Index

$A(p\,q)$, 43, 53
A_1, 183
A_2, 171, 182
A_3, 50, 183, 184
A_n, 50, 54, 183, 187
B_1, 183
B_2, 171, 182, 183, 186
B_3, 184
B_n, 183, 187, 190
C_1, 183
C_2, 171, 182, 183, 186
C_3, 184
C_n, 183, 187, 190
D_2, 171, 182, 183
D_3, 183, 184
D_n, 183, 187, 190
$E(2)$, 102, 235
$E(3)$, 46
E_6, 183, 190
E_7, 183, 190
E_8, 183, 190
$F(n)$, 49, 54
F_4, 183, 190
$GL(1;Q)$, 44, 52
$GL(2;C)$, 52
$GL(2;R)$, 47
$GL(2;Z)$, 50, 54
$GL(3;Z)$, 50
$GL(n;C)$, 52
$GL(n;F)$, 38, 40, 83
$GL(n;Q)$, 52
$GL(n;R)$, 52, 117
$GL(n;Z)$, 49, 50, 54, 92
G_2, 171, 182, 183, 187
$HT(p\,q)$, 41, 53
H_1^2, 116, 214
H_2^2, 115, 214, 217
H_4, 240
$ISO(2)$, 102, 235, 303
$ISO(2)$, little group, 302
$ISO(3)$, 236, 237
$Nil(n)$, 43, 53
$O(3\,1)$, 296
$O(3)$, 44, 88
$O(3;Z)$, 50
$O(n)$, 44, 47, 164
$O(n;G)$, 46
$O(n;Z)$, 50, 54
$O(p\,q)$, 47
$OU(2n)$, 48
P_n, 50
$SL(1;Q)$, 44, 53
$SL(2;C)$, 47
$SL(2;R)$, 29, 31–33, 45, 47, 64, 66, 70, 112, 115, 214
$SL(n;C)$, 47, 52
$SL(n;Q)$, 47
$SL(n;R)$, 33, 47, 52, 184
$SL(n;Z)$, 50
$SO(2\,1)$, 117
$SO(2\,1)$, little group, 302
$SO(2\,1)/SO(2)$, 118
$SO(2)$, 54, 186
$SO(2n)$, 185
$SO(2n+1)$, 185
$SO(3\,1)$, 298
$SO(3\,1)$, little group, 302, 304
$SO(3\,2)$, 238
$SO(3)$, 54, 101, 119
$SO(3)$, little group, 302
$SO(3)/SO(2)$, 120
$SO(4\,1)$, 238
$SO(5)$, 186
$SO(n)$, 47, 164
$SO(p\,q)$, 47, 185
$SU(1\,1)$, 41, 47, 53, 117
$SU(1\,1)/U(1)$, 118
$SU(2)$, 53, 119
$SU(2)/U(1)$, 120
$SU(n)$, 47, 101, 184

$SU(p\,q)$, 47, 184
S^2, 214, 217
S_3, 7, 50
S_n, 50, 54
$Sol(n)$, 42, 53
$Sp(1)$, 44
$Sp(2;R)$, 45
$Sp(2n;R)$, 45
$Sp(n)$, 44, 185
$Sp(n;C)$, 45
$Sp(n;G)$, 46
$Sp(n;R$, 45
$Sp(p\,q)$, 185
$U(1\,1)$, 47
$U(2)$, 44, 88
$U(2)$, contraction of, 240
$U(2;Q)$, 186
$U(n)$, 44, 47, 101
$U(n)$, representations of, 101
$U(n;G)$, 46
$U(p\,q)$, 47
$USp(2n)$, 48
$UT(1\,1)$, 94
$UT(p\,q\,r)$, 41, 53
$UT(p\,q)$, 53
V_4, 17
Z, integers, 49
Contraction, 233

Abelian group, 43
Active interpretation, of group action, 104
Aether, 319
Affine transformations, 41
Algebraic constraints, 32
Algebraic equations, 4
Algebraic manifold, 32, 117
Algebras, contraction of, 240
Alternating group, 7, 50
Amplitudes, external, 60
Amplitudes, internal, 60
Analytic, continuation, 45, 97, 161, 163, 200
Analytic, reparameterization, 127
Angular momentum, matrix elements, 246
Angular momentum, operators, 293
Angular momentum, states, 242
Annihilation operators, 95, 99
Annihilation operators, bosons, 99
Annihilation operators, fermions, 100
Annihilation operators, two photon, 86
Anticommutation relations, 100
Anticommutator, 100
Anticommute, 52
Antihermitian matrices, 87
Antipodal points, 119
Araki-Satake root diagram, 217
Associativity, 5, 26, 27
Automorphism, involutive, 201
Auxiliary equation, 13
Auxiliary equation, for cubic, 16, 22
Auxiliary equation, for quartic, 17, 20

