

Cambridge University Press

978-0-521-17561-6 - Random Fields on the Sphere: Representation, Limit Theorems
and Cosmological Applications

Domenico Marinucci and Giovanni Peccati

Index

[More information](#)

Index

- A^* , 17
 $C(G)$, 20
 $C_{l_1 l_2}$, 77
Cum (\mathbf{X}_b), 94
 $D[\gamma; l_1, l_2, l_3]$, 106
 $D^l(g)$, 52
 D_4 , 24
 $E_{l_1 \dots l_n}$, 155
 G -set, 18
 H_q , 92
 H_x , 19
 $I_d(f)$, 88
 $I_{l_1 l_2 l_3}$, 229
 $L^2(G)$, 20
 M_π , 34
 $O(n)$, 16
 $SL(n, \mathbb{R})$, 16
 $SO(3)$, 14
 $SO(n)$, 16
 $SU(2)$, 21
 $SU(n)$, 17
 S^1 , 13
 S^2 , 14
 S_n , 17
 $S_{l_1 \dots l_n}$, 148
 T^π , 116
 $T^{(0)}, T^{(1)}$, 116
 $U(n)$, 17
 U_{2l} , 58
 Z_n , 17
 $[n]$, 94
 $\Delta_{l_1 \dots l_n}$, 148
 $\Delta_{l_1 l_2 l_3}$, 230
 Δ_r , 72
 Δ_{S^2} , 72
 $\Gamma_{CL(k)}(p, 3)$, 106
 $\Gamma_{\overline{CL(k)}}(p, 3)$, 106
 Γ_C , 97
 $\Gamma_{L(k)}(p, 3)$, 106
 $\Gamma_{\overline{F}}$, 96
 χ_π , 35
 $\delta(\gamma; l_1, l_2, l_3)$, 106
 \hat{G} , 26
 $\hat{\gamma}$, 105
 $[\pi]$, 23
 $\|\cdot\|_G$, 20
 $\|\cdot\|_V$, 25
 $\langle \cdot, \cdot \rangle_V$, 25
 $\mathbf{GL}(n, \mathbb{R})$, 16
 \mathbf{X}^b , 94
 \mathbf{X}_b , 94
 $\mathcal{G}\{l_1, m_1; \dots; l_r, m_r\}$, 82
 \mathcal{H}_l , 51, 73
 $\pi \sim \pi'$, 23
 π -invariant, 23
 ψ_m^l , 52
 $\bar{B}_{l_1 l_2 l_3}$, 228
 $\widehat{I}_{l_1 l_2 l_3}$, 229
 $d(x, y)$, 65
 $d\sigma(x)$, 65
 d_{TV} , 100
 $d_{mn}^l(\vartheta)$, 55
 dg , 20
 $f \otimes_r g$, 90
 k -loop, 106
 z - x - z convention, 50
 z - y - z convention, 49
 $\mathbf{GL}(n, \mathbb{C})$, 17
 $\text{Perm}(X)$, 17
 $\mathcal{H}_l(S^2)$, 248
 \mathcal{K}_l , 249
 $Y_{l,ms}$, 289

- $\langle \cdot, \cdot \rangle_G$, 20
- $D^l \circ T$, 62
- $D_{mm}^l(\varphi, \vartheta, \psi)$, 55
- $N(\mu, \sigma^2)$, 85
- $N_k(m, V)$, 85
- $P_n^{(a,b)}$, 56
- $Y_{lm}(\vartheta, \varphi)$, 64
- Angular power spectrum, 139
 - estimation, 197
- Associated Legendre functions, 315
- Averaging trick, 26
- Bispectrum, 226
 - reduced, 226
 - Sachs-Wolfe, 241
 - sample, 228
- Blackbody radiation, 195
- Brownian motion, 87
- Cauchy distribution, 142
- Chaotic decomposition, 93
- Character, 13
- Chebyshev polynomials, 58
- Class function, 36
- Clebsch-Gordan
 - coefficients for $SO(3)$, 78
 - matrix, 77
 - description, 78
- Clebsch-Gordan coefficients, 179
- Clebsch-Gordan matrices, 178
- Clique, 109
- COBE, 195
- Compact neighbourhood, 19
- Complex noise, 127
 - Gaussian, 127
- Conjugacy-invariant (class, central) function, 42
- Contraction, 90
- Coset
 - left, 17
 - right, 17
- Cosmic Variance, 219
- Cubature points, 249
- Cubature weights, 249
- Cumulant, 94
 - joint, 94
 - polyspectrum, 164
- Diagram, 96
 - connected, 97
 - paired, 97
- Dirichlet distribution, 235
- Discrete Fourier transform, 120
- Dual, 13
- Edge, 96
 - flat, 97
- Equivalent representations, 23
- Euler angles of $SO(3)$, 49
- Euler angles of $SU(2)$, 46
- Frequency components, 180
- Fubini, 178
- Gaunt integral, 82
 - generalized, 82
- Gaunt integrals, 176
- Graph, 104
 - not directed, 104
- Gravitational lensing, 283
- Group, 15
 - Abelian (commutative), 15
 - action, 18
 - transitive, 18
 - Cantor, 36
 - circle, 17
 - cyclic, 17
 - dihedral, 24
 - dual of, 26
 - general linear
 - complex, 17
 - real, 16
 - Lie, 21
 - orthogonal, 16
 - quotient, 18
 - special
 - linear, 16
 - orthogonal, 16
 - unitary, 17
 - symmetric, 17
 - topological, 19
 - unitary, 17
- Haar measure, 13, 20
 - of $SO(3)$, 50
 - of $SU(2)$, 21
 - of a finite group, 20
- Hausdorff space, 19
 - locally compact, 19
- Hausman test, 203
- Hermite polynomial, 174
- Hermite polynomials, 92
- Hermite subordination, 176
- High-frequency asymptotics, 169
- High-frequency CLT, 176
- High-frequency ergodicity, 198
- High-frequency Gaussianity, 205

