GAUTHAM KUMAR JAYAKUMAR - CV

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EDUCATION

M.Sc. Physics—Vellore Institute of Technology, Chennai **August 2020 - July 2022**
University Gold Medal (Summa cum laude) - CGPA: 9.91/10

B.S. Physics—University of California, Davis **September 2014 - June 2019**

TECHNICAL/COMMUNICATION SKILL SET

Programming/Markup

Proficient: : Python2/3 (Matplotlib, numpy, scipy, pandas,pyplot), ROOT@Cern, MATLAB, LaTex, Tensor Flow, Linux, CalcHEP, MicrOMEGAS, PYTHIA, Mathematica, Excel
Familiar: R, HTML, SQL, JavaScript, Geant, C++, Excel VBA

Languages Fluent in English, Tamil, Japanese, and conversational in Hindi.

AWARDS/FELLOWSHIPS

University Gold Medal (Summa Cum Laude) - Masters of Science, Physics **August 2022**
School of Advanced Sciences, Vellore Institute of Technology

CSIR-UGC JRF: Junior Research Fellowship for Physical Sciences **May 2022 - Apr 2027**
Council of Scientific & Industrial Research and University Grants Commission of India

CSIR-UGC AP: Lectureship/Asst. Professorship for Physical Sciences **May 2022 - Lifetime**
Council of Scientific & Industrial Research and University Grants Commission of India

Dean's List Cash Award - For Highest Rank Holder in the University **AY 2021**
School of Advanced Sciences, Vellore Institute of Technology

Dean's List Cash Award - For Highest Rank Holder in the University **AY 2022**
School of Advanced Sciences, Vellore Institute of Technology

Best Paper/Talk :
"Gravitational Waves from Cosmological Phase Transitions" **June 2021**
National Science Engineering & Technology Conference(NCSET-20)— Vellore Institute of Technology, Chennai

SUMMER SCHOOLS/CERTIFICATE COURSES

Virtual School on Flavor Structure of Standard Model (Hep-Pheno school) **September 2021**
Indian Institute of Sciences & IIT-Kanpur (school link: **HEP-Pheno***)*

Summer School on Particle Physics (smr 3560) **June 2021**
The Abdus Salam International Centre for Theoretical Physics (school link: **smr 3560***)*

USPAS Accelerator Physics Fundamentals **July 2020**
University of California, Davis—Taught by Prof. Eric Prebys

RESEARCH EXPERIENCE

Centre for High Energy Physics **January 2022 - September 2022**
Indian Institute of Sciences, Bangalore—Advised by Prof. Ranjan Laha

- Working on using sub-PeV diffuse gamma rays as a probe for heavy dark matter for Masters Thesis
- Developed equation/method for calculating the Prompt photon flux of high energy gamma rays occurring from Dark Matter Decayv from a sky-section of the Milkyway Galaxy.
- Used the new Tibet-ASγ survey readings along with develpoed method to set better stringent limits on Dark matter lifetimes for Pev Mass scales (Very Heavy Dark Matter)
- Successfully Presented and Defended Thesis.
- Currently working on fine tuning the limits by digitizing astronomical background models.
- Currently working on Analysing current datasets and available literature to set a previous combined limit on heavy dark matter lifetimes
- Notes/Codes/Thesis at `https://github.com/Hamiltonianronin/VHDM-Thesis`

School of Advanced Sciences **September 2020 - January 2022**
Vellore Institute of Technology, Chennai—Advised by Prof. Ayon Patra

- Reviewed available literature and techniques in BSM model building (THDM,LRSM..etc) for Dark Matter/ Early Universe cosmology etc and probing them with gravitational wave backgrounds arising from cosmological phase transitions.
- Worked on probing extended Left-Right Symmetric Models (LRSM) with singlet scalar dark matter and generating gravitational waves at electroweak and higher Left-Right symmetry breaking scales.
- Theoretically resolved the scalar sector of the model under the phase transition to calculate relevant gravitational wave signal parameters and signal strength.
- Currently working on calculating thermal masses to better refine the One loop finite-temperature effective potential with higher order daisy terms.
- Attempting to fit necessary asymmetry parameters for Electro Weak baryogenesis via leptogenesis along with required Dark Matter relic density within these same models.
- Notes/Codes at `https://github.com/Hamiltonianronin/SGWB_Ayon`.