Baker-Campbell-Hausdorff formulas, 122
Basis, 69
Basis functions, 11
Basis states, contraction of, 242
BCH formulas, 122
BCH formulas, contraction of, 243
Bessel functions, 246
Bilinear constraints, 43
Block diagonal, 72
Block matrix decomposition, 202
Bohr radius, 287
Boltzmann constant, 130
Boost, 34
Bose-Einstein counting problem, 106, 108
Bose-Einstein statistic, 291
Boson operator algebras, 99
Boson operators, 99
Bounded, 30
Building up principle, 180
Building up process, 182

C-number, 143
Canonical commutation relations, 170, 180, 195
Canonical coordinates, 324, 341
Cartan, covering theorem, 120
Cartan, decomposition, 95
Cartan-Killing form, 73
Cartan-Killing inner product, 73, 92, 114, 158, 167
Casimir covariants, 178
Casimir invariants, 162, 167
Casimir operators, 174, 181, 218, 228, 247
Casimir operators, contraction of, 236, 241
Casimir operators, higher order, 165
Cauchy, 339
Cayley-Hamilton theorem, 66, 178
Character table, 11
Character table, of S_2, 12
Character table, of S_3, 14
Character table, of S_4, 18
Character, of real form, 199
Characteristics, method of, 327
Christoffel symbol, 227
Classical functions, 4
Classical problems, double a cube, 4

Classical problems, square a circle, 4
Classical problems, trisect an angle, 4
Clebsch-Gordan series, 299
Closed, 30
Closure, 5, 26, 27
Columbus, 28
Commutation, 67
Commutation relations, 101
Commutation relations, C_2, 173
Commutative, 5, 151
Commutative group, 43
Commutator, 67
Commutator, in algebra, 67
Commutator, in group, 67
Commuting operators, 217
Compact, 30
Compact, and metric, 73
Compass, 24
Complementary series, of represaentations, 213
Completeness relations, 346
Completeness relations, special functions, 245
Complex extension, 185
Complex numbers, 38, 39
conformal condition, 267
Conformal group, 228, 344
Conformal map, 231
Conjugate subgroups, 8
Connectivity matrix, 60
Conservation, of momentum, 57
Constraint equation, 323, 332, 341
Constraints, 40
Constructable numbers, 24
Contraction, of $U(2)$, 240
Contraction, of algebras, 240
Contraction, of basis states, 242
Contraction, of BCH formulas, 243
Contraction, of Casimir operators, 241
Contraction, of Dynkin diagram, 189
Contraction, of groups, 233
Contraction, of matrix elements, 243
Contraction, of parameter space, 241
Contraction, of representations, 242
Contraction, of special functions, 244
Coordinate representation, 309
Coordinate, dependent, 327
Coordinate, independent, 327
Coset, 9, 116
Coset representative, 116, 302
Cover, open, 28
Covering group, 117, 120
Covering group, $\overline{SO(2,1)/SO(2)}$, 122
Covering group, $\overline{SU(1,1)/U(1)}$, 122
Covering group, universal, 120
Covering problem, 112
Creation operators, 95, 99
Creation operators, bosons, 99
Creation operators, fermions, 100
Creation operators, two photon, 86
Crossing symmetry, 57
Cubic equation, 3, 13, 24
Cubic equation, Galois group, 14
Cylinder, 332, 341

Defining matrix representation, 149
Degeneracy, and symmetry, 262
Dependent coordinate, 327
DeSitter symmtry, 267
Determining equation, 324, 325, 341
Dicke model, 143
Diffeomorphism, 122
Differential equations, 321
Differential equations, and Lie groups, 321
Differential operators, first order, 101
Dimension, 69
Dimension, of manifold, 30
Dimension, of root space, 174
Direct product group, 10
Discrete invariant subgroup, 120
Discrete series, of representations, 213
Discriminant, 13
Dispersion relation, 254
double the cube, 25
Dynamical symmetry, 262
Dynkin diagram, 180, 186, 188
Dynkin diagram, contraction of, 189

