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Dr. Girish Kumar

CONTACT INFORMATION

Jones PSC, Room 702C
Department of Physics and Astronomy
University of South Carolina
Columbia, SC 29208, USA

Email: girish89@sc.edu
Web: girishky.github.io

EDUCATION

Ph.D. in Theoretical Particle Physics **Aug 2011 - Sept 2016**
Physical Research Laboratory, Ahmedabad, India
Degree awarded by Indian Institute of Technology Gandhinagar, India in **Aug 2017**
Thesis Title : *Decays of Hadrons as Probes of the Standard Model and Beyond*
Advisor : Prof. Namit Mahajan

Master Of Science in Physics **2009 - 2011**
University of Delhi, Delhi, India

Bachelor Of Science in Physics **2006 - 2009**
University of Delhi, Delhi, India

PROFESSIONAL EXPERIENCE

University of South Carolina, Columbia, SC, USA
Postdoctoral Fellow **Sept 2023 - present**

National Taiwan University, Taipei, Taiwan
Postdoctoral Fellow **Sept 2019 - 2023**

Tata Institute of Fundamental Research, Mumbai, India
Visiting Fellow **Sept 2017 - August 2019**

Physical Research Laboratory, Ahmedabad, India
Postdoctoral fellow **Sept 2016 - Aug 2017**

RESEARCH INTEREST

Flavor physics, Semileptonic B-decays, Rare kaon decays, Hadronic τ decays, lepton flavor violation, Effective field theories, Electric and magnetic dipole moments, Leptoquark models, Supersymmetric theories, Extended Higgs models

PROFESSIONAL ACTIVITIES

Local Organizing Committee, "Cosmology Frontier in Particle Physics: Astroparticle Physics and Early Universe" at National Taiwan University, October 2021.

Organizer, Particle Physics Journal Club (Fall 2022 and Spring 2021), Department of Physics, National Taiwan University, Taiwan.

Coordinator, Pheno Journal Club (Nov 2017– Sept 2018), Department of Theoretical Physics, Tata Institute of Fundamental Research, India.

