

# Alessandro Rudi

Professor of Practice



**Knowledge Group:** Economics, Politics and Decision Sciences

**Research Domains:** Digital Transformation

**Teaching Domains:**

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## Articles in Scholarly Journals

### **Finding global minima via kernel approximations**

RUDI, A., U. MARTEAU-FEREY, F. BACH, "Finding global minima via kernel approximations", *Mathematical Programming*, 2025, vol. 209, pp. 703-784

### **Approximation of optimization problems with constraints through kernel Sum-of-Squares**

AUBIN-FRANKOWSKI, P.-C., A. RUDI, "Approximation of optimization problems with constraints through kernel Sum-of-Squares", *Optimization*, 2024, pp. 1-26

### **Optimal Estimation of Smooth Transport Maps with Kernel SoS**

VACHER, A., B. MUZELLEC, F. BACH, F.-X. VIALARD, A. RUDI, "Optimal Estimation of Smooth Transport Maps with Kernel SoS", *SIAM Journal on Mathematics of Data Science*, 2024, vol. 6, no. 2, pp. 311-342

### **Second Order Conditions to Decompose Smooth Functions as Sums of Squares**

MARTEAU-FEREY, U., F. BACH, A. RUDI, "Second Order Conditions to Decompose Smooth Functions as Sums of Squares", *Siam Journal on Optimization*, 2024, vol. 34, no. 1, pp. 616-641

### **Exponential Convergence of Sum-of-Squares Hierarchies for Trigonometric Polynomials**

BACH, F., A. RUDI, "Exponential Convergence of Sum-of-Squares Hierarchies for Trigonometric Polynomials", *Siam Journal on Optimization*, 2023, vol. 33, no. 3, pp. 2137-2159

### **Vector-Valued Least-Squares Regression under Output Regularity Assumptions**

BROGAT-MOTTE, L., A. RUDI, C. BROUARD, J. ROUSU, F. D'ALCHÉ-BUC, "Vector-Valued Least-Squares Regression under Output Regularity Assumptions", *Journal of Machine Learning Research*, 2022, vol. 23, no. 344, pp. 1-50

### **A General Framework for Consistent Structured Prediction with Implicit Loss Embeddings**

CILIBERTO, C., A. RUDI, L. ROSASCO, "A General Framework for Consistent Structured Prediction with Implicit Loss Embeddings", *Journal of Machine Learning Research*, 2020, vol. 21, no. 98, pp. 1-67

### **Approximating Hamiltonian dynamics with the Nyström method**

RUDI, A., L. WOSSNIG, C. CILIBERTO, A. ROCCHETTO, M. PONTIL, S. SEVERINI, "Approximating Hamiltonian dynamics with the Nyström method", *Quantum*, 2020, vol. 4, pp. 234

### **Faster Kriging: Facing High-Dimensional Simulators**

LU, X., A. RUDI, E. BORGONOVO, L. ROSASCO, "Faster Kriging: Facing High-Dimensional Simulators", *Operations Research*, 2020, vol. 68, no. 1, pp. 233-249

### **Optimal rates for spectral algorithms with least-squares regression over Hilbert spaces**

LIN, J., A. RUDI, L. ROSASCO, V. CEVHER, "Optimal rates for spectral algorithms with least-squares regression over Hilbert spaces", *Applied and Computational Harmonic Analysis*, 2020, vol. 48, no. 3, pp. 868-890

### **Statistical limits of supervised quantum learning**

CILIBERTO, C., A. ROCCHETTO, A. RUDI, L. WOSSNIG, "Statistical limits of supervised quantum learning", *Physical Review A*, 2020, vol. 102, no. 4

### **Regularized Kernel Algorithms for Support Estimation**

RUDI, A., E. DE VITO, A. VERRI, F. ODONE, "Regularized Kernel Algorithms for Support Estimation", *Frontiers in Applied Mathematics and Statistics*, 2017, vol. 3, pp. 23