Eigenoperator, commutation relations, 159
Eigenoperator, decomposition, 159
Electromagnetic field, 294
Embedded groups, 48
Entropy representation, 320
Equation, constraint, 323, 332
Equation, determining, 324, 325
Equation, surface, 323, 332
Equilibrium, thermodynamic, 130
Equivalence Principle, 104, 283
Equivalence, Principle of, 253
Euclidean, group, 46
Euclidean, motions, 235
Euclidean, submanifold, 217
Euclidean, transformations, 89
EXP, 65
EXPonential, 62, 66
EXPonential, operation, 66
EXPonentiation, 111

Factor group, 10
Faithful, 9
Faithful, representation, 7, 138

Fermion operator algebras, 100
Fermion operators, 100
Fibonacci number, 49, 54
Fibonacci-type series, 54
Field, 295
Field, equations, 297
Field, theory, 4
fine structure constant, 256
First order equations, 324
First prolongation, 324
Fluctuation-Dissipation theorem, 320
Fock space, 241
Fourgroup, 17
Frobenius method, 256
Fully reducible, 71, 152
Fundamental roots, 187

Galilei group, 47, 90, 97
Galiliean transformation, 53
Galois group, 5, 24
Galois group, for quartic, 17
Galois theory, 4
Galois E., 3
Galois E., 322, 339
Galois' theorem, 10
General linear, algebras, 84
General linear, groups, 40
Generating function, 246
Geometric symmetry, 258
Globally symmetric spaces, 216
Gravitons, 320
Group theory, 4
Group, 'infinite', 3
Group, abelian, 7
Group, axioms, 5, 26
Group, commutative, 7
Group, composition function, 31
Group, composition map, 30
Group, elements, 26
Group, generators, 7
Group, inversion map, 30
Group, multiplication, 5, 7, 26
Group, operations, 5, 26
Group-subgroup chain, 14, 17
Group-subgroup diagram, 8
Groups, intersections of, 90

Hamilton's equations, 44, 45, 204
Harmonic oscillator wavefunctions, 244
harmonic oscillator, isotropic, 108
Heat equation, 339
Heisenberg, algebra, 100
Heisenberg, commutation relations, 87
Heisenberg, group, 43
Heisenberg, identity, 124
Helicity, of photon, 294
Helicity, state, 295
Hermite polynomials, 109, 244
Higher order equations, 337
Hilbert-Schmidt inner product, 72
Homogeneous Lorentz group, 296
Homogeneous Lorentz transformation, 298
Homogeneous polynomials, 160, 291
Homomorphic image, 9
Homomorphism, 9
Hooke's law, 343
Hyperbolic plane, 230
Hyperboloid, 29, 32
Hyperboloid, single-sheeted, 115, 116, 214
Hyperboloid, two-sheeted, 115, 214

Identity, 5, 27
Inönü-Wigner contraction, 233, 234
Indefinite metric, 45, 223
Independent coordinate, 327
Independent functions, 217
Independent roots, 217
Index, of real form, 199
Inertial frame, 319
Infinitesimal generator, 324, 333
Inhomogeneous Lorentz group, 238, 296, 297
Inner product, 69, 72
Integrability condition, 68
Interpretations of group action, active, 104
Interpretations of group action, passive, 104
Intersections, of groups, 47
Invariance algebra, 108
Invariant, measure, 75, 219
Invariant, metric, 75, 219
Invariant, operators, 162, 167, 181
Invariant, subalgebra, 152
Invariant, subgroup, 8, 10
Invariant, subspace, 41
Inverse, 5, 27
Inverse, image, 9
Inversion mapping, 33
Involutive automorphism, 201
Irreducible, 71, 153
Irreducible, representations, 12
Isomorphism, 9
isomorphism, 9
Isomorphism, problem, 117
Isotropic, 217

Jacobi identity, 67, 68, 169
Jacobi polynomials, 244, 246

Kepler's Third Law, 343
Klein four-group, 17

Klein group, 17
Klein-Gordon equation, 255
Kustaanheimo-Stiefel transformation, 273