PUBLICATIONS

Articles in Refereed Journals

1. W.-S. Hou, **G. Kumar** and S. Teunissen, "Discovery Prospects for Electron and Neutron Electric Dipole Moments in the General Two Higgs Doublet Model," [arXiv: 2308.04841 [hep-ph]] (*accepted in PRD as Letter*)
2. W.-S. Hou, **G. Kumar** and T. Modak, "Probing Baryogenesis with Radiative Beauty Decay and Electron EDM," [arXiv: 2302.08847 [hep-ph]] (*accepted in PRD as Letter*)
3. **G. Kumar**, "Interplay of the charged Higgs effects in $R_{D^{(*)}}$, $b \to s\ell^+\ell^-$ and W-mass," Phys. Rev. D **107**, 075016 (2023) [arXiv: 2212.07233 [hep-ph]]
4. D. Das, J. Das, **G. Kumar** and N. Sahoo, "$\Lambda_b \to \Lambda(\to p\pi^-)\ell^+\ell^-$ as probe of CP-violating New Physics," Phys. Rev. D **108**, 015001 (2023) [arXiv: 2211.09065 [hep-ph]]
5. W.-S. Hou, **G. Kumar** and S. Teunissen, "Enhanced $B_q \to \ell\ell'$ and $B \to (K, \pi)\ell\ell'$ in light of $(g-2)_\mu$," [arXiv: 2209.02086 [hep-ph]] (*accepted for publication in Phys. Rev. D*)
6. W.-S. Hou, **G. Kumar**, "Strange processes in general two Higgs doublet model," JHEP **10**, 129 (2022) [arXiv: 2207.07030 [hep-ph]]
7. W.-S. Hou, **G. Kumar** and S. Teunissen, "Charged lepton EDM with extra Yukawa couplings," JHEP **01**, 092 (2022) [arXiv: 2109.08936 [hep-ph]]
8. W.-S. Hou, and **G. Kumar**, "Charged lepton flavor violation in light of Muon $g-2$," Eur. Phys. J. C 81, 1132 (2021) [arXiv: 2107.14114 [hep-ph]]
9. W.-S. Hou, R. Jain C. Kao, **G. Kumar** and T. Modak, "Collider prospects for muon $g-2$ in general two Higgs doublet model," Phys. Rev. D **104**, 075036 (2021) [arXiv: 2105.11315 [hep-ph]]
10. W.-S. Hou and **G. Kumar**, "Muon flavor violation in two Higgs doublet model with extra Yukawa couplings," Phys. Rev. D **102**, 115017 (2020) [arXiv: 2008.08469 [hep-ph]]
11. W.-S. Hou and **G. Kumar**, "Coming decade of $h \to \tau\mu$ and $\tau \to \mu\gamma$ interplay in τ flavor violation search," Phys. Rev. D **101**, no.9, 095017 (2020) [arXiv: 2003.03827 [hep-ph]]
12. D. Das, B. Kindra, **G. Kumar** and N. Mahajan, "$B \to K_2^*(1430)\ell^+\ell^-$ distributions at large recoil in the Standard Model and beyond," Phys. Rev. D **99**, no.9, 093012 (2019) [arXiv: 1812.11803 [hep-ph]]
13. C. Hati, **G. Kumar**, J. Orloff and A.M. Teixeira, "Reconciling B-decay anomalies with neutrino masses, dark matter and constraints from flavour violation," JHEP 1811, 011 (2018) [arXiv: 1806.10146 [hep-ph]]
14. D. Das, C. Hati, **G. Kumar** and N. Mahajan, "Scrutinizing R-parity violating interactions in light of $R_{K^{(*)}}$ data," Phys. Rev. D **96**, 095033 (2017) [arXiv: 1705.09188 [hep-ph]]
15. D. Das, C. Hati, **G. Kumar** and N. Mahajan, "Towards a unified explanation of $R_{D^{(*)}}$, R_K and $(g-2)_\mu$ anomalies in a left-right model with leptoquarks," Phys. Rev. D **94**, 055034 (2016) [arXiv: 1605.06313 [hep-ph]]
16. **G. Kumar**, "Constraints on a scalar leptoquark from the kaon sector," Phys. Rev. D **94**, no. 1, 014022 (2016) [arXiv: 1603.00346 [hep-ph]]

17. C. Hati, **G. Kumar** and N. Mahajan, "$\bar{B} \to D^{(*)}\tau\bar{\nu}$ excesses in ALRSM constrained from B, D decays and $D^0 - \bar{D}^0$ mixing," JHEP **1601**, 117 (2016) [arXiv: 1511.03290 [hep-ph]]
18. **G. Kumar** and N. Mahajan, "$B \to K^*\ell^+\ell^-$: Zeroes of angular observables as test of standard model," Phys. Rev. D **93**, no. 5, 054041 (2016) [arXiv: 1412.2955 [hep-ph]]

Preprints on arXiv/under Review

19. A. Dighe, S. Ghosh, **G. Kumar** and T.S. Roy, "Tensors for tending to tensions in τ decays," [arXiv: 1902.09561 [hep-ph]]
20. **G. Kumar** and N. Mahajan, "Asymmetries and observables for $\Lambda_b \to \Lambda\ell^+\ell^-$," [arXiv: 1511.00935 [hep-ph]]

Articles in Conference Proceedings

21. **G. Kumar**, "Kaon Processes in general 2HDM," J. Phys. Conf. Ser. **2446**, 012005 (2023) [arXiv: 2211.02276 [hep-ph]]
22. **G. Kumar**, C. Hati, J. Orloff and A.M. Teixeira, "Reconciling B-meson anomalies, neutrino masses and dark matter," Springer Proc.Phys. 234 (2019) 417-423 [arXiv: 1811.10927[hep-ph]]
23. **G. Kumar**, D. Das, C. Hati and N. Mahajan, "Explaining $R_{D^{(*)}}$, R_K and $(g-2)_\mu$ in E_6 motivated left-right model,", Springer Proc. Phys. 203 (2018) 373-375