### **Geometrical and computational aspects of Spectral Support Estimation for novelty detection**

RUDI, A., F. ODONE, E. DE VITO, "Geometrical and computational aspects of Spectral Support Estimation for novelty detection", *Pattern Recognition Letters*, 2014, vol. 36, pp. 107-116

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## **Proceedings/Presentations**

### **Efficient Sampling of Stochastic Differential Equations with Positive Semi-Definite Models**

RAJ, A., U. SIMSEKLI, A. RUDI, "Efficient Sampling of Stochastic Differential Equations with Positive Semi-Definite Models" in *Advances in Neural Information Processing Systems 36 (NeurIPS 2023) -the Thirty-Seventh Annual Conference on Neural Information Processing Systems - December 10-16, 2023, New Orléans, United States of America*

### **GloptiNets: Scalable Non-Convex Optimization with Certificates**

BEUGNOT, G., J. MAIRAL, A. RUDI, "GloptiNets: Scalable Non-Convex Optimization with Certificates" in *Advances in Neural Information Processing Systems 36 (NeurIPS 2023) -the Thirty-Seventh Annual Conference on Neural Information Processing Systems - December 10-16, 2023, New Orléans, United States of America*

### **Active Labeling: Streaming Stochastic Gradients**

CABANNES, V., F. BACH, V. PERCHET, A. RUDI, "Active Labeling: Streaming Stochastic Gradients" in *NeurIPS 2022 - The Thirty-Sixth Annual Conference on Neural Information Processing Systems, Nov. 28-Dec. 9, 2022, New Orléans, United States of America*

### **Infinite-Dimensional Sums-of-Squares for Optimal Control**

BERTHIER, E., J. CARPENTIER, A. RUDI, F. BACH, "Infinite-Dimensional Sums-of-Squares for Optimal Control" in Proceedings of the 61st IEEE Conference on Decision and Control - Dec. 6-9, 2022, Cancún, Mexico

### **Measuring dissimilarity with diffeomorphism invariance**

CANTELOBRE, T., C. CILIBERTO, A. RUDI, B. GUEDJ, "Measuring dissimilarity with diffeomorphism invariance" in Proceedings of Machine Learning Research, Volume 162: International Conference on Machine Learning, July 17-23, 2022, Baltimore, Maryland, United States of America

### **Non-Convex Optimization with Certificates and Fast Rates Through Kernel Sums of Squares**

WOODWORTH, B., F. BACH, A. RUDI, "Non-Convex Optimization with Certificates and Fast Rates Through Kernel Sums of Squares" in Proceedings of Machine Learning Research, Volume 178: Conference on Learning Theory, July 2-5, 2022, London, Great Britain

### **Nyström Kernel Mean Embeddings**

CHATALIC, A., N. SCHREUDER, L. ROSASCO, A. RUDI, "Nyström Kernel Mean Embeddings" in Proceedings of Machine Learning Research, Volume 162: International Conference on Machine Learning, July 17-23, 2022, Baltimore, Maryland, United States of America

### **On the Benefits of Large Learning Rates for Kernel Methods**

BEUGNOT, G., A. RUDI, J. MAIRAL, "On the Benefits of Large Learning Rates for Kernel Methods" in Proceedings of Machine Learning Research, Volume 178: Conference on Learning Theory, July 2-5, 2022, London, Great Britain

### **On the Consistency of Max-Margin Losses**

NOWAK-VILA, A., A. RUDI, F. BACH, "On the Consistency of Max-Margin Losses" in Proceedings of Machine Learning Research, Volume 151: International Conference on Artificial Intelligence and Statistics, A Virtual Conference - March 28-30, 2022

### **Sampling from Arbitrary Functions via PSD Models**

MARTEAU-FEREY, U., F. BACH, A. RUDI, "Sampling from Arbitrary Functions via PSD Models" in Proceedings of Machine Learning Research, Volume 151: International Conference on Artificial Intelligence and Statistics, A Virtual Conference - March 28-30, 2022

