
Author Index

- Adamczak, R., 288
 Akaïke, H., 462
 Albin, J.M.P., 106
 Alexander, K., 287, 290
 Andersen, N.T., 288–290
 Anderson, T.W., 105
 Arcones, M.A., 288, 290
 Aronsajn, N., 105
- Baernstein II, A., 102, 667
 Balabdaoui, F., 604
 Baldi, P., 106
 Ball, K., 105, 289
 Baraud, Y., 538, 603, 664, 665
 Barron, A., 604, 665
 Bartlett, P., 288
 Bass, R., 288
 Beckner, W., 287
 Bednorz, W., 287
 Beers, G., 35
 Beirlant, J., 463
 Bennett, G., 286
 Benyamini, Y., 102
 Beran, R., 665
 Bergh, J., 387
 Berman, S.M., 105, 106
 Besov, O.V., 387
 Bickel, P.J., 463, 464, 538
 Billingsley, P., 603
 Birgé, L., xiii, 289, 464, 538, 603, 665
 Birman, M.S., 289, 387
 Blum, J.R., 288, 290
 Bobkov, S.G., 105
 Bogachev, V.I., 105, 388
 Bonami, A., 287
 Borell, C., 102, 105, 287
 Borisov, I.S., 290
 Borovkov, A., 106
 Boucheron, S., 102, 286–288
 Bourdaud, G., 387
 Bousquet, O., 287, 288
 Bretagnolle, J., 538
 Brown, L.D., 14, 669
 Bull, A., 463, 538, 665
- Bunea, F., 665
 Butucea, C., 464, 664
- Cai, T.T., 14, 464, 664–666, 669
 Cameron, R.H., 105
 Cantelli, F.P., 13, 228, 670
 Carl, B., 289
 Carpentier, A., 538, 665
 Carroll, R. J., 464
 Castillo, I., 464, 539, 603, 604
 Cavalier, L., 464, 664
 Cencov, N., 462
 Cencov, N.N., 538
 Cervonenkis, A.Ya., 110, 212, 289
 Chernozhukov, V., 288, 463, 666
 Chetverikov, D., 288, 463, 666
 Chevet, S., 105
 Choi, H., 106
 Ciesielski, Z., 387, 388
 Claeskens, G., 538
 Cohen, A., 387
 Coulhon, T., 387
 Cox, D.D., 605
 Csörgö, M., 463
- Dümbgen, L., 537, 539, 604, 664–666
 Dalalyan, A., 14
 Daubechies, I., 386, 387
 Davies, E.B., 105
 Davies, P.L., 539
 de Acosta, A., 106
 de Cristoforis, M.L., 387
 de la Peña, V., 102, 287
 DeHardt, J., 288, 290
 Deheuvels, P., 463
 DeVore, R., 387
 Devroye, L., 288, 463, 671
 Dobrić, V., 289
 Donoho, D., 464
 Donoho, D.L., 538, 665
 Donsker, M.D., 228
 Doob, J.L., 228, 604
 Doss, C., 604

