

1. Record Nr.	UNINA9910461741803321
Autore	Garling D. J. H.
Titolo	Clifford algebras : an introduction / / D.J.H. Garling [[electronic resource]]
Pubbl/distr/stampa	Cambridge : , : Cambridge University Press, , 2011
ISBN	1-107-22240-0 1-280-77308-1 1-139-07669-8 9786613683854 0-511-97299-7 1-139-08124-1 1-139-07097-5 1-139-07897-6 1-139-08351-1
Descrizione fisica	1 online resource (vii, 200 pages) : digital, PDF file(s)
Collana	London Mathematical Society student texts ; ; 78
Disciplina	512.57
Soggetti	Clifford algebras
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Title from publisher's bibliographic system (viewed on 05 Oct 2015).
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover; London Mathematical Society Student Texts 78: Clifford Algebras: An Introduction; Title; Copyright; Contents; Introduction; PART ONE: THE ALGEBRAIC ENVIRONMENT; 1: Groups and vector spaces; 1.1 Groups; 1.2 Vector spaces; 1.3 Duality of vector spaces; 2: Algebras, representations and modules; 2.1 Algebras; 2.2 Group representations; 2.3 The quaternions; 2.4 Representations and modules; 2.5 Module homomorphisms; 2.6 Simple modules; 2.7 Semi-simple modules; 3: Multilinear algebra; 3.1 Multilinear mappings; 3.2 Tensor products; 3.3 The trace 3.4 Alternating mappings and the exterior algebra 3.5 The symmetric tensor algebra; 3.6 Tensor products of algebras; 3.7 Tensor products of super-algebras; PART TWO: QUADRATIC FORMS AND CLIFFORD ALGEBRAS; 4: Quadratic forms; 4.1 Real quadratic forms; 4.2 Orthogonality; 4.3 Diagonalization; 4.4 Adjoint mappings; 4.5 Isotropy; 4.6 Isometries and the orthogonal group; 4.8 The Cartan-Dieudonne

theorem; 4.9 The groups $SO(3)$ and $SO(4)$; 4.10 Complex quadratic forms; 4.11 Complex inner-product spaces; 5: Clifford algebras; 5.1 Clifford algebras; 5.2 Existence; 5.3 Three involutions
5.4 Centralizers, and the centre; 5.5 Simplicity; 5.6 The trace and quadratic form on $A(E, q)$; 5.7 The group $G(E, q)$ of invertible elements of $A(E, q)$; 6: Classifying Clifford algebras; 6.1 Frobenius' theorem; 6.2 Clifford algebras $A(E, q)$ with $\dim E = 2$; 6.3 Clifford's theorem; 6.4 Classifying even Clifford algebras; 6.5 Cartan's periodicity law; 6.6 Classifying complex Clifford algebras; 7: Representing Clifford algebras; 7.1 Spinors; 7.2 The Clifford algebras $A_{k,k}$; 7.3 The algebras $B_{k,k+1}$ and $A_{k,k+1}$; 7.4 The algebras $A_{k+1,k}$ and $A_{k+2,k}$; 7.5 Clifford algebras $A(E, q)$ with $\dim E = 3$
7.6 Clifford algebras $A(E, q)$ with $\dim E = 4$; 7.7 Clifford algebras $A(E, q)$ with $\dim E = 5$; 7.8 The algebras A_6, B_7, A_7 and A_8 ; 8: Spin; 8.1 Clifford groups; 8.2 Pin and Spin groups; 8.3 Replacing q by $-q$; 8.4 The spin group for odd dimensions; 8.5 Spin groups, for $d = 2$; 8.6 Spin groups, for $d = 3$; 8.7 Spin groups, for $d = 4$; 8.8 The group $Spin_5$; 8.9 Examples of spin groups for $d \geq 6$; 8.10 Table of results; PART THREE: SOME APPLICATIONS; 9: Some applications to physics; 9.1 Particles with spin $1/2$; 9.2 The Dirac operator; 9.3 Maxwell's equations; 9.4 The Dirac equation
10: Clifford analyticity; 10.1 Clifford analyticity; 10.2 Cauchy's integral formula; 10.3 Poisson kernels and the Dirichlet problem; 10.4 The Hilbert transform; 10.5 Augmented Dirac operators; 10.6 Subharmonicity properties; 10.7 The Riesz transform; 10.8 The Dirac operator on a Riemannian manifold; 11: Representations of Spin and $SO(d)$; 11.1 Compact Lie groups and their representations; 11.2 Representations of $SU(2)$; 11.3 Representations of Spin and $SO(d)$ for $d \leq 4$; 12: Some suggestions for further reading; The algebraic environment; Quadratic spaces; Clifford algebras
Clifford algebras and harmonic analysis

Sommario/riassunto

Clifford algebras, built up from quadratic spaces, have applications in many areas of mathematics, as natural generalizations of complex numbers and the quaternions. They are famously used in proofs of the Atiyah-Singer index theorem, to provide double covers (spin groups) of the classical groups and to generalize the Hilbert transform. They also have their place in physics, setting the scene for Maxwell's equations in electromagnetic theory, for the spin of elementary particles and for the Dirac equation. This straightforward introduction to Clifford algebras makes the necessary algebraic background - including multilinear algebra, quadratic spaces and finite-dimensional real algebras - easily accessible to research students and final-year undergraduates. The author also introduces many applications in mathematics and physics, equipping the reader with Clifford algebras as a working tool in a variety of contexts.