

Rikab Gambhir

Curriculum Vitae

224 Albany Street
Apt. 387
Cambridge, MA
USA - 02139
☎ +1 7323062441
✉ rikab@mit.edu

Education

2020 - **PhD (Expected)**, *Physics*, Massachusetts Institute of Technology, MA, USA.
Present

2016-2020 **Bachelor of Science**, *Majors in Physics, Applied Science, and Mathematics*, Rutgers University Honors College - New Brunswick, New Jersey, USA.
GPA : 4.00/4.00, Graduated with Highest Honors

Thesis A Search for Fully Hadronic Final State Vector-Like Quark Pair Production in 13TeV pp Collisions using CMS Data

Publications and Preprints

2020 **A search for bottom-type, vector-like quark pair production in a fully hadronic final state in proton-proton collisions at $\sqrt{s} = 13$ TeV**, *CMS Collaboration*, arXiv:2008.09835.
Submitted to Physical Review D

Honors & Scholastic Achievements

2020 **Weidner Award**.
Prize awarded by the Rutgers Physics Department for academic performance

2019 **Barry Goldwater Scholar**.
Selected by the Barry Goldwater Scholarship and Excellence in Education Foundation and the Department of National Defense Education Program for research

2019 **Mary Wheeler Wigner Memorial Scholarship**.
Scholarship awarded by the Rutgers Physics Department for academic performance

2018 **Herman Y. Carr Scholarship**.
Scholarship awarded by the Rutgers Physics Department for academic performance

2018 **Kuhl Memorial Engineering Scholarship**.
Scholarship awarded by the Rutgers Engineering Department for academic performance, leadership, and service

2017 **Aresty Summer Science Fellowship**.
Fellowship awarded to rising sophomores for conducting research over the summer

2016 **Rutgers Trustee Scholars Grant**.
Scholarship awarded to members of the Rutgers Honors College

2020 Graduated Rutgers University with Highest Honors

2016-2020 Ranked 1/992 in the Rutgers School of Engineering each semester

2016-2020 Achieved the Rutgers School of Engineering Deans List each semester

Research Projects

Title **Search for Bottom-Like VLQ Pair Production in the Fully Hadronic Mode**
Supervisor Prof. Stephen Schnetzer, Rutgers University - New Brunswick, NJ
Duration April 2018 - August 2020

Description We search for the production of a pair of bottom-type, vector-like quarks (VLQ's) each decaying into a b quark and either a Higgs or a Z boson using data from 13 TeV center-of-mass proton-proton collisions recorded by the CMS Experiment, and significantly extend previous exclusion limits.

CMS Note B2G-19-005

Title **Modeling 2D Flows using the Discrete Vortex Method**

Supervisor Prof. Mitsunori Denda, Rutgers University - New Brunswick, NJ

Duration May 2017 - April 2018

Description We implement Discrete Vortex Method for turbulent fluid flow in the analysis of the 2D motion of an oscillating wing, and show that the method is capable of reproducing industry-grade accuracy in a fraction of the time.

Talks

19 April 2020 **A Search for Fully Hadronic Final State Vector-Like Quark Pair Production in 13 TeV pp Collisions using CMS Data.**

APS April 2020, 19 April 2020, Washington D.C

29 July 2019 **A Search for Fully Hadronic Final State Vector-Like Quark Pair Production in 13 TeV pp Collisions using CMS Data.**

2019 Meeting of the Division of Particles & Fields of the American Physical Society, 29 Jul-2 Aug 2019, Boston, MA

4 August **How Can We Model Insect Flight Quickly and Accurately?.**

2017 Rutgers Summer Aresty Symposium, 4 Aug 2017, New Brunswick, NJ

Extra-Curriculars

2016 - 2020 **Director of the Rutgers Machine Learning & AI Club.**

I gave weekly lectures on deep learning topics, ranging from basic statistics to advanced network architectures, and led students in building and designing their own neural network projects

2017 - 2019 **American Institute of Aeronautics and Astronautics.**

I worked on a machine-learning based computer vision system for an unmanned aircraft to identify targets on the ground as part of the AUVSI SUAS competition.

Technical skills

Programming C++, Python, Java, Android, Bash, \LaTeX , Qiskit

Data Mathematica, Matlab, ROOT, Keras, Pytorch, Tensorflow, Numpy, Scipy, CMSSW

Analysis

Machine Learning Implementation & Design of CNN's, RNN's, GAN's, Bayesian Networks, Autoencoders, Neural ODE's, Deep Set Networks

Relevant Advanced Coursework

Graduate Quantum Mechanics, General Relativity, Applied Group Theory, Quantum Field Theory, Particle Physics

Undergraduate Quantum Computing, Abstract Algebra, Differential Geometry, Modern Physics Lab, Real & Complex Analysis, Electrodynamics, Classical Mechanics, Thermal Physics