Govind S. Krishnaswami - Publications (Jan 2025)

A. Theoretical Physics: Quantum Field Theory, Matrix models, Fluids and Plasmas, Nonlinear Dynamics, Integrable Systems and Mathematical Physics

- REFEREED PUBLICATIONS IN JOURNALS

1. *A model of interacting partons for hadronic structure functions*, G. S. Krishnaswami and S. G. Rajeev, Phys. Lett. B **441**, 429 (1998) [arXiv:hep-ph/9807345].

2. *An interacting parton model for quark and anti-quark distributions in the baryon*, V. John, G. S. Krishnaswami and S. G. Rajeev, Phys. Lett. B **487**, 125 (2000) [arXiv:hep-ph/0310027].

3. *Parton model from bi-local solitonic picture of the baryon in two-dimensions*, V. John, G. S. Krishnaswami and S. G. Rajeev, Phys. Lett. B **492**, 63 (2000) [arXiv:hep-th/0310014].

4. *Entropy of operator-valued random variables: A variational principle for large N matrix models*, L. Akant, G. S. Krishnaswami and S. G. Rajeev, Int. J. Mod. Phys. A **17**, 2413 (2002) [arXiv:hep-th/0111263].

5. *Collective potential for large-N Hamiltonian matrix models and free Fisher information*, A. Agarwal, L. Akant, G. S. Krishnaswami and S. G. Rajeev, Int. J. Mod. Phys. A **18**, 917 (2003) [arXiv:hep-th/0207200].

6. $2+1$ *Abelian 'Gauge Theory' Inspired by Ideal Hydrodynamics*, G. S. Krishnaswami, ITP-UU-05/28, SPIN-05/22, Int. J. Mod. Phys. A **21**, 3771-3808 (2006), [arXiv:hep-th/0507283].

7. *Phase transition in matrix model with logarithmic action: Toy-model for gluons in baryons*, G. S. Krishnaswami, ITP-UU-06/02, SPIN-06/02, JHEP **03** (2006) 067, [arXiv:hep-th/0601216].

8. *Multi-matrix loop equations: algebraic & differential structures and an approximation based on deformation quantization*, G. S. Krishnaswami, ITP-UU-06/20, SPIN-06/17, JHEP **08** (2006) 035, [arXiv:hep-th/0606224].

9. *Non-anomalous 'Ward' identities to supplement large-N multi-matrix loop equations for correlations*, L. Akant and G. S. Krishnaswami, ITP-UU-06/49, SPIN-06/39, JHEP **02** (2007) 073, [arXiv:hep-th/0611350].

10. *Schwinger-Dyson operator of Yang-Mills matrix models with ghosts and derivations of the graded shuffle algebra*, G. S. Krishnaswami, ITP-UU-07/43, SPIN-07/31, DCPT-09/93, J. Phys. A: Math. Theor. **41** (2008) 145402; arXiv:0708.3056 [hep-th].

11. *Schwinger-Dyson operators as invariant vector fields on a matrix-model analogue of the group of loops*, G. S. Krishnaswami, DCPT-09/91, J. Math. Phys. **49** 062303, (2008); arXiv:0803.0487 [hep-th].

12. *Possible large-N fixed-points and naturalness for $O(N)$ scalar fields*, G. S. Krishnaswami, DCPT-09/89, J. Phys. A: Math. Theor. **42** (2009) 345403; arXiv:0904.4799 [hep-th].

13. *On lightest baryon and its excitations in large-N $1+1$ dimensional QCD*, G. S. Krishnaswami, DCPT-10/17, J. Phys. A: Math. Theor. **43** (2010) 395401; arXiv:1005.4942 [hep-th].

14. *A KdV-like advection-dispersion equation with some remarkable properties*, A. Sen, D. Ahalpara, A. Thyagaraja and G. S. Krishnaswami; Communications in Nonlinear Science and Numerical Simulation **17**, 11, 4115 (2012), arXiv:1109.3745 [nlin.PS].

15. *Comment on "Spin-Gradient-Driven Light Amplification in a Quantum Plasma"*, G. S. Krishnaswami, R. Nityananda, A. Sen, A. Thyagaraja, Phys. Rev. Lett. **112** 129501 (2014), arXiv:1403.0228 [physics.plasma-ph].

16. *Higgs Mechanism and the Added-Mass Effect*, G. S. Krishnaswami and S. S. Phatak, Proc. R. Soc. A **471**: 20140803, (2015), DOI 10.1098/rspa.2014.0803 arXiv:1407.2689 [hep-th, physics.flu-dyn].

17. *A critique of recent semi-classical spin-half quantum plasma theories*, G. S. Krishnaswami, R. Nityananda, A. Sen, A. Thyagaraja, Contrib. Plasma Phys. **55**, 1, 3–11 (2015) (Invited Paper), DOI: 10.1002/ctpp.201400043, arXiv:1407.6865 [physics.plasma-ph].