Centre for Quantum Mathematics and Physics **April 2019 - January 2020**
University of California, Davis—Advised by Prof. Markus Luty

- Worked with Markus on developing new re-normalization coding package for improvements on 2-D ϕ^4 Scalar Field Theories.
- Worked on using Tensor Flow machine learning processes to develop and optimise Hamiltonian Truncation techniques.
- Worked on generating truncated Hilbert spaces for 2-D ϕ^4 Scalar Field Theories to successfully test the Fock Space Truncation computational method.

Undergraduate Research **January 2018 - June 2018**
University of California, Davis—Advised by Prof. Michael Mulhearn.

- Modelled fields of real-valued High tension capacitors used in high-speed triggers for event selection in Particle colliders.

RSI-Summer Research Fellowship **March 2014 - May 2014**
Indian Institute of Technology-Madras—Advised by Dr.Rajesh Narayana

- Simulated Ising spin states of Ferro Magnetic to Para-Magnetic transitions in solids using Statistical Monte-Carlo methods. - Gave talk on findings.

Link to **Github Repository**

TALKS AND CONFERENCES

National Science Engineering & Technology Conference—NCSET-21 **Jan 2022**
Vellore Institute of Technology

- Talk: "Dark Matter - Beyond the WIMP miracle".

National Science Engineering & Technology Conference—NCSET-20 **June 2021**
Vellore Institute of Technology, Chennai

- Talk: "Gravitational Waves from Cosmological Phase Transitions".

National Science Engineering & Technology Conference—NCSET-19 **December 2020**
Vellore Institute of Technology, Chennai

- Talk: "Taming the Particle Zoo - Group Theories in Particle Physics", December 2020.

String Math 2020 - Cern **July 2020**
University of StellenBosch/Cape Town, Virtual

2nd INDO-KOREA Virtual Conference—DAMFT-2021 **May 2021**
Virtual - VIT, Chennai

- Conference on the Development of Advanced Materials for Future Technologies

Talk slides and other relevant material found at:

`https://github.com/Hamiltonianronin/talks-and-other-papers-`

WORK/TEACHING EXPERIENCE

Chegg Inc **Nov'23 - present**
Advanced Physics Expert

- Working as a Chegg Expert to aid/tutor students in understanding and solving advanced physics problems/concepts at the graduate and undergraduate level.

Deloitte India - Executive Analyst **September 2022 - present**
Consulting - Core Business Operations (Operations Transformations): Economic Development and Urban Transformations

- Functional consultant with a Southern State Industrial Investment Promotion Agency in aiding their Ease of Doing Business Efforts.
  - Acted as intermediary between multiple line departments and System Integrator to prepare functional specification documents for the System Integrator in order to aid in the digitalisation of departmental services.
  - Helped department in User Acceptance Testing of said services post development and facilitated any further changes if required.

  - Developed survey questionnaires and subsequent empirical/statistical scoring methodology to aid in ranking of over 160 services on state single window portal
  - Contributed to Business Process Re-Engineering or services and Policy development pertaining to the same.
  - Aided in implementation of Business Reform Action Plan (BRAP) reforms and subsequent evidence submission.
  - Contributed to a State-wide Industrial Incentives Impact Report
- Aided a Northern State's Industrial Development Agency in project monitoring via maintenance and development of a Power BI Dashboard.
- Co-Authored a Deloitte white paper in collaboration with FICCI titled 'Accelerating Tamil Nadu's Progress to becoming a One Trillion Dollar Economy by 2030-31'
- Contributed to Deloitte White paper in collaboration with Asian Development Bank, for G20 titled 'Enhancing MSME Participation in Global Value Chains'
- Contributed to firm Business development ventures by networking with prospective clients, generating leads and preparing business proposals.

SurgTest **Apr'22 - June'22**

Freelance Consultant

- Worked on a contract basis as a consultant to help improve pricing policies and content delivery for the Medical Ed-tech company Surgtest.
- Extensively Analysed competitor price points to help pinpoint weakness in current course packages offered.
- Analysed trends in sales with regard to proximity of the NEET super speciality exams to zone in on which time periods will benefit from price drops and aggressive outreach policies.
- Tested the Surgtest app to query log required improvements and bug fixes in design flaws.
- Looked at usage rates to ascertain which type of content media is consumed better at different time periods of test preparations i.e, 3 months before exam, one week before exam etc.