### **A Dimension-free Computational Upper-bound for Smooth Optimal Transport Estimation**

VACHER, A., B. MUZELLEC, A. RUDI, F. BACH, F.-X. VIALARD, "A Dimension-free Computational Upper-bound for Smooth Optimal Transport Estimation" in Proceedings of Machine Learning Research, Volume 134: Conference on Learning Theory, August 15-19, 2021, Boulder, Colorado, United States of America

### **Beyond Tikhonov: faster learning with self-concordant losses, via iterative regularization**

BEUGNOT, G., A. RUDI, J. MAIRAL, "Beyond Tikhonov: faster learning with self-concordant losses, via iterative regularization" in NeurIPS 2021 · Thirty-Fifth Annual Conference on Neural Information Processing Systems, December 6-14, 2021, Virtual Conference

### **Disambiguation of Weak Supervision leading to Exponential Convergence rates**

CABANNES, V., F. BACH, A. RUDI, "Disambiguation of Weak Supervision leading to Exponential Convergence rates" in Proceedings of Machine Learning Research, Volume 139: International Conference on Machine Learning, July 18-24, 2021, Virtual Conference

### **Fast Rates for Structured Prediction**

CABANNES, V., F. BACH, A. RUDI, "Fast Rates for Structured Prediction" in Proceedings of Machine Learning Research, Volume 134: Conference on Learning Theory, August 15-19, 2021, Boulder, Colorado, United States of America

### **Max-margin is dead, long live max-margin!**

NOWAK-VILA, A., A. RUDI, F. BACH, "Max-margin is dead, long live max-margin!" in The Thirty-Eighth International Conference on Machine Learning - July 18-24, 2021, Virtual Conference

### **Mixability made efficient: Fast online multiclass logistic regression**

JÉZÉQUEL, R., P. GAILLARD, A. RUDI, "Mixability made efficient: Fast online multiclass logistic regression" in NeurIPS 2021 · Thirty-Fifth Annual Conference on Neural Information Processing Systems, December 6-14, 2021, Virtual Conference

### **Overcoming the curse of dimensionality with Laplacian regularization in semi-supervised learning**

CABANNES, V., L. PILLAUD-VIVIEN, A. RUDI, F. BACH, "Overcoming the curse of dimensionality with Laplacian regularization in semi-supervised learning" in NeurIPS 2021 · Thirty-Fifth Annual Conference on Neural Information Processing Systems, December 6-14, 2021, Virtual Conference

### **PSD Representations for Effective Probability Models**

RUDI, A., C. CILIBERTO, "PSD Representations for Effective Probability Models" in NeurIPS 2021 · Thirty-Fifth Annual Conference on Neural Information Processing Systems, December 6-14, 2021, Virtual Conference

### **Consistent Structured Prediction with Max-Min Margin Markov Networks**

NOWAK-VILA, A., F. BACH, A. RUDI, "Consistent Structured Prediction with Max-Min Margin Markov Networks" in Proceedings of Machine Learning Research, Volume 119: International Conference on Machine Learning, July 13-18, 2020, Virtual

### **Efficient improper learning for online logistic regression**

JÉZÉQUEL, R., P. GAILLARD, A. RUDI, "Efficient improper learning for online logistic regression" in Proceedings of Machine Learning Research, Volume 125: Conference on Learning Theory, July 9-12, 2020, Online

### **Gain with no Pain: Efficiency of Kernel-PCA by Nyström Sampling**

STERGE, N., B. SRIPERUMBUDUR, L. ROSASCO, A. RUDI, G. STOLTZ, "Gain with no Pain: Efficiency of Kernel-PCA by Nyström Sampling" in Proceedings of Machine Learning Research, Volume 108: International Conference on Artificial Intelligence and Statistics, August 26-28, 2020, Online

### **Kernel Methods Through the Roof: Handling Billions of Points Efficiently**

MEANTI, G., L. CARRATINO, L. ROSASCO, A. RUDI, "Kernel Methods Through the Roof: Handling Billions of Points Efficiently" in NeurIPS 2020 · Thirty-Fourth Annual Conference on Neural Information Processing Systems, Dec. 6-12, 2020, Virtual-Only Conference