18. *Local conservative regularizations of compressible magnetohydrodynamic and neutral flows*, G. S. Krishnaswami, S. Sachdev, A. Thyagaraja, Phys. Plasmas **23** 022308 (2016), DOI: 10.1063/1.4942621, arXiv:1602.04323 [physics.plasma-ph].

19. *Algebra and geometry of Hamilton's quaternions*, G. S. Krishnaswami and S. Sachdev, Resonance, **21**, 6, 529–544 June (2016), DOI:10.1007/s12045-016-0358-9, arXiv:1606.03315 [math.HO].

20. *Curvature and geodesic instabilities in a geometrical approach to the planar three-body problem*, G. S. Krishnaswami and H. Senapati, J. Math. Phys. 57, 102901 (2016) (**Featured Article**), DOI: 10.1063/1.4964340, arXiv:1606.05091 [math-phys].

21. *Conservative regularization of compressible dissipationless two-fluid plasmas*, G. S. Krishnaswami, S. Sachdev, A. Thyagaraja, Phys. Plasmas **25**, 022306 (2018), DOI: 10.1063/1.5016088, arXiv:1711.05236 [physics.plasm-ph].

22. *On the Hamiltonian formulation, integrability and algebraic structures of the Rajeev-Ranken model*, G. S. Krishnaswami and T. R. Vishnu, J. Phys. Commun. **3**, 025005 (2019), DOI: 10.1088/2399-6528/ab02a9; arXiv:1804.02859 [hep-th].

23. *Stability and chaos in the classical three rotor problem*, G. S. Krishnaswami and H. Senapati, Indian Academy of Sciences Conference Series **2**(1), 139 (2019), DOI:10.29195/iascs.02.01.0020; arXiv:1810.01317 [nlin-CD].

24. *An Introduction to the Classical Three-Body Problem: From Periodic Solutions to Instabilities and Chaos*, G. S. Krishnaswami and H. Senapati, Resonance, **24**, 1, 87–114 January (2019), DOI:10.1007/s12045-019-0760-1; arXiv:1901.07289 [nlin-CD].

25. *Invariant tori, action-angle variables, and phase space structure of the Rajeev-Ranken model*, G. S. Krishnaswami and T. R. Vishnu, J. Math. Phys. **60**, 082902 (2019), DOI: 10.1063/1.5114668; arXiv:1906.03141 [nlin.SI].

26. *Classical three rotor problem: periodic solutions, stability and chaos*, G. S. Krishnaswami and H. Senapati, Chaos **29**(12), 123121 (2019) [**Editor's Pick**]; DOI: 10.1063/1.5110032; arXiv:1811.05807v2 [nlin-CD].

27. *Nonlinear dispersive regularization of inviscid gas dynamics*, G. S. Krishnaswami, S. S. Phatak, S. Sachdev and A. Thyagaraja, AIP Advances, **10**(2) 025303 (2020), DOI: 10.1063/1.5133720; arXiv:1910.07836 [physics.flu-dyn].

28. *The Added Mass Effect and the Higgs Mechanism: How accelerated bodies and elementary particles can gain inertia*, G. S. Krishnaswami and S. S. Phatak, Resonance, **25**(2), 191 (2020), DOI: 10.1007/s12045-020-0936-8; https://rdcu.be/b2Whl; arXiv:2005.04620 [physics.flu-dyn,hep-ph].

29. *Ergodicity, mixing and recurrence in the three rotor problem*, G. S. Krishnaswami and H. Senapati, Chaos **30**(4), 043112 (2020) [**Editor's Pick**]; DOI: 10.1063/1.5141067; arXiv:1910.04455 [nlin-CD].

30. *The idea of a Lax pair - Part I: Conserved quantities for a dynamical system*, G. S. Krishnaswami and T. R. Vishnu, Resonance **25**(12), 1705-1720 (2020); https://rdcu.be/ccQnD; DOI: 10.1007/s12045-020-1091-y.

31. *The idea of a Lax pair - Part II: Continuum wave equations*, G. S. Krishnaswami and T. R. Vishnu, Resonance **26**(2), 257-274 (2021); DOI: 10.1007/s12045-021-1124-1.

32. *Quantum Rajeev-Ranken model as an anharmonic oscillator*, G. S. Krishnaswami and T. R. Vishnu, J. Math. Phys. **63**, 032101 (2022), DOI: 10.1063/5.0079269; arXiv:2111.03858 [math-ph].

33. *Bifurcation cascade, self-similarity and duality in the 3-rotor problem*, G. S. Krishnaswami and A. Yadav, Chaos **33**, 083101 (2023); DOI: 10.1063/5.0160496; arXiv:2303.01057 [nlin.CD].