- Dudley, R.M., xii, 16, 102, 106, 110, 169, 212, 227, 228, 266, 287–290, 386–388
- Durot, C., 604
- Durrett, R., 664
- Durst, M., 290
- Dvoretzky, A., 169
- Edmunds, D.E., 387
- Efromovich, S.Y., 664, 665
- Einmahl, U., 287, 288, 463
- Ermakov, M.S., 537
- Fan, J., 464
- Fernique, X., 102, 105, 106, 287
- Figiel, T., 102
- Fisher, R.A., xi, 13
- Folland, G.B., xii, 228, 386, 419
- Frazier, M., 387
- Freedman, D., 604
- Fromont M., 537
- Güntürk C.S., 463
- Gach, F., 604
- Gardner, R.J., 105
- Gauss, C.F., xi, 13
- Gayraud, G., 538
- Gelfand, I., 88
- Geller, D., 387
- Genovese, C., 665
- Ghosal, S., 603–605
- Ghosh, J.K., 603, 604
- Giné, E., 102, 106, 285, 287–290, 387, 388, 463, 464, 538, 604, 664–666
- Glivenko, V.I., 13, 228
- Goldenshluger, A., 665, 674
- Golitschek, M.V., 387
- Golubev, G.K., 14, 664, 674
- Golubev, Y., 665
- Grama, I., 14
- Groeneboom, P., 604
- Gross, L., 105, 287
- Guillou, A., 288, 463
- Härdle, W., 386, 387, 538
- Haagerup, U., 287
- Haar, A., 386
- Hall, P., 106, 538
- Hanson, D.L., 286
- Hardy, G.H., 387
- Haussler, D., 289
- Hoeffding, V., 286, 287
- Hoffmann, M., 604, 665, 666
- Hoffmann-Jørgensen, J., 102, 106, 286, 289, 388
- Horváth, L., 463
- Houdré, C., 288
- Huber, C., 538
- Huet, S., 538, 664
- Ibragimov, I.A., 13, 464, 465, 538
- Ingster, Y.I., 511, 537, 664
- Jaffard, S., 666
- Jain, N.C., 288
- Jawerth, B., 387
- Johnson, W.B., 286
- Johnstone, I.M., 538, 665
- Jongbloed, G., 604
- Jordan, M.I., 605
- Juditsky, A., 539, 665
- Kahane, J.P., 102, 286–288
- Kakutani, S., 106
- Kalliampur, G., 105
- Kanter, M., 102
- Karhunen, K., 105
- Kato, K., 288, 463, 666
- Katri, C.G., 105
- Katz, M.F., 106
- Kerkyacharian, G., 386–388, 463, 538, 539, 665
- Khasminskii, R.Z., 13, 464, 465, 538
- Khinchin, A., 287
- Kiefer, J., 169, 604
- Klein, T., 158, 287
- Klemela, J., 464
- Kolmogorov, A.N., 13, 228, 289, 387, 538
- Koltchinskii, V., 288, 290, 463, 538
- Konstant, D.G., 106
- Korostelev, A.P., 538
- Kovac, A., 539
- Kuelbs, J., 106
- Kulikov, V.N., 604
- Kwapien, S., 286
- Löfström, J., 387
- Lévy, P., 26, 102
- Lambert-Lacroix, S., 539, 665
- Latała, R., 286–288
- Laurent, B., 464, 465, 537, 538, 664
- Le Cam, L., xi, xiii, 13, 290, 603, 604
- Leadbetter, M.R., 105, 106
- Leahu, H., 605
- Ledoux, M., xi, xiii, 102, 105, 106, 287, 290
- Leindler, L., 105
- Lepski, O.V., 537, 664, 665, 674, 677
- Levit, B., 464
- Li, K.C., 665
- Li, W.V., 105, 106
- Lijoi, A., 605
- Linde, W., 106
- Lindenstrauss, J., 102
- Lindgren, G., 105, 106
- Littlewood, J.E., 287, 386, 387