### **Non-parametric Models for Non-negative Functions**

MARTEAU-FEREY, U., F. BACH, A. RUDI, "Non-parametric Models for Non-negative Functions" in NeurIPS 2020 · Thirty-Fourth Annual Conference on Neural Information Processing Systems, Dec. 6-12, 2020, Virtual-Only Conference

### **Statistical Estimation of the Poincaré constant and Application to Sampling Multimodal Distributions**

PILLAUD-VIVIEN, L., F. BACH, T. LELIÈVRE, A. RUDI, G. STOLTZ, "Statistical Estimation of the Poincaré constant and Application to Sampling Multimodal Distributions" in Proceedings of Machine Learning Research, Volume 108: International Conference on Artificial Intelligence and Statistics, August 26-28, 2020, Online

### **Structured Prediction with Partial Labelling through the Infimum Loss**

CABANNES, V., A. RUDI, F. BACH, "Structured Prediction with Partial Labelling through the Infimum Loss" in Proceedings of Machine Learning Research, Volume 119: International Conference on Machine Learning, July 13-18, 2020, Virtual

### **Affine Invariant Covariance Estimation for Heavy-Tailed Distributions**

OSTROVSKII, D., A. RUDI, "Affine Invariant Covariance Estimation for Heavy-Tailed Distributions" in Proceedings of Machine Learning Research, Volume 99: Conference on Learning Theory, June 25-28, 2019, Phoenix, United States of America

### **Beyond Least-Squares: Fast Rates for Regularized Empirical Risk Minimization through Self-Concordance**

MARTEAU-FEREY, U., D. OSTROVSKII, A. RUDI, F. BACH, "Beyond Least-Squares: Fast Rates for Regularized Empirical Risk Minimization through Self-Concordance" in Proceedings of Machine Learning Research, Volume 99: Conference on Learning Theory, June 25-28, 2019, Phoenix, United States of America

### **Efficient online learning with kernels for adversarial large scale problems**

JÉZÉQUEL, R., A. RUDI, P. GAILLARD, "Efficient online learning with kernels for adversarial large scale problems" in Advances in Neural Information Processing Systems 32 (NeurIPS 2019), Dec. 8-14, 2019, Vancouver, Canada

### **Globally Convergent Newton Methods for Ill-conditioned Generalized Self-concordant Losses**

MARTEAU-FEREY, U., F. BACH, A. RUDI, "Globally Convergent Newton Methods for Ill-conditioned Generalized Self-concordant Losses" in Advances in Neural Information Processing Systems 32 (NeurIPS 2019), Dec. 8-14, 2019, Vancouver, Canada

### **Localized Structured Prediction**

CILIBERTO, C., F. BACH, A. RUDI, "Localized Structured Prediction" in Advances in Neural Information Processing Systems 32 (NeurIPS 2019), Dec. 8-14, 2019, Vancouver, Canada

### **Massively scalable Sinkhorn distances via the Nyström method**

ALTSCHULER, J., F. BACH, A. RUDI, J. NILES-WEED, "Massively scalable Sinkhorn distances via the Nyström method" in Advances in Neural Information Processing Systems 32 (NeurIPS 2019), Dec. 8-14, 2019, Vancouver, Canada

### **Sharp Analysis of Learning with Discrete Losses**

NOWAK-VILA, A., A. RUDI, F. BACH, "Sharp Analysis of Learning with Discrete Losses" in Proceedings of Machine Learning Research, Volume 89: The 22nd International Conference on Artificial Intelligence and Statistics, April 16-18, 2019, Naha, Okinawa, Japan

### **Differential Properties of Sinkhorn Approximation for Learning with Wasserstein Distance**

LUISE, G., A. RUDI, M. PONTIL, C. CILIBERTO, "Differential Properties of Sinkhorn Approximation for Learning with Wasserstein Distance" in Advances in Neural Information Processing Systems 31 (NeurIPS 2018), Dec. 2-8, 2018, Montréal, Canada

