] M. van der Put, *Stable reductions of algebraic curves*, Indag. Math. **46** (1984), 461–478.

[Sch] P. Schneider, *Rigid-analytic L-transforms*, Number Theory, Noordwijkerhout 1983, Proc. Journées Arithm., Springer Lecture Notes in Math., vol. 1068 (1984), pp. 216–230.

[St] U. Stuhler, *p-adic homogeneous space and moduli problems*, preprint, Wuppertal, 1985.

[T] J. Tate, *Rigid analytic spaces*, Invent. Math. **12** (1971), 257–289.

[R] M. Raynaud, *Géométrie analytique rigide d'après Tate, Kiehl*, ..., Table Ronde d'Analyse non archimédienne, Bull. Soc. Math. France, Mém. 39–40, 1974.

LOTHAR GERRITZEN

BULLETIN (New Series) OF THE
AMERICAN MATHEMATICAL SOCIETY
Volume 15, Number 2, October 1986

0273-0979/86 $1.00 + $.25 per page

Topology and analysis, the Atiyah-Singer index formula and gauge-theoretic physics, Universitext, by B. Booss and D. D. Bleecker, Springer-Verlag, New York-Berlin-Heidelberg-Tokyo, 1985, xvi + 451 pp., $34.00. ISBN 0-387-96112-7

"Why is the Â-genus of a spin manifold an integer?"

The two mathematicians who asked each other this question in Oxford in the early sixties answered it in the form of a theorem which is still being generalized and reproved nearly a quarter of a century later. The question itself concerned a result in algebraic topology drawn from the pages of Borel and Hirzebruch, but the answer the pair sought was an analytical one—the integer ought to be the index of an elliptic operator. Finding that operator, the Dirac operator, was a turning point in their endeavors and added another example to the Gauss-Bonnet theorem, the Riemann-Roch theorem, and the Hirzebruch signature theorem, each of which could now be considered as a special case of one all-embracing theorem—the index theorem of Atiyah and Singer.

In its most basic form the theorem says how to calculate the index of an elliptic operator D on a closed manifold in terms of topological invariants of the manifold. The index of D is the difference $\dim \ker D - \dim \operatorname{coker} D$, and the topological invariants are characteristic classes of the tangent bundle of the manifold and of the vector bundles on which the operator D is defined. In its refinements, the index is interpreted as more than simply an integer. For example, if a group G acts on the manifold, there is an index in the