- Loève, M., 105
 Lopuhaä, H. P., 604
 Lorentz, G.G., 387, 677
 Lounici, K., 288, 464, 538, 665
 Love, E.R., 289
 Low, M., 464, 669
 Low, M.G., 14, 664–666
 Lugosi, G., 102, 286–288
- Ma, Z., 665
 Madych, W., 463
 Madych, W.R., 463
 Makovoz, Y., 387
 Mallat, S., 386
 Mammen, E., 664
 Marcus, D.J., 388
 Marcus, M.B., 102, 288
 Martin, W.T., 105
 Mason, D., 287, 288, 463
 Massart, P., xiii, 102, 163, 169, 286–289, 464, 603, 665
 Matias, C., 664
 Mattila, P., 35
 Maurer, A., 288
 Maurey, B., 102, 289
 McDiarmid, C., 286, 287
 Meise, M., 539
 Meister, A., 464
 Meyer, Y., 386, 387
 Milman, V. D., 102
 Mogulskii, A., 106
 Montgomery-Smith, S., 134, 286
- Nadaraya, E.A., 13, 678
 Nemirovski, A., 464, 538
 Nemirovski, A.S., 464, 465, 604
 Nickl, R., 106, 288–290, 387, 388, 462–464, 538, 539, 603, 604, 664–666
 Nolan, D., 289, 290
 Norvaissa, R., 387
 Nussbaum, M., 13, 14, 464, 664
- Oleskiewicz, K., 287
 Ossiander, M., 288, 290
 Ottaviani, G., 286
 Oxtoby, J.C., 102
- Pötscher, B.M., 387, 388, 604
 Pólya, G., 387
 Pajor, A., 289
 Paley, R.E.A.C., 102, 287, 386
 Parzen, E., 462
 Pearson, K., 537
 Peetre, J., 387
 Pensky, M., 464
 Pesenson, I.Z., 387
- Petrushev, P., 387
 Philipp, W., 289
 Picard, D., 386, 387, 463, 538, 539, 665
 Pickands, J. III, 106
 Pinelis, I., 288
 Pinsker, M.S., 664
 Pisier, G., 102, 105, 286, 287, 289
 Piterbarg, V.I., 106
 Plackett, R.L., 13
 Pollard, D., 288–290
 Polyak, B.T., 604
 Pouet, C., 538, 664
 Prünster, I., 605
 Prékopa, A., 105
 Prakasa Rao, B.L.S., 604
- Radulović, D., 464
 Ray, K., 464, 604
 Reiß, M., 14, 290
 Reynaud-Bouret, P., 288
 Rhee, W.T., 290
 Rigollet, P., 665
 Rio, E., 158, 286, 287, 463, 680
 Ritov, Y., 464
 Robins, J., 539, 665
 Rootzén, H., 105, 106
 Rosenblatt, M., 462, 463, 538
 Rousseau, J., 604
 Roynette, B., 106, 387, 388
 Rufibach, K., 604
 Rufibach, K., 604
- Söhl, J., 604
 Sakhanenko, L., 463
 Salem, R., 102
 Samson, P.M., 287
 Sauer, N., 289
 Schechtman, G., 286
 Schervish, M.J., 604
 Schmidt, E., 26, 102
 Schmidt-Hieber, J., 604
 Schwartz, L., 604
 Seleznev, O., 106
 Sellan, F., 387
 Severini, T.A., 603
 Shannon, C.E., 386
 Shao, Q.-M., 105, 106
 Sheehy, A., 290
 Shelah, S., 289
 Shen, X., 603, 604
 Shepp, L.A., 102, 388
 Sichel, W., 387
 Sidak, Z., 105
 Simon, B., 105
 Slepian, D., 105
 Smirnov, N.V., 13, 537, 538
 Sobolev, S.L., 387

686

Solomjak, M.Z., 289, 387
 Spokoiny, V., 537, 539, 664
 Stefanski, L. A., 464
 Stigler, S.M., 13
 Stolz, W., 106
 Stone, C.J., 538, 681
 Strassen, V., 388
 Strobl, F., 290
 Stute, W., 463
 Sudakov, V.N., 102, 105, 106
 Suslina, I.A., 511, 537, 664
 Szabó, B., 664–666
 Szarek, S.J., 287

Talagrand, M., xi, xiii, 102, 105, 139, 287, 288, 290
 Taqqu, M.S., 387
 Taylor, B.A., 102
 Teh, Y.W., 605
 Tikhomirov, V.M., 289, 387
 Topsoe, F., 603
 Tribouley, K., 665
 Triebel, H., 386, 387
 Tsirelson, B.S., 102, 106
 Tsybakov, A.B., 386, 387, 464, 537, 538, 664, 665

Ulam, S., 102

van de Geer, S., xiii, 289, 538, 603, 665
 van der Vaart, A., xi, xiii, 106, 287–290, 464, 465,
 539, 602–604, 665, 666

Author Index

van Keilegom, I., 538
 van Zanten, J.H., 106, 602, 604, 666
 Vapnik, V.N., 110, 212, 289
 Vial, P., 387
 Vidakovic, B., 464
 Vilenkin, N.Y., 88

Wasserman, L., 604, 665
 Watson, G.S., 13
 Wegkamp, M., 464, 665
 Weiss, G., 387
 Wellner, J., 287–290, 604
 Wolfowitz, J., 169, 604
 Wong, W.H., 603
 Woyczynsky, W., 286
 Wright, F.T., 286