Laplace equation, 338
Laplace-Beltrami operators, 217, 218, 227
Laplace-Runge-Lenz vector, 262
Laplacian operators, 236
Laziness, principle of maximum, 239
Legendre polynomials, 244, 246
Levi-Civita skew tensor, 177
Levi-Civita symbol, 163
Lie algebra, $\mathfrak{a}(p\,q)$, 87, 147
Lie algebra, $\mathfrak{gl}(n;F)$, 84, 94
Lie algebra, $\mathfrak{ht}(p\,q)$, 84
Lie algebra, $\mathfrak{nil}(n)$, 87, 148
Lie algebra, $\mathfrak{ou}(2n)$, 203
Lie algebra, $\mathfrak{o}(n;G)$, 89
Lie algebra, $\mathfrak{o}(p\,q)$, 88
Lie algebra, $\mathfrak{sl}(2;C)$, 174
Lie algebra, $\mathfrak{sl}(2;R)$, 70, 112, 115, 174, 196
Lie algebra, $\mathfrak{sl}(n)$, 90
Lie algebra, $\mathfrak{sl}(n;C)$, 90, 96, 97
Lie algebra, $\mathfrak{sl}(n;Q)$, 90, 97
Lie algebra, $\mathfrak{sl}(n;R)$, 90, 96, 202, 204
Lie algebra, $\mathfrak{sol}(n)$, 87, 148
Lie algebra, $\mathfrak{so}(2\,1)$, 88
Lie algebra, $\mathfrak{so}(2n)$, 205
Lie algebra, $\mathfrak{so}(3\,1)$, 89
Lie algebra, $\mathfrak{so}(3\,2)$, 97
Lie algebra, $\mathfrak{so}(3)$, 98, 101, 174
Lie algebra, $\mathfrak{so}(4\,1)$, 97
Lie algebra, $\mathfrak{so}(4)$, 150
Lie algebra, $\mathfrak{so}(5)$, 97, 165
Lie algebra, $\mathfrak{so}(n)$, 150, 164, 202
Lie algebra, $\mathfrak{so}(p\,q)$, 95, 202
Lie algebra, $\mathfrak{so}^*(2n)$, 205
Lie algebra, $\mathfrak{sp}(2n;R)$, 202–204
Lie algebra, $\mathfrak{sp}(G;C)$, 89
Lie algebra, $\mathfrak{sp}(G;R)$, 89
Lie algebra, $\mathfrak{sp}(n)$, 150, 202
Lie algebra, $\mathfrak{sp}(n;G)$, 89
Lie algebra, $\mathfrak{sp}(p\,q)$, 88, 202
Lie algebra, $\mathfrak{su}(1\,1)$, 159, 161, 163, 196
Lie algebra, $\mathfrak{su}(2)$, 125, 159, 160, 162, 196
Lie algebra, $\mathfrak{su}(2n)$, 205
Lie algebra, $\mathfrak{su}(n)$, 90, 150, 202
Lie algebra, $\mathfrak{su}(p\,q)$, 96, 202
Lie algebra, $\mathfrak{su}^*(2n)$, 205
Lie algebra, $\mathfrak{usp}(2n)$, 203
Lie algebra, $\mathfrak{ut}(1\,1)$, 94
Lie algebra, $\mathfrak{ut}(p\,q\,r)$, 85
Lie algebra, $\mathfrak{ut}(p\,q)$, 84, 148
Lie algebra, $\mathfrak{u}(n)$, 90
Lie algebra, $\mathfrak{u}(n;F)$, 202
Lie algebra, $\mathfrak{u}(n;G)$, 89
Lie algebra, $\mathfrak{u}(p\,q)$, 88
Lie algebra, $\mathfrak{u}(p\,q;F)$, 202
Lie algebras, 62, 63
Lie algebras, properties of, 67
Lie groups, 3, 24, 30
Lie groups, and differential equations, 321
Lie groups, global properties, 65
Lie groups, local properties, 65
Lie symmetries, 334, 338
Lie M. S., 322, 339
Lie S., 2
Light cone, 113
Limit points, 30
Linear constraints, 40
Little group, 302
Local groups, 341
Local Lie groups, 341
Loops, none in Dynkin diagrams, 188
Lorentz group, 34, 45, 89, 296
Lorentz group, homogeneous, 296
Lorentz group, in a plane, 88
Lorentz group, inhomogeneous, 296, 297
Lorentz transformations, 34, 46, 238, 295
Lorentz transformations, homogeneous, 298
lowering operators, 260