Executive Member - Student Council **Nov' 21-July' 22**

School of Advanced Sciences—Vellore Institute of Technology, Chennai

- Currently part of VIT student council as the Physics Masters Program Representative
- Worked closely with the Student Welfare Council to update academic calendar, hostel policies after monitoring and gauging student productivity through the academic semester.
- Analysed student feedback in the physics masters program and compared with current research trends, upcoming jrf projects of national labs to propose new changes to program curriculum and policy.
- Changes have been accepted at the campus level, waiting on approval from central VIT board to execute said changes in all four VIT-Campuses.

AJ Tutoring **Sep'19 - Mar'20**

Academic and Test-Prep Tutor

- Worked as a Private tutor on a one to one client interaction basis.
- Maintained log of all client data, tracked score improvements, conceptual weak points etc,. to provide data driven feedback and build tutoring curriculum to better aid all 35 clients under purview.
- Taught Physics, and Math for all AP levels and Sat Subjects
- Guided multiple students to 800's in Sat subjects, 1400+ in SATs, and 4 above in AP Physics and Calculus.

Physics Club **Apr'15 - Apr'19**
University of California, Davis

- Worked as tutor with the physics dept. student club.
- Taught and helped students for all lower level undergrad physics and math courses along with some advanced undergraduate courses as well.
- Typical responsibilities included, doubt clarification, homework help and re-teaching/further elucidation of missed or misunderstood concepts.

Akilan Institute **Jan'17 - Jan'18**
NTSE, KVPY and JEE Foundation

- Worked as faculty for scholarship exam prep.(NTSE / KVPY), and JEE foundation summer courses.
- Typically involved small focused groups and a completely pedagogical teaching system.
- Entire batch of students qualified for NTSE second rounds and KVPY second round.

Campus Recreation Unions—Sports Official **September 2018 - March 2019**
University of California, Davis

- Officiated games for CRU at UC Davis in it's Competitive sports division.(Basketball Volleyball)
- Also was involved in developing new systems for three man refereeing and updating Intra-mural sport policy, pricings, rulebook, and referee training to better officiate games.

PSBB Sr.Secondary School—Consultant **July 2018 - September 2018**
Chennai, India

- Worked with my alma matter's team to design space-settlement on MATLAB and write technical paper for NASA ISSDC. Team took National title, and finished among the top at the international rounds
- Parallely, also taught Physics for CBSE class 11 and class 12.

Libre Texts Project—Content Creator **October 2015 - December 2016**
University of California, Davis(remote)

- Created wiki notes and developed the entire online library for the UC Davis PHY7 series.
- Developed new format for Online wiki that allowed better end- user readability and facilitated overall understanding of relevant Physics and mathematical concepts.

ModelUN at UC Davis—Tech Operations **April 2015 - January 2017**
University of California, Davis(remote)

- Hosted multiple conferences and won delegation awards at various MUN conferences in the collegiate circuit.(Berkeley, Univ. of Chicago etc.)
- Developed a functional financial model for AggieMUN conference on excel and Python.

ARTICLES/PUBLICATIONS/THESIS

Towards one trillion:
Accelerating Tamil Nadu's progress to become a trillion-dollar economy **April 2023**
with Akshay Natteri Mangadu, Joseph Thomas, and Kartik Agarwal

- Deloitte White paper in collaboration with Federation of Indian Chambers of Commerce & Industry

Probing Dark Matter through Cosmic Gamma Rays **June 2021**
Masters Thesis - Unpublished

EXTRA CURRICULAR ACTIVITES AND OTHER WORK EXPERIENCES

Culinary Arts
Davis, California

- Trained under chefs from Le Cordon Bleu and had Stagiare at Osteria Fasulo, an haute cuisine restaurant in Davis.**(June'17 - Sep'17)**

Basketball
Various Places

- Coached three summers in India at YMCA-Nandanam. Developed training menu's for a select group of individuals who later competed at the National level.**(June'16-June'18)**
- Participant of the U-19 Indian National Basketball team training camp.**(June'15)**
- Three time intramural basketball tournament winner at UC Davis.
- Part of club basketball and played as part of the UC Davis, NCAA Division 1 collegiate basketball practice squad.**(Jan'16 - Dec'18)**

Music
Davis, California

- Worked as an article writer for reporting Classical, Jazz and Rock music performances delivered at Mondavi Centre and Ann.E.Pitzer Centre.**(Sep'17-Dec'17)**
- Former manager and member of the Davis based Indie-Folk and blue grass band, Tempora.**(Jan'16-June'16)**