

1. Record Nr.	UNINA9910502638103321
Autore	Gao Zheng
Titolo	Concentration of maxima and fundamental limits in high-dimensional testing and inference / / Zheng Gao, Stilian Stoev
Pubbl/distr/stampa	Cham, Switzerland : , : Springer International Publishing, , [2021] ©2021
ISBN	3-030-80964-1
Descrizione fisica	1 online resource (147 pages)
Collana	Springer Briefs in Probability and Mathematical Statistics
Disciplina	530.474
Soggetti	Phase transformations (Statistical physics) Phase transformations (Statistical physics) - Data processing Màxims i mínims Transformacions de fase (Física estadística) Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Contents -- Acronyms -- 1 Introduction and Guiding Examples -- 1.1 The Additive Error Model -- 1.2 Genome-Wide Association Studies and the Chi-Square Model -- 1.3 Contents -- 2 Risks, Procedures, and Error Models -- 2.1 Statistical Risks -- 2.2 Statistical Procedures -- 2.3 Related Literature and Our Contributions -- 2.4 Relationships Between the Asymptotic Risks -- 2.5 The Asymptotic Generalized Gaussian (AGG) Models -- 2.6 Rapid Variation and Relative Stability -- 2.7 Auxiliary Facts About Gaussian Distributions -- 3 A Panorama of Phase Transitions -- 3.1 Sparse Signal Detection Problems -- 3.2 Sparse Signal Support Recovery Problems -- 3.3 The Exact Support Recovery Problem -- 3.4 The Approximate Support Recovery Problem -- 3.5 Monotonicity of the Benjamini-Hochberg Procedure -- 3.6 The Exact-Approximate Support Recovery Problem -- 3.7 The Approximate-Exact Support Recovery Problem -- 3.8 Asymptotic Power Analysis: A Discussion -- 4 Exact Support Recovery Under Dependence -- 4.1 Generalizations of Distributional and Dependence Assumptions -- 4.2 Sufficient Conditions for Exact Support Recovery -- 4.3 Dependence and Uniform

Relative Stability -- 4.4 Necessary Conditions for Exact Support Recovery -- 4.5 Dense Signals -- 4.6 Numerical Illustrations for Independent Errors -- 5 Bayes and Minimax Optimality -- 5.1 Bayes Optimality in Support Recovery Problems -- 5.2 Bayes Optimality of Oracle Thresholding -- 5.3 Bayes Optimality of Likelihood Ratio Thresholding -- 5.4 Sub-optimality of Data Thresholding Procedures -- 5.5 Minimax Optimality in Exact Support Recovery -- 5.5.1 Point-Wise Minimax Optimality for Thresholding Procedures -- 5.5.2 Minimax Optimality over All Procedures -- 5.6 Optimality and Sub-optimality: A Discussion -- 6 Uniform Relative Stability for Gaussian Arrays. 6.1 Ramsey's Theory and the Structure of Correlation Matrices -- 6.2 URS Implies UDD (Proof of the "Only If" Part of Theorem 6.1) -- 6.3 UDD Implies URS (Proof of the "If" Part of Theorem 6.1) -- 6.3.1 Bounding the Upper Tails of AGG Maxima -- 6.3.2 Bounding the Lower Tails of Gaussian Maxima -- 6.4 Numerical Illustrations of Exact Support Recovery Under Dependence -- 7 Fundamental Statistical Limits in Genome-Wide Association Studies -- 7.1 Support Recovery Problems in Chi-Squared Models -- 7.1.1 The Exact Support Recovery Problem -- 7.1.2 The Exact-Approximate Support Recovery Problem -- 7.1.3 The Approximate Support Recovery Problem -- 7.1.4 The Approximate-Exact Support Recovery Problem -- 7.1.5 Comparison of One- Versus Two-Sided Alternatives in Additive Error Models -- 7.2 Odds Ratios and Statistical Power -- 7.3 Optimal Study Designs and Rare Variants -- 7.4 Phase Transitions in Large-Scale Association Screening Studies -- 7.5 Numerical Illustrations of the Phase Transitions in Chi-Square Models -- 7.5.1 Exact Support Recovery -- 7.5.2 Approximate, and Approximate-Exact Support Recovery -- Appendix A Additional Proofs -- A.1 Auxiliary Facts of Chi-Square Distributions -- A.2 Proof of Theorem 7.1 [eflinkthm:chispssquaredspsexactspboundary7.17](#) -- A.3 Proof of Theorem 7.3 [eflinkthm:chispssquaredspsexactspboundary7.37](#) -- A.4 Proof of Theorems 7.2 [eflinkthm:chispssquaredspsexactspboundary7.27](#) and 7.4 [eflinkthm:chispssquaredspsexactspboundary7.47](#) -- Appendix B Exact Support Recovery in Non AGG Models -- B.1 Strong Classification Boundaries in Other Light-Tailed Error Models -- B.1.1 Additive Error Models with Heavier-Than-AGG Tails -- B.1.2 Additive Error Models with Lighter-Than-AGG Tails -- B.2 Thresholding Procedures Under Heavy-Tailed Errors -- Appendix Bibliography.