Manifestly covariant, 295
Manifestly covariant, representations, 300
Manifold, 28, 63
Matrix elements, 4
Matrix elements, angular momentum, 246
Matrix elements, contraction of, 243
Matrix groups, 32, 38
Matrix inversion, 32
Matrix multiplication, 7, 32
Matrix representations, 4, 6, 9
Maxwell's Equations, 294, 296, 344
Measure, 75, 219
Measure, invariant, 75, 219
Mechanical similarity, 342
Method of characteristics, 327
Metric, 75, 219
Metric preserving groups, antisymmetric, 89
Metric preserving groups, antisymmetric metric, 45
Metric preserving groups, compact, 44, 87

Metric preserving groups, general metric, 46
Metric preserving groups, noncompact, 45, 88
Metric preserving groups, singular, 89
Metric tensor, 219, 223
Metric, invariant, 75, 219
Michelson-Morely experiment, 319
Microwave background radiation, 319
Minimal electromagnetic coupling, 254
Minkowski, transformation, 200
Minkowski, trick, 200
Modular groups, 49, 92
Momentum conservation, 57
Momentum representation, 309
Multilinear constraints, 47, 90
Multiplication table, 11
Multiply connected, 223
Mutually commuting operators, 174, 180

Network, 60
Network topology, 60
Neutrinoes, 320
Nilpotent, 73, 148, 151
Nilpotent, algebras, 87, 160
Nilpotent, groups, 43
Noether's Theorem, 346
Noncompact, 30
Nonsemisimple, 71, 152
Nonsemisimple, group, 3
Normally ordered, 125

One-parameter group, 324
Operator algebras, 99
Operators, momentum, 43
Operators, position, 43
Order, normal, 125
Order, of a group, 9
Orthogonal groups, 44, 87
Orthogonality relations, 346
Orthogonality relations, special functions, 245

Parameter space, contraction of, 241
Parameterization problem, 122
Parseval inequality, 347
Partial differential equations, 338
Partition function, 130
Pascal triangle, 291
Passive interpretation, of group action, 104
Pauli spin matrices, 34, 88
Periodic Table, Mendelyeev, 55
Permutation, group, 6
Permutation, matrix, 6
Permutation, representation, 50
Permutation, transformation, 160
phase shift, 281, 282
Photon, 294, 310
Photon, number states, 241
Photon, operators, 42, 86, 95, 123, 148, 154, 160, 166, 240
Poincaré group, 46, 90, 97, 238
Poincare plane, 230
Point transformations, 341
Polarization, 294
Polarization, and inner products, 77
polynomial equation, 5
Principal series, 213
Principal series, of representations, 213
Principle of Equivalence, 253, 283
Principle of Relativity, 253, 283
Problems, of antiquity, 24
projective transformation, 266
Prolongations, first, 324, 341
Prolongations, higher order, 337
Prolongations, second, 334
Pseudo-Riemannian symmetric space, 215, 216, 223

Quadratic constraints, 43
Quadratic equation, 3, 11
Quadratic equation, Galois group, 12
Quadratic resolvent, 22
Quadrature, 4, 322
Quadrupole tensor operators, 293
quantum number, principle, 55
Quartic equation, 3, 16
Quaternions, 38, 39, 51
Quintic equation, 3, 19
Quintic equation, Galois group, 20
Quotient, 9, 116
Quotient, space, 10

radial quantum number, 256
Radicals, 3, 322, 339
raising operators, 260
Rank, 162, 167, 173
Rank, for symmetric space, 217
Real form, 195
Real form, character of, 199
Real form, classical algebras, 205
Real form, classical equivalences, 206
Real form, compact, 198
Real form, exceptional algebras, 207
Real form, index of, 199
Real form, least compact, 198
Real numbers, 38, 39
Recursion relation, root chain, 169
Reducible, 71, 152
Reduction of order, 336
Regular elements, 165
Regular representation, 70, 146, 158

