Javad Komijani

Zurich, Switzerland
jkomijani at gmail.com | +41767969992 | LinkedIn | Personal webpage

Professional Summary

Highly analytical and detail-oriented researcher with a strong background in computational and theoretical physics, statistical analysis, and machine learning. Holding an MSc in Electrical Engineering and a PhD in Physics, with extensive experience in numerical simulations and data-driven research. Passionate about applying data science and machine learning techniques to solve complex real-world problems.

Education

- **PhD in Physics**: Washington University in St. Louis, 2015

  Thesis: Topics in Lattice Gauge Theory and Theoretical Physics

  - Development of theoretical models based on effective field theories,
  - Applied Bayesian inference to analyze lattice QCD data,
  - Estimation of parameters of the Standard Model of Particle Physics,
  - Introduction of new concepts in mathematical physics

- **MSc in Electrical Engineering**: University of Tehran, 2009

  Focus: Wave propagation, signal processing, statistical analysis

Technical Skills

- **Programming & Tools**: Python, Cython, C/C++, MATLAB, Mathematica, PyTorch, Pandas, NumPy, SciPy, Scikit-learn
- **Machine Learning & AI**: Generative Models, Diffusion Models, Normalizing Flows
- **Mathematical & Statistical Methods**: Bayesian Inference, Monte Carlo Methods, Statistical Analysis, Optimization
- **Computational Methods**: Numerical Simulations, High-Performance Computing (HPC)

Work & Research Experience

- **Postdoctoral & Senior Postdoctoral Researcher**: ETH Zurich, 2021 – Present

  - Developed and implemented machine learning algorithms for generating lattice field configurations
  - Worked with HPC systems in lattice-QCD simulations
  - Collaborated with international teams on computational and theoretical research projects
  - Supervised and mentored PhD and Master students
  - Participated in teaching Quantum Mechanics at ETH Zurich

- **Postdoctoral Researcher**:
  University of Tehran, 2019 – 2020
  University of Glasgow, 2017 – 2018
  Technical University of Munich, 2015 – 2017

  - Determination of parameters of the Standard Model of Particle Physics, such as the masses of quarks and various decay constants and form factors, by lattice-QCD computations, theoretical modeling, and statistical analysis

Selected Publications & Conference Proceedigs

- J. Komijani, M. K. Marinkovic, "Normalizing flows for SU(N) gauge theories employing singular value decomposition," [arXiv:2501.18288]. InspireHEP
- J. Komijani, M. K. Marinkovic, "Generative models for scalar field theories: how to deal with poor scaling?," [arXiv:2301.01504]. InspireHEP
- J. Komijani, "First-order nonlinear eigenvalue problems involving functions of a general oscillatory behavior," *J. Phys. A: Math. and Theor. 54, 465202 (2021)* [arXiv:2107.02475].
- J. Komijani, P. Petreczky and J. H. Weber, "Strong coupling constant and quark masses from lattice QCD," *Prog. Part. Nucl. Phys. 113, 103788 (2020)* [arXiv:2003.11703].
- C.M. Bender, J. Komijani, Q. Wang, "Nonlinear eigenvalue problems for generalized Painlevé equations," *J. Phys. A: Math. and Theor. 52, 315202 (2019)* [arXiv:1903.10640].
- C.T.H. Davies *et al.*, "Determination of the quark condensate from heavy-light current-current correlators in full lattice QCD," *Phys. Rev. D 100, 034506 (2019)* [arXiv:1811.04305]. InspireHEP
- A. Bazavov *et al.*, "Up-, down-, strange-, charm-, and bottom-quark masses from four-flavor lattice QCD," *Phys. Rev. D 98, 054517 (2018)* [arXiv:1802.04248]. InspireHEP
- A. Bazavov *et al.*, "B- and D-meson leptonic decay constants from four-flavor lattice QCD," *Phys. Rev. D 98, 074512 (2018)* [arXiv:1712.09262]. InspireHEP
- N. Brambilla , J. Komijani, A.S. Kronfeld, A. Vairo, "Relations between Heavy-light Meson and Quark Masses," *Phys. Rev. D 97, 034503 (2018)* [arXiv:1712.04983]. InspireHEP
- J. Komijani, "A discussion on leading renormalon in the pole mass," *JHEP 1708, 062 (2017)* [arXiv:1701.00347]. InspireHEP
- C.M. Bender and J. Komijani, "Painlevé Transcendents and $\mathcal{PT}$-Symmetric Hamiltonians," *J. Phys. A: Math. and Theor. 48, 475202 (2015)* [arXiv:1502.04089].
- A. Bazavov *et al.*, "Charmed and light pseudoscalar meson decay constants from four-flavor lattice QCD with physical light quarks," *Phys. Rev. D 90, 074509 (2014)* [arXiv:1407.3772]. InspireHEP
- C.M. Bender, A. Fring and J. Komijani, "Nonlinear Eigenvalue Problems," *J. Phys. A: Math. and Theor. 47, 235204 (2014)* [arXiv:1401.6161].
- C. Bernard and J. Komijani, "Chiral Perturbation Theory for All-Staggered Heavy-Light Mesons," *Phys. Rev. D 88, 094017 (2013)* [arXiv:1309.4533]. InspireHEP