### **Exponential Convergence of Testing Error for Stochastic Gradient Methods**

PILLAUD-VIVIEN, L., A. RUDI, F. BACH, "Exponential Convergence of Testing Error for Stochastic Gradient Methods" in Proceedings of Machine Learning Research, Volume 75: Conference On Learning Theory, July 6-9, 2018, Stockholm, Sweden

### **Learning with SGD and Random Features**

CARRATINO, L., A. RUDI, L. ROSASCO, "Learning with SGD and Random Features" in Advances in Neural Information Processing Systems 31 (NeurIPS 2018), Dec. 2-8, 2018, Montréal, Canada

### **Manifold Structured Prediction**

RUDI, A., C. CILIBERTO, G. MARCONI, L. ROSASCO, "Manifold Structured Prediction" in Advances in Neural Information Processing Systems 31 (NeurIPS 2018), Dec. 2-8, 2018, Montréal, Canada

### **On Fast Leverage Score Sampling and Optimal Learning**

RUDI, A., D. CALANDRIELLO, L. CARRATINO, L. ROSASCO, "On Fast Leverage Score Sampling and Optimal Learning" in Advances in Neural Information Processing Systems 31 (NeurIPS 2018), Dec. 2-8, 2018, Montréal, Canada

### **Statistical Optimality of Stochastic Gradient Descent on Hard Learning Problems through Multiple Passes**

PILLAUD-VIVIEN, L., A. RUDI, F. BACH, "Statistical Optimality of Stochastic Gradient Descent on Hard Learning Problems through Multiple Passes" in Advances in Neural Information Processing Systems 31 (NeurIPS 2018), Dec. 2-8, 2018, Montréal, Canada

### **Consistent Multitask Learning with Nonlinear Output Relations**

CILIBERTO, C., A. RUDI, L. ROSASCO, M. PONTIL, "Consistent Multitask Learning with Nonlinear Output Relations" in Advances in Neural Information Processing Systems 30 (NIPS 2017), Dec. 4-9, 2017, Long Beach, CA, United States of America

### **FALKON: An Optimal Large Scale Kernel Method**

RUDI, A., L. CARRATINO, L. ROSASCO, "FALKON: An Optimal Large Scale Kernel Method" in Advances in Neural Information Processing Systems 30 (NIPS 2017), Dec. 4-9, 2017, Long Beach, CA, United States of America

### **Generalization Properties of Learning with Random Features**

RUDI, A., L. ROSASCO, "Generalization Properties of Learning with Random Features" in Advances in Neural Information Processing Systems 30 (NIPS 2017), Dec. 4-9, 2017, Long Beach, CA, United States of America

### **A Consistent Regularization Approach for Structured Prediction**

CILIBERTO, C., L. ROSASCO, A. RUDI, "A Consistent Regularization Approach for Structured Prediction" in Advances in Neural Information Processing Systems 29 (NIPS 2016), Dec. 5-10, 2016, Barcelona, Spain

### **NYTRO: When Subsampling Meets Early Stopping**

CAMORIANO, R., T. ANGLES, A. RUDI, L. ROSASCO, "NYTRO: When Subsampling Meets Early Stopping" in Proceedings of Machine Learning Research, Volume 51: International Conference on Artificial Intelligence and Statistics, May 9-11, 2016, Cadiz, Spain

### **Less is More: Nyström Computational Regularization**

RUDI, A., R. CAMORIANO, L. ROSASCO, "Less is More: Nyström Computational Regularization" in Advances in Neural Information Processing Systems 28 (NIPS 2015), Dec. 7-10, 2015, Montréal, Canada

### **On the Sample Complexity of Subspace Learning**

RUDI, A., G. D. CANAS, L. ROSASCO, "On the Sample Complexity of Subspace Learning" in Advances in Neural Information Processing Systems 26 (NIPS 2013), Dec. 5-8, 2013, Lake Tahoe, Nevada, United States of America

### **A general method for the point of regard estimation in 3D space**

PIRRI, F., M. PIZZOLI, A. RUDI, "A general method for the point of regard estimation in 3D space" in 2011 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), June 20-25, 2011, Colorado Springs, United States of America