# Irwin Tay

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Personal Website
Moosach, Munich, Germany

## Education

**Ludwig Maximilian University of Munich** — Munich, Germany
*Masters in Astrophysics* — *Oct. 2023 – Now*

**National University of Singapore** — Singapore
*Bachelor of Science in Physics (Honours), Minor in Medical Physics, Specialisation in Astrophysics* — *Aug. 2019 – June 2023*

**Anglo-Chinese Junior College** — Singapore
*GCE A-Level, A for both H2 Physics and H2 Mathematics* — *Jan. 2015 – Dec. 2016*

## Experience

**Master's Thesis with Machine Learning Application** — Feb. 2025 – Now
*Max Planck Institute For Astrophysics* — *Munich, Germany*

- Applied statistical (Bayesian) and machine learning techniques to classify sources of gravitational wave signals from LISA data with the supervision of Dr. Valeriya Korol.
- Evaluated various supervised learning models including k-NN, SVM, Random Forest, XGBoost, NGBoost, and neural networks for classification performance.
- Employed Bayesian classification methods to enhance model interpretability and probabilistic understanding.
- Conducted hyperparameter tuning using Bayesian optimisation to improve model performance and generalisation.

**Data Scientist Werkstudent** — Oct. 2024 – Now
*Orbem GmbH* — *Munich, Germany*

- Utilized ClearML for training and evaluation of 3D image models aimed at business-oriented applications.
- Ensured high data quality by performing data preprocessing, cleaning, and validation tasks for accurate model performance.
- Collaborated with cross-functional teams to understand business requirements and translate them into machine learning solutions.
- Developed and optimized data pipelines to automate model training and deployment workflows.

**AI/MRI Scientist Werkstudent** — Oct. 2023 – Oct. 2024
*Orbem GmbH* — *Munich, Germany*

- Developed a simulation working pipeline with KomaMRI to produce simulated MRI images and obtained promising classification results for Sexing
- Worked on 3D object detection with nnDetection to potentially replace the pipeline of using YOLOX in 2D image detection
- Data formatting as well as data analysis using industry standard machine learning workflow - ClearML

**Machine Learning Student Researcher** — Feb. 2024 – Aug 2024.
*Ludwig Maximilian University of Munich* — *Munich, Germany*

- Researching on optimisation of neural network hyperparameters by introducing new mathematical framework and testing it empirically
- Built a basic SBI pipeline using eROSITA simulated data for parameter estimation
- Implementing new novel models and neural network working pipeline into the field of Physics particularly Cosmology, with the potential aim of generalising

**Bachelor's Thesis with Machine Learning Application** — Aug. 2022 – June 2023
*National University of Singapore* — *Singapore*

- Conducted research on gravitational wave analysis using machine learning techniques with LISA data under A/Prof Alvin Chua
- Testing various analysing techniques such as interpolation and poly-fitting
- By using blackhole perturbation theory, successfully modelled a trivial case of gravitational waveforms, through the use of deep neural network, interpolation and polynomial fitting, produced by a special binary system.
- Familiarization of Python Package FastEMRIWaveforms (FEW) for EMRI waveform coding.

**Tutor** Apr. 2019 – Dec. 2022

*Happy Tutors Learning Centre* *Singapore*

- Physics and Mathematics tutor who taught from Secondary to Junior College level
- Successfully helped students improve their grades and helping them to enter the top Junior College in Singapore

**3rd Sergeant (3SG)** Jan. 2017 – Jan. 2019

*Republic of Singapore Air Force (RSAF)* *Singapore*

- Served in the 505SQN of Air Civil Engineering Squadron
- Served as the Guard of Honour for the Air Force contingent in the 2018 National Day Parade for Singapore's 53rd birthday

**Student Researcher** Dec. 2015 – July 2016

*Agency for Science, Technology and Research (A*STAR)* *Singapore*

- Cultivated Swift programming language via Xcode to develop a prototype of the application
- Presented research findings at the 2016 AHFE conference in Florida, USA

## Certificate

**Learn C++ Programming -Beginner to Advance- Deep Dive in C++** | udemy Sept 2023

**CS50AI: CS50's Introduction to Artificial Intelligence with Python** | edX July 2022

**Decentralised Finance (DeFi) Infrastructure** | Coursera June 2022

**Introduction to Data Science in Python** | Coursera June 2022

**Introduction to Structured Query Language (SQL)** | Coursera May 2022

## Achievement

**Boon Lay Community Service Book Prize 2020** | People's Association 2020

**A*STAR Science Award (Junior College)** | A*STAR 2015

**Bronze Award** | Singapore Mathematical Olympiad (Senior Section) 2013

**Honourable Mention** | Singapore Mathematical Olympiad (Junior Section) 2012

## Publication

Tay, Irwin and Swee Lan See (2017). "Adaptive UI for Enhanced Music Experience". In: *Advances in Affective and Pleasurable Design*. Ed. by WonJoon Chung and Cliff Sungsoo Shin. Cham: Springer International Publishing, pp. 105–115. ISBN: 978-3-319-41661-8. URL: https://doi.org/10.1007/978-3-319-41661-8_11.

## Technical Skills

**Languages**:Python, Julia, LaTeX, SQL (MAMP), Swift, Markdown, Lua, C++, HTML, CSS
**Developer Tools**: Git, Gitlab, VS Code, Vim, NeoVim, Jupyter Notebook
**Industry Tools**: ClearML, Redbrick, Atlassian
**Softwares**: Mathematica, Matlab, Maple, Origin, SRIM & TRIM, Paravision
**Libraries**: pandas, NumPy, Matplotlib, Tensorflow, Keras, FEW, Scipy, scikit-learn, pytorch and more
**Astrophysics**: MCMC, RNG, Monte Carlo Sampling, N-Body Simulation, Bayesian Inference, SBI

## Volunteering & Co-Curricular Activities

**Singapore Students' Association of Germany (SSAG) Vice President** Apr 2024 – May 2025

**Boon Lay Community Service (Meet the People Session)** Jan. 2020 – Dec. 2020

**NUS Physics Society Event's Vice Director** 2022 – 2023

**NUS Physics Society Marketing Director** 2019 –2020