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	Nota di contenuto	1. Introduction -- 2. Path integrals in quantum mechanics. 2.1. The Feynman path integral. 2.2. Defining the path integral. 2.3. Transformation techniques. 2.4. Group path integration. 2.5. Klein-Gordon particle. 2.6. Basic path integrals -- 3. Separable coordinate systems on spaces of constant curvature. 3.1. Separation of variables and breaking of symmetry. 3.2. Classification of coordinate systems. 3.3. Coordinate systems in spaces of constant curvature -- 4. Path integrals in pseudo-Euclidean geometry. 4.1. The pseudo-Euclidean plane. 4.2. Three-dimensional pseudo-Euclidean space -- 5. Path integrals in Euclidean spaces. 5.1. Two-dimensional Euclidean space. 5.2. Three-dimensional Euclidean space -- 6. Path integrals on spheres. 6.1. The two-dimensional sphere. 6.2. The three-dimensional sphere -- 7. Path integrals on hyperboloids. 7.1. The two-dimensional pseudosphere. 7.2. The three-dimensional pseudosphere -- 8. Path integral on the complex sphere. 8.1. The two-dimensional complex sphere. 8.2. The three-dimensional complex sphere. 8.3. Path integral

evaluations on the complex sphere -- 9. Path integrals on Hermitian hyperbolic space. 9.1. Hermitian hyperbolic space HH(2). 9.2. Path integral evaluations on HH(2) -- 10. Path integrals on Darboux spaces. 10.1. Two-dimensional Darboux spaces. 10.2. Path integral evaluations. 10.3. Three-dimensional Darboux spaces -- 11. Path integrals on single-sheeted hyperboloids. 11.1. The two-dimensional single-sheeted hyperboloid -- 12. Miscellaneous results on path integration. 12.1. The D-dimensional pseudosphere. 12.2. Hyperbolic rank-one spaces. 12.3. Path integral on SU(n) and SU(n-1,1) -- 13. Billiard systems and periodic orbit theory. 13.1. Some elements of periodic orbit theory. 13.2. A billiard system in a hyperbolic rectangle. 13.3. Other integrable billiards in two and three dimensions. 13.4. Numerical investigation of integrable billiard systems -- 14. The Selberg trace formula. 14.1. The Selberg trace formula in mathematical physics. 14.2. Applications and generalizations. 14.3. The Selberg trace formula on Riemann surfaces. 14.4. The Selberg trace formula on bordered Riemann surfaces -- 15. The Selberg super-trace formula. 15.1. Automorphisms on super-Riemann surfaces. 15.2. Selberg super-zeta-functions. 15.3. Super-determinants of Dirac operators. 15.4. The Selberg super-trace formula on bordered super-Riemann surfaces. 15.5. Selberg super-zeta-functions. 15.6. Super-determinants of Dirac operators. 15.7. Asymptotic distributions on super-Riemann surfaces -- 16. Summary and discussion. 16.1. Results on path integrals. 16.2. Results on trace formulæ. 16.3. Miscellaneous results, final remarks, and outlook.

| Sommario/riassunto | In this second edition, a comprehensive review is given for path integration in two- and three-dimensional (homogeneous) spaces of constant and non-constant curvature, including an enumeration of all the corresponding coordinate systems which allow separation of variables in the Hamiltonian and in the path integral. The corresponding path integral solutions are presented as a tabulation. Proposals concerning interbasis expansions for spheroidal coordinate systems are also given. In particular, the cases of non-constant curvature Darboux spaces are new in this edition. The volume also contains results on the numerical study of the properties of several integrable billiard systems in compact domains (i.e. rectangles, parallelepipeds, circles and spheres) in two- and three-dimensional flat and hyperbolic spaces. In particular, the discussions of integrable billiards in circles and spheres (flat and hyperbolic spaces) and in three dimensions are new in comparison to the first edition. In addition, an overview is presented on some recent achievements in the theory of the Selberg trace formula on Riemann surfaces, its super generalization, their use in mathematical physics and string theory, and some further results derived from the Selberg (super-) trace formula. |