34. *Screwon spectral statistics and dispersion relation in the quantum Rajeev-Ranken model*, G. S. Krishnaswami and T. R. Vishnu, Physica D **463**, 134170 (2024); DOI: 10.1016/j.physd.2024.134170; arXiv:2312.13122 [nlin.SI].

35. *Quantum three-rotor problem in the identity representation*, G. S. Krishnaswami and H. Senapati, Phys. Rev. E **111**, 014221 (2025); DOI: 10.1103/PhysRevE.111.014221, arXiv:2407.15482 [nlin.CD].

- THESES

1. *A model of interacting partons for hadronic structure functions*, G. S. Krishnaswami, Undergraduate Thesis, University of Rochester 1999 [arXiv:hep-ph/9911538]. Received 1999 Apker Award of the American Physical Society.

2. *Large-N Limit as a Classical Limit: Baryon in Two-dimensional QCD and Multi-Matrix Models*, G. S. Krishnaswami, PhD Thesis, U. Rochester 2004 [arXiv:hep-th/0409279].

- PREPRINTS AND UNPUBLISHED ARTICLES

1. *The x dependence of parton distributions compared with neutrino data*, G.S. Krishnaswami and S.G. Rajeev, [arXiv:hep-ph/9908279].

2. *The anti-quark distribution function of the baryon*, V. John, G.S. Krishnaswami and S.G. Rajeev, [arXiv:hep-ph/9908285].

3. *Variational ansatz for gaussian + Yang-Mills two matrix model compared with Monte-Carlo simulations in 't Hooft limit*, G. S. Krishnaswami, [arXiv:hep-th/0310110].

4. *Inhomogeneous vortex lattices: core structure, nucleation and dissipation*, L. Baksmaty, G. S. Krishnaswami, S. Woo, S. Choi, N. Bigelow (2004). Also as Abstract L4.005, 35th Meeting of the APS Division of Atomic, Molecular and Optical Physics (DAMOP04), Tuscon, AZ, May 25-29, (2004).

5. *Naturalness via scale invariance and non-trivial UV fixed points in a $4d$ $O(N)$ scalar field model in the large-N limit*, G. S. Krishnaswami, ITP-UU-07/3, SPIN-07/3, [arXiv:hep-th/0701102].

6. *A critique of recent theories of spin half quantum plasmas*, G. S. Krishnaswami, R. Nityananda, A. Sen, A. Thyagaraja (2013), arXiv:1306.1774 [physics.plasma-ph].

7. *Conservative regularization of compressible flow and ideal magnetohydrodynamics*, G. S. Krishnaswami, S. Sachdev, A. Thyagaraja, arXiv:1510.01606v2 [physics.flu-dyn] (12 Nov, 2016).

8. *An introduction to Lax pairs and the zero curvature representation*, G. S. Krishnaswami and T. R. Vishnu, arXiv:2004.05791 [nlin.SI] (13 Apr, 2020).

9. *Level crossing instabilities in inviscid isothermal compressible Couette flow*, G. S. Krishnaswami, S. Sachdev and P. Sinha, arXiv:2412.20813 [physics.flu-dyn] (30 Dec 2024).

B. Experimental Physics

E1 *Precision calibration of the NuTeV calorimeter*, D. A. Harris *et al.* [NuTeV Collaboration], Nucl. Instrum. Meth. A **447**, 377 (2000) [arXiv:hep-ex/9908056].

E2 *Studies of the response of the prototype CMS hadron calorimeter, including magnetic field effects, to pion, electron, and muon beams*, V. V. Abramov *et al.* [CMS-HCAL Collaboration], Nucl. Instrum. Meth. A **457**, 75 (2001) [arXiv:hep-ex/0007045].

C. Mathematics

M1 *The distribution of inverses modulo a prime in short intervals*, S. M. Gonek, G. S. Krishnaswami and V. L. Sondhi, Acta Arith. **102**, no. 4, 315 (2002), DOI: 10.4064/aa102-4-3.

D. Miscellaneous

1. *Editorial*, G. S. Krishnaswami, Resonance, **21**, 6, 489 June (2016), DOI:10.1007/s12045-016-0354-0.

E. PhD Theses supervised

1. Sonakshi Sachdev, *Conservative regularization of neutral fluids and plasmas*, July 2020, arXiv:2007.14086 [physics.flu-dyn].

2. Himalaya Senapati, *Instabilities and chaos in the classical three-body and three-rotor problems*, July 2020, arXiv:2008.02670 [nlin.CD].

3. Sachin Phatak, *Field theoretic viewpoints on certain fluid mechanical phenomena*, Oct 2020, arXiv:2010.04921 [physics.flu-dyn].

4. T R Vishnu, *Integrability and dynamics of the Rajeev-Ranken model*, Sept 2021, arXiv:2109.12579 [math-ph].