Xia, Y., 666

Yang, G.L., 13
 Young, L.C., 289
 Yukich, J., 464

Zaitsev, A., 463
 Zhang, C.H., 14, 669
 Zhao, L.H., 604
 Zhou, H.H., 14
 Zinn, J., 285–290, 463
 Zygmund, A., 102, 287, 386, 387

Index

- χ^2 concentration inequality, 119
 χ^2 -test, 481
- adaptive
 confidence set, 628
 confidence set, non-existence of, 630, 641
 dishonest confidence set, 640
 estimation, 614
 hypothesis testing, 607
 signal detection, 608
 tests for uniformity, 611
- admissible approximating sequence, 391
 Anderson's Lemma, 51
 approximate identity, 295, 337, 367, 423
 approximation by operators, 336
 approximation in Besov spaces by integral operators, 337
- Banach space valued random variables and sample continuous processes, 17
 Banach-valued Gaussian random variables, 22
 Banach-valued random variable, 17, 122
 Banach-valued random variable, concentration inequalities, 170
 Bayesian credible sets, 601
 Bayesian inference, 570
 Bernstein–von Mises theorem, 591
 finite-dimensional, 592
 in multiscale spaces, 596
 in Sobolev spaces, 594
 Bernstein bracketing numbers, 206
 exponential inequality, 207
 Berry-Esseen theorem, 664
 Besov space, 327
 action of differential operator on, 346
 Donsker properties, 381
 duality, 340
 periodic, 352, 357
 classical definition, 328
 equivalence of definitions, 331
 Littlewood-Paley definition, 330
 low-frequency approximation definition, 329
 of generalised functions, 339
 on \mathbb{R}^d , 366
 wavelet definition, 331, 357, 366
 bootstrap, 270, 271
 bounded p -variation function, 220, 235, 271, 349
 class
 $L^2(P)$ -bracketing covering numbers, 272
 $L^2(P)$ -covering numbers, 272
 uniform Donsker property, 271
 bounded differences (function with), 161
 bounded Lipschitz distance between bounded process, 246
 bounded Lipschitz metric, 2, 246
 bracketing covering numbers, 195
 bracketing expectation bound, 196, 201, 202
 bracketing numbers for the class of p variation functions, 272
 bounded monotone functions, 203
 Brownian bridge, 88, 251, 479
 as generalised function, 379
 Brownian motion, 47, 87
- Cameron-Martin formula, 73, 75, 76
 cancellation properties of wavelets, 315
 canonical U -statistic, 176
 central limit theorem
 in Hilbert spaces, 284
 in the space of continuous functions, 283
 in Banach spaces, 253
 chaining, 41
 class of functions
 P -Donsker, 253
 P -Glivenko-Cantelli, 234
 P -measurable, 235
 P -pregaussian, 251
 uniform Donsker, 265
 uniformly pregaussian, 263
 comparison principle for Rademacher processes, 136
 concentration
 for χ^2 variables, 119
 for empirical processes, 156, 158
 for Gaussian chaos, 119
 for Gaussian processes, 24, 32, 34
 for Rademacher processes, 142, 143
 for self-bounding variables, 164

688

concentration (*cont.*)
 for variables with bounded differences, 162

confidence set
 adaptive, 628
 by extreme value asymptotics, 526
 Kolmogorov-Smirnov type, 524
 via multiscale asymptotics, 535, 646
 via posterior credible sets, 601
 via Rademacher complexities, 527
 via unbiased risk estimation, 530, 650

contraction principles, 127

convergence in law for bounded processes (or in $\ell_\infty(T)$), 243
 portmanteau theorem, 282
 asymptotic equicontinuity condition, 243
 bounded Lipschitz distance condition, 246

convex distance, 139

convolution, 292
 kernel, 220, 389
 bandlimited, 452
 density estimator, 389
 of order S , 399

covariance, 19

covering number, 41

cyclostationary Gaussian process, 106

cylindrical σ -algebra, 16

deconvolution
 kernel density estimator, 453
 wavelet density estimator, 453

Dirichlet kernel, 298

dishonest confidence set, 640

Donsker class, 253

Donsker property
 p -variation balls, 271
 of unions of Donsker classes, 255
 balls in Besov spaces, 381
 bounded Lipschitz balls, 279
 convex hulls, 257