Relativity Principle, 283
Relativity, Principle of, 253
Reparameterization, local, 127
Representation, 6
Representation, contraction of, 242
Representation, coordinate, 309
Representation, faithful, 138
Representation, irreducible, 213
Representation, manifestly covariant, 300
Representation, momentum, 309
Representation, reducible, 213
Representation, unitary, 213
Representation, unitary irreducible, 298, 300, 301
Representations, of $SU(1\,1)$, 213
Representations, of $SU(2)$, 213
Resolvent equation, 15
Riccati equation, 334
Riemannian globally symmetric space, 217
Riemannian space, 216
Riemannian symmetric space, 214–216
Risch, 340
Rodriguez formula, 109
Root space diagram, 174
Root chain, 170
Root chain, recursion relation, 169
Root reflections, 170
Root space, 167, 180
Root space, decomposition, 181
Root space, diagram, 166, 170, 173, 180, 182, 196
Roots, 167, 174
Roots, of secular equation, 180
Roots, properties of, 180
Ruler, 24
Rydberg electron, 281

Scaling transformation, 329, 333, 338
Scattering matrix, 58
scattering phase shift, 281, 282
Schrödinger equation, 254, 255
Schrödinger prescription, 254
Schrodinger equation, 57
Schur's Lemma, 120
Schwartz inequality, 181, 190
Schwinger representation, 105, 264, 271
Second order equations, 334
Second prolongation, 334
Secular equation, 66, 159, 160, 167, 180, 217
Secular equation, independent functions, 180
Secular equation, roots of, 180
Secular equation, independent coefficients, 167, 174
Self-conjugate, 8
Semidirect sum, 234
Semisimple, 71, 152
Semisimple, group, 3
Semisimple, Lie algebras, 167
Sheets, 54
Similarity transformations, 70
Simple, 71, 153
Simple group, 3
Simply connected, 120
Single-sheeted hyperboloid, 115, 116
Solution surface, cylinder, 332
Solvable, 151
Solvable, algebras, 87
Solvable, group, 3, 42
Spacetime, 200
Spacetime, coordinates, 34
Special functions, 244
Special functions, completeness relations, 245
Special functions, contraction of, 244
Special functions, orthogonality relations, 245
Special linear groups, 47, 90
Special Relativity, 319
Spectrum generating, algebra, 109, 293
Spectrum generating, group, 278
speed of light, c, 319
Spherical harmonics, 244, 246, 255
Spin groups, and $SO(n)$, 208
Spin states, 44, 295
Spinor, of $SO(3)$, 186
Spinor, of $SO(5)$, 186
Splitting map, 201
Splitting transformation, 201
square the circle, 25
Squeezed states, 41
Stability subgroup, of a vector, 302
Structure constants, 69, 170, 172, 181
Structure factor, 137
Structure theory, for lie algebras, 146
Structure theory, for simple lie algebras, 158
Subalgebra, 73
Subalgebra, invariant, 152
Subfield restriction, 202
Subgroup, 7
Subgroup, invariant, 8
Subgroup, normal, 8
Surface equation, 323, 332, 341
Symmetric, group, 6
Symmetric, matrix, 29
Symmetric, polynomials, 10
Symmetric, spaces, 214
Symmetry, and degeneracy, 262
Symmetry, crossing, 57
Symplectic group, 44, 87

Symplectic transformations, 204

Tensor, 295
Thermal expectation values, 130
Thomas precession, 35
Time-ordered product, 128
Time-reversal operator, 302
Topological space, 28
Topology, 28
Transfer matrix, 57
Transformation, scaling, 333
Translation group, 43
trisect an angle, 25
Tschirnhaus transformation, 13, 22
Tschirnhaus transformation, for cubic, 15
Tschirnhaus transformation, for quartic, 17, 20
Two photon algebra, 86, 166
Two-sheeted hyperboloid, 115

Uncertainty relations, of statistical mechanics, 320
Unimodular groups, 47
Unit disk, 230
Unit sphere, 28
Unitary groups, 44, 87, 101
Unitary irreducible representations, 298, 300, 301
Unitary representation, 43
Universal covering group, 120
Upper half plane, 230
Upper triangular, 148
Upper triangular, algebras, 84
Upper triangular, and photon operators, 123
Upper triangular, groups, 40

VanderMonde matrix, 179
Variables, dependent, 323
Variables, independent, 323
Velocity addition law, 34
Vierergruppe, 17, 226
Viscous medium, 320

Wave equation, 254
Weyl group, 176
Weyl group, of reflections, 176
Weyl symmetry, 170
Wick rotation, 128
Wigner-Stone theorem, 245, 346