

Govind S. Krishnaswami - Publications (December 2023)

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](https://arxiv.org/abs/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](https://doi.org/10.1098/rspa.2014.0803) [arXiv:1407.2689](https://arxiv.org/abs/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](https://doi.org/10.1002/ctpp.201400043), [arXiv:1407.6865](https://arxiv.org/abs/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](https://doi.org/10.1063/1.4942621), [arXiv:1602.04323](https://arxiv.org/abs/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](https://doi.org/10.1007/s12045-016-0358-9), [arXiv:1606.03315](https://arxiv.org/abs/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](https://doi.org/10.1063/1.4964340), [arXiv:1606.05091](https://arxiv.org/abs/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](https://doi.org/10.1063/1.5016088), [arXiv:1711.05236](https://arxiv.org/abs/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](https://doi.org/10.1088/2399-6528/ab02a9); [arXiv:1804.02859](https://arxiv.org/abs/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](https://doi.org/10.29195/iascs.02.01.0020); [arXiv:1810.01317](https://arxiv.org/abs/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](https://doi.org/10.1007/s12045-019-0760-1); [arXiv:1901.07289](https://arxiv.org/abs/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](https://doi.org/10.1063/1.5114668); [arXiv:1906.03141](https://arxiv.org/abs/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](https://doi.org/10.1063/1.5110032); [arXiv:1811.05807v2](https://arxiv.org/abs/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](https://doi.org/10.1063/1.5133720); [arXiv:1910.07836](https://arxiv.org/abs/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://doi.org/10.1007/s12045-020-0936-8); <https://rdcu.be/b2Whl>; [arXiv:2005.04620](https://arxiv.org/abs/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](https://doi.org/10.1063/1.5141067); [arXiv:1910.04455](https://arxiv.org/abs/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1063/5.0079269); [arXiv:2111.03858](https://arxiv.org/abs/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](https://doi.org/10.1063/5.0160496); [arXiv:2303.01057](https://arxiv.org/abs/2303.01057) [nlin.CD].
- PREPRINTS UNDER REVIEW
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 - THESES
 1. *A model of interacting partons for hadronic structure functions*, G. S. Krishnaswami, Undergraduate Thesis, University of Rochester 1999 [[arXiv:hep-ph/9911538](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://arxiv.org/abs/1306.1774) [physics.plasma-ph].

7. *Conservative regularization of compressible flow and ideal magnetohydrodynamics*, G. S. Krishnaswami, S. Sachdev, A. Thyagaraja, [arXiv:1510.01606v2](https://arxiv.org/abs/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](https://arxiv.org/abs/2004.05791) [nlin.SI] (13 Apr, 2020).

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](https://arxiv.org/abs/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](https://arxiv.org/abs/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](https://doi.org/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](https://doi.org/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](https://arxiv.org/abs/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](https://arxiv.org/abs/2008.02670) [nlin.CD].
3. Sachin Phatak, *Field theoretic viewpoints on certain fluid mechanical phenomena*, Oct 2020, [arXiv:2010.04921](https://arxiv.org/abs/2010.04921) [physics.flu-dyn].
4. T R Vishnu, *Integrability and dynamics of the Rajeev-Ranken model*, Sept 2021, [arXiv:2109.12579](https://arxiv.org/abs/2109.12579) [math-ph].