Dudley's theorem, 44

Dudley-Pollard theorem for VC subgraph classes of functions, 218

empirical measure, 40, 109

empirical metric entropy, 184

empirical process, 110
 smoothed, 421

entropy
 of a function with respect to a probability measure, 60
 tensorization, 61
 variational definition, 62

envelope, 186

equivalence of statistical experiments, vii, 8

Fourier series, 297

Fourier transform, 293

Index

Fréchet derivative, 552

Fubini's theorem for outer expectations, 231

full class of functions, 191

functions of bounded p -variation, 349

functions of bounded variation, 349

Gaussian
 chaos, 119
 conjugate prior, 589
 process, 19
 regression model, 4

Gaussian and Poisson randomization, 132

Gaussian likelihood, 468

Gaussian sequence space model, 7, 471

Gaussian white noise model, 6, 469
 definition, 469
 Kullback-Leibler distance between two shift experiments, 476
 likelihood ratio, 470
 sample splitting, 473

generalised functions, 294

generic chaining, 103

Grenander estimator, 563

Hölder space, 350

Haar basis, 298

Hamming distance, 115, 139

Hellinger distance, 542

Hellinger entropy integral, 548

Herbst method, 64, 155

higher order kernels, 302

Hoeffding decomposition, 176, 441

honest confidence set, 523

inequality
 Bennett's, 118
 Bernstein's, 118, 119
 maximal, for expectations, 196
 Borell's, 36
 Borell-Sudakov-Tsirelson, 34
 Brunn-Minkowski, 59
 Dvoretzky-Kiefer-Wolfowitz, 163
 Hanson-Wright's, 120
 Hoeffding's, 114
 Hoffmann-Jørgensen's, 126, 130
 isoperimetric
 Gaussian, 31, 73
 on the sphere, 26
 Khatri-Sidak, 52
 Lévy's maximal, 87, 122
 Lévy-Ottaviani's, 124
 logarithmic-Sobolev, 62
 modified logarithmic-Sobolev, 150
 Pinsker, 474
 Prohorov's, 118
 Talagrand's convex distance, 140

- Talagrand's, lower tail, 158
 Talagrand's, upper tail, 156
 integrability of Gaussian processes, 24, 25, 34
 isonormal process, 19, 379, 469
 isoperimetry, 26
- Jain-Marcus CLT, 283
- Karhunen-Loève expansion, 71
 Khinchin-Kahane inequalities, 143, 144
 Kirschbraun-McShane extension theorem, 227
 Kolmogorov-Smirnov test, 478
 Kolmogorov-distance, 3
 Koltchinskii-Pollard entropy, 186, 263
 expectation bounds, 187–192
 Komlós-Major-Tusnady (KMT) theorem, 411
 Kullback-Leibler divergence, 474
- Lévy's series representation for Brownian motion, 87
 law of large numbers in Banach spaces (Mourier LLN), 241
 Le Cam distance, 9
 Lepski's method, 614
 likelihood function, 546
 derivatives of, 552
 score perturbation, 553
 Littlewood-Paley decomposition, 304
 log-concavity of Gaussian measures, 50
 lower bounds for multiple hypothesis tests, 512
- maximal form of the classical inequalities, 135
 maximal inequality for subgaussian sequences, 121
 maximum likelihood estimator
 asymptotic normality of, 568
 asymptotic normality of, 560
 inconsistency in the Sobolev norm, 557
 nonparametric, 547
 of a monotone density, 563
 over a Sobolev ball, 555
 rates of convergence, 547, 558, 565
 sieved, 550
 uniform consistency, 556
 measurable cover, 192, 195, 230
 measurable envelope, 186, 230
 metric entropy, 41, 372
 of functions of p -variation, 272
 lower bound for Gaussian processes, 57
 modulus of continuity bound for subgaussian process, 44
 of balls in Besov spaces, 374
 of balls in Euclidean space, 373
 of balls in Hölder spaces, 377
 of balls in Sobolev spaces, 377
 upper bounds for subgaussian processes, 41
- minimax
 confidence set, 524
 rate of estimation, 512
 rate of testing, 477
 separation rate, 477
 signal detection problem, 492
 test for uniformity, 485
 testing of composite hypotheses, 506
 multiresolution analysis, 305
- non-existence of adaptive confidence sets, 630, 641
 nonparametric Gaussian regression, 6
 normal means model, 8
- order of a convolution kernel, 425
 outer expectation, 229
 outer probability, 229
 Oxtoby-Ulam theorem, 17
- P -bridge process, 251
 P -Donsker class (conditions for)
 VC -type, VC -hull, 259
 asymptotic equicontinuity criterion, 254
 bracketing, 260
 integrability necessary condition, 254
 Koltchinskii-Pollard entropy, 259
 multipliers (randomized empirical process), 261, 284
 random entropy, 257
 P -motion process, 261
 packing number, 41
 Paley-Zygmund argument, 25, 144
 parametric models, xi
 Parseval's identity, 296
 perfect map, 232, 248
 permanence of the P -Donsker property
 convex hulls, 257
 unions, 255
 permanence properties of VC -classes, 216
 Plancherel's theorem, 293
 plug-in test, 479
 Poincaré's lemma, 30
 pointwise countable approximation property, 266
 Poisson summation formula, 294
 Portmanteau theorem, 282
 posterior contraction rates for Gaussian priors, 578
 posterior distribution, 572
 contraction rate, 573, 576, 577, 584, 586, 588
 Gaussian conjugate model, 589
 in the Gaussian white noise model, 572
 in the i.i.d. sampling model, 572
 Précopa-Leindler theorem, 49
 pregaussian class, 251
 prelinear version (of a P -bridge), 252
 prior distribution, 571
 prior distribution, product, 582