SELECTED TALKS

- **Minimal charged Higgs interpretation of B-physics anomalies and W-mass shift**
  Invited talk at National Tsing Hua University, Dec 08, 2022, Hsinchu, Taiwan.
- **Strange Processes in General 2HDM**
  International Conference on Kaon Physics (KAON2022), September 13 - 16, 2022, Osaka University, Osaka, Japan.
- **Charged Lepton Flavor Violation in the General Two Higgs Doublet Model**
  XIV International Conference on Interconnections between Particle Physics and Cosmology (PPC 2021), Norman, Oklahoma, May 2021 (online).
- **Minimal New Physics Explanation for Anomalies in Hadronic Tau Decays**
  Intensity Frontier in Particle Physics: Flavor, CP Violation and Dark Physics, October 3 - 6, 2019, National Taiwan University, Taipei, and National Center for Theoretical Sciences, Hsinchu, Taiwan.
- **Minimal New Physics Explanation of Anomalies in Hadronic Tau Decays**
  ANOMALIES 2019 (INDO-US workshop), July 17-20, 2019, Indian Institute of Technology, Hyderabad, India.
- **Connecting B decay anomalies with neutrino mass, dark matter and flavor violation**
  16th Conference on Flavor Physics and CP Violation (FPCP), July 14 -18, 2018, IIT Hyderabad and University of Hyderabad, Hyderabad, India

- **Resolution of R_K and R_{K^*} via R-Parity Violating Interactions**
  Mass2018: Origin of Mass at the High Energy and Intensity Frontier, May 28 - June 1, 2018, Centre for Cosmology and Particle Physics Phenomenology (CP^3-Origins), Odense, Denmark
- **Explanation of $b \to s\mu^+\mu^-$ Anomalies in RPV Framework**
  Blueprints Beyond the Standard Model , January 5 - 8, 2018, Tata Institute of Fundamental Research, Mumbai, India
- **Role of Kaon Physics in Search of New Physics**
  Workshop on High Energy Physics and Phenomenology (WHEPP XV), December 14 - 23, 2017, Indian Institute of Science Education and Research, Bhopal, India
- **Resolving R_K and R_{K^*} Anomalies via R-Parity Violating Interactions**
  25th International Conference on Supersymmetry and the Unification of Fundamental Interactions (SUSY17), December 11 - 15, 2017, Tata Institute of Fundamental Research, Mumbai, India
- **Explaining $R_{D^{(*)}}$, R_K and $(g-2)_\mu$ Anomalies in a Left-Right Model with Leptoquarks**
  XXII DAE-BRNS **High Energy Physics Symposium**, 12 - 16 December, 2016, University of Delhi, Delhi, India
- **Asymmetries in the Angular Distribution of Rare Decay $\Lambda_b \to \Lambda\ (\to N\pi)\ell^+\ell^-$**
  Area Seminar, July 16, 2015, THEPH, Physical Research Laboratory (PRL), Ahmedabad, India
- **Correlations among $B \to K^*\ell\ell$ Observables (Zeroes) as Probes of New Physics**
  XXI DAE-BRNS High Energy Physics Symposium, December 8 - 12, 2014, Indian Institute Technology (IIT), Guwahati, India

REFERENCES

- **Professor Namit Mahajan** (PhD Advisor) [email: nmahajan@prl.res.in]
  Physical Research Laboratory, Ahmedabad, India
- **Professor Alexey A. Petrov** [email: apetrov@sc.edu]
  University of South Carolina, Columbia, SC, USA
- **Professor George Wei-Shu Hou** [email: wshou@phys.ntu.edu.tw]
  National Taiwan University, Taipei, Taiwan
- **Professor Amol S. Dighe** [email: amol@theory.tifr.res.in]
  Tata Institute of Fundamental Research, Mumbai, India
- **Professor Tuhin S. Roy** [email: tuhin@theory.tifr.res.in]
  Tata Institute of Fundamental Research, Mumbai, India