Jonas Tjepkema

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EDUCATION

MAASTRICHT UNIVERSITY
Bachelor's of Science, in Physics and Mathematics
Expected January 2022 | Cum. GPA: 8.1 | Cum Laude

COURSEWORK

PHYSICS
Classical Mechanics, Vibrations and Waves, Optics, Electromagnetism, Relativistic Electrodynamics, Statistical Thermodynamics, Quantum Mechanics, Nuclear and Elementary Particle Physics, Special Relativity, General Relativity

MATHEMATICS
Single and Multivariable Calculus, Signal Processing (Fourier and wavelet transforms, PCA, etc...), Linear Algebra, Probability and Statistics, Ordinary and Partial Differential Equations, Advanced Mathematical Tools for Physics (Integral Transforms, Green's Functions and Special PDE Solutions, Variational Calculus, etc...), Fundamentals of Tensor Calculus

PRACTICALS
Physics Lab I, II and III, Advanced Electronics, Image and Signal Processing, Analysis of Big Data in Physics

COMPUTER SKILLS

Python • C and some C++ (including Microcontroller programming)• PyROOT • Matlab • TensorFlow • Electronics • Robotics • Web Dev (HTML, CSS, Javascript) • LaTeX •Fusion360 •Full time Linux User

Explore my GitHub: Jonastjep

AWARDS

Maastricht University, Science for society competition - First Prize - for the Flui.Go Micro-Biochip group project.

INTERESTS

Books, climbing, skateboard, climate activism and board games among other things, including everything mentioned in this CV.

RESEARCH

GWFP (PARTICLE PHYSICS) | Maastricht University
Member of the LHCb (CERN) collaboration and Nikhef
Sept. 2019 – Feb. 2021 | Maastricht, The Netherlands

- Worked with **Dr. Jacco de Vries** and **Dr. Chris Pawley** on baryonic decay in the context of my Honours Programme. The research was on the production ratio of the Λ_c^+ and Ξ_c^+ baryons through the $pK^-\pi^+$ decay mode.
- Data clean-up (secondary decay and noise removal); Data fitting (estimation of number of produced baryons); Monte-Carlo collision simulation production; Analysis of efficiencies for particle identifications, selections and triggers; Dalitz plots for resonant structures; Estimation of yield ratios.
- Analysis done using PyROOT, CERNs powerful framework for data processing. The code for the project is open and can be found here.

GWFP (GRAVITATIONAL WAVES) | Maastricht University
Member of the Virgo collaboration and Nikhef
Sept. 2021 – Jan. 2022 | Maastricht, The Netherlands

- Worked with **Dr. Gideon Koekoek** and **Dr. Sarah Caudill** to investigate the use of quantum computing as a tool for improving the computational power of gravitational wave data analysis. The project was made in collaboration with Utrecht University, IBM and the Eindhoven University of Technology.
- Research into converting matched filtering from a classical algorithm to a quantum version using Grover's algorithm.
- Creating a quantum circuit for the algorithm and implementing it in Qiskit (see here). Testing the results on real data and making complexity analyses of the algorithm and different circuit transpilations.

A FEW PROJECTS

AUTONOMOUS EXTRATERRESTRIAL ROVER PROTOTYPE
Student-lead (by me) Project

- Improvements of 3D printable rover design: RF communication; live video (visible, near IR and thermal) and data-logging and serving (GPS, acceleration, temperature, pressure, altitude, humidity) using a Flask server; LiDAR mapping (ROS, SLAM); CAD modeling (robotic arm, solar panel mount, collection tray, etc...). See more on the interactive report.

SAT. TELECOMMUNICATION AND CUBESAT PROTOTYPING
Student-lead (by me) Project

- Construction of V-dipole and turnstile antennas for satellite (NOAA and Meteor) RF reception; SDR usage; Noise reduction; Signal protocols and decoding; Image transmission through SSTV; Weather satellite data and image analysis; CAD. More can be found in the project report.

PYDEPTH PROJECT: BINOCULAR COMPUTER DEPTH VISION
Student-lead (by others) Project

- Project aimed at teaching depth perception to a computer by using deep Convolutional Neural Networks (CNN) and stereo-cameras; Implementation of disparity maps (using parallax shifts) and dual input CNNs.
- Project done using PyTorch and a RaspberryPi, with planned implementation onto an exploration drone. More information can be found here.

OBSTACLE AVOIDANCE USING GENETIC AI
Extracurricular Personal Project

- Creation of a simulated vehicle and obstacle terrain in Python, JavaScript and Processing; Implementation of genetic AI, specifically the NEAT approach (NeuroEvolution of Augmented Topologies) and optimisation of parameters.
- Experience the AI training process, or control the simulation here.

Please note that the PDF version of this CV contains many clickable links in-text for more information (e.g. names, course descriptions, code, etc...) if interested.