690

projection density estimator, 390
 projection kernel, 297

quadratic forms in normal variables, 120

Rademacher

complexities, 173
 process, 136
 random variable, 37
 randomization, 129, 132
 sequence, 128

randomized empirical process, 40

reproducing kernel Hilbert space (RKHS), 67, 68
 of Brownian bridge, 88
 of Brownian motion, 70
 of released at zero integrated Brownian motion,
 81

sample bounded process, 17

sample continuity of subgaussian processes, 43

sample continuous process, 17

sample splitting, 473

Sauer's lemma, 213

SBC-process, 122

self-bounding random variable, 151, 164

self-similar functions, 644, 648, 657

separable process, 16

Shannon basis, 300

Slepian's lemma, 55

small ball probabilities for Gaussian processes, 78,
 82, 86–88

Sobolev imbedding, 338

Sobolev space, 292, 347, 351

square root trick, 275

stationary Gaussian

process, 91
 sequence, 89, 90

subadditive random variables, 151

exponential bounds, 156

subgaussian random variable, process, 36, 40

symmetrization, 131

Talagrand's convex distance inequality, 140

Talagrand's inequality

lower tail, 158
 upper tail, 156

testing against Hellinger separated alternatives, 545

testing between Hellinger balls, 543

testing lower bound, 478

testing of composite hypotheses, 494

Index

tight, 17

total variation distance, 474

trigonometric basis, 297

Tsybakov, A.B., 604

U -statistic, 175, 441, 484, 501, 530

Ulam's theorem, 17

uniform CLT in finite dimensions, 265

uniform Donsker property, 265

uniform law of large numbers

for VC -type classes, 240

for classes of sets, 240

necessary and sufficient conditions in terms of

empirical entropies, 236, 239

under bracketing conditions, 241

uniform pregaussian property, 263

uniformity class for weak convergence, 600

Vapnik-Červonenkis or VC

-hull, 222, 225

-major, 223

-subgraph, 217

-type, 220

class of sets, 212

law of large numbers, 227

Varshamov-Gilbert bound, 115

wavelet

bandlimited, 316

boundary corrected, 361

Daubechies, 318

density estimator, 220, 390

Meyer, 316

periodised, 353

projection kernel, 313

S -regular, 326

tensor product, 368

thresholding, 622

wavelet projection

density estimator, 220, 390

estimator of a function in white noise, 391

wavelet series, 307

for multivariate functions, 369

for periodic functions on the unit interval, 355

Gaussian, 379, 589

random uniform, 662

with boundary corrected wavelets, 365

white noise process, 19, 379, 469

zero-one law for Gaussian processes, 21