High-resolution asymptotics, 169
 Homogeneous space, 18
 Homomorphism, 16
 kernel of, 16
 Hypercontractivity, 91
 Hypergroups, 188
 Instrumental noise, 201
 Intertwining operator, 23
 Isomorphism, 16
 Isotropic, 14
 Isotropy, 114
 Isotypical space, 42
 Jacobi polynomials, 56
 Koornwinder, 55
 Kronecker product, 148
 Laplacian, 70
 spherical, 70, 72
 Lebesgue measure on the sphere, 65
 Legendre
 associated function, 64
 polynomials, 64
 Legendre's equation, 315
 Leonov-Shiryaev identities, 95
 Liboff, 170
 Loop, 105
 Maximal ε -net, 265
 Mehler-Dirichlet formulae, 319
 Method of moments and cumulants, 99
 simplified, 102
 Miller, 46
 Mixed states, 188
 Narcowich, Petrushev and Ward, 246
 Needlets, 245, 246, 249
 bispectrum, 275
 coefficients, 253
 definition, 248
 estimation, 265
 angular power spectrum, 272
 localization, 256
 Mexican, 247, 261
 mixed, 310
 properties, 252
 spin, 282
 uncorrelation, 257
 Non-Gaussianity
 testing, 238
 Peter-Weyl Theorem, 14, 40
 on the sphere, 68
 stochastic, 118

Plancherel identity, 32
 Planck, 194
 Planckian curve, 195
 Polarization, 282
 Polynomials
 Chebyshev, 317
 Gegenbauer, 313
 Hermite, 174
 Jacobi, 312
 Legendre, 256, 314
 orthogonal, 312
 ultraspherical, 313
 Polyspectrum, 148, 223
 angular, 148
 cumulant, 164
 Pontryagin theory, 13
 Pure states, 188
 Random field, 115
 strongly isotropic, 115
 weakly isotropic, 115
 Reconstruction formula, 254
 Reduced polyspectrum, 157
 Representation, 22
 character of, 35
 dimension (d_π), 22
 direct sum, 30
 equivalence class of, 23
 invariant subset of, 23
 irreducible, 14, 23
 left regular, 26
 matrix, 14, 23
 right regular, 26
 tensor product, 30
 trivial, 22
 unitary, 14, 25
 Rodrigues' formula, 312
 Schur Lemma, 28
 Schur's orthogonality relations, 32
 Skorohod space, 239
 Space of matrix coefficients, 34
 Spectral measure, 128
 Spectral moments, 148
 Spectral process, 128
 Spectral representation
 of spherical fields, 123
 Sphere, 14
 Spherical distance, 65
 Spherical harmonics, 64
 properties, 317
 Spin fiber bundles, 286
 Spin random fields, 282

Cambridge University Press

978-0-521-17561-6 - Random Fields on the Sphere: Representation, Limit Theorems
and Cosmological Applications

Domenico Marinucci and Giovanni Peccati

Index

[More information](#)*Index*

341

Spin spherical harmonics, 289
Stationarity, 114
Sternberg, 45
Stochastic integral, 88
 multiple (Wiener-Itô), 88
 multiplication formulae, 90
Stokes' parameters, 284
Subgroup, 15
 improper, 15
 proper, 15
Subordinated fields, 173
Tight frames, 253
Topology, 19
Total variation distance, 100
Triangle conditions, 78
Varshalovich, Moskalev and Khersonskii, 45,
 170
Vertex, 96
Vilenkin and Klimyk, 45, 55
Weakly stationary field, 127
Wiener chaos, 89
Wigner $3j$ coefficients, 83
Wigner $6j$ coefficients, 109
Wigner D functions, 55
Wigner D matrix, 53
WMAP, 194