Songnan QI
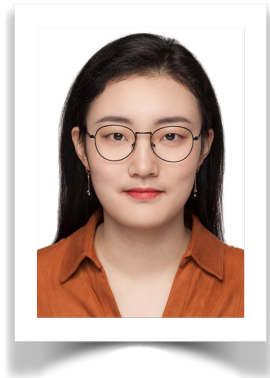
Birthdate : 09.19.1997
Address : Rue du Prieuré 15,
         Geneva 1202, Switzerland
Telephone : +41 78 633 91 09
E-mail : qisongnan@outlook.com

Education

2024 - 2026	Graduate student majoring in **Astrophysics** at the University of Geneva
2020 - 2024	**Bachelor's degree in Physics** at the University of Geneva (GPA : 5.35/6)
2015 - 2019	Double bachelor's degree in Economic and Social Administration at the Sino-French Institute of Renmin University of China and Paul-Valéry Montpellier III University in France (GPA : 3.72/4)

Projects & Research Experience

Evection resonance in the hierarchical restricted 3-body problem   09.2024 - 12.2024
Under the supervision of Dr. Jérémy COUTURIER and Prof. Adrien LELEU
- Simplified the Hamiltonian of the massless particle in a hierarchical restricted problem to an one-degree-of-freedom, autonomous, single-parameter and dimensionless one ;
- Searched for the theoretical evection resonance by analysing the bifurcations of the phase space topology ;
- Simulated the Sun-Earth-Moon system and the exoplanetary system of TOI-6303 b to confirm the existence of evection resonance with the N-body software NcorpiON

MCMC algorithm application: Estimating the mass of exoplanets   10.2024 - 12.2024
As part of the course 'Astrophysics & Data Science'
- Computed the maximum likelihood estimates of the physical parameters of a planet ;
- Coded the Metropolis-Hastings algorithm ;
- Computed the posterior distributions of the orbital parameters of a planet and the interval estimates of its mass

Neural Network from scratch   10.2024 - 12.2024
As part of the course 'Astrophysics & Data Science'
- Implemented all the functions needed to create a neural network without using any package besides numpy and matplotlib.pyplot ;
- Trained the network with two datasets: a 2-class problem and a 3-class problem
- Adjusted the number of neurons per hidden layer and the number of hidden layers to optimise the accuracy of the classification

Population synthesis of wind-fed BH-HMXBs   11.2023 - 03.2024
Under the supervision of Ph.D candidate Zepei XING and Prof. Marc AUDARD
- Simulated 500000 binaries by using the binary population synthesis code POSYDON ;
- Selected wind-fed high-mass X-ray binaries with a black hole (BH-HMXBs) among the generated dataset ;
- Analysed the main features of the binary population that evolved into wind-fed BH-HMXBs and compared them with observational data ;
- Studied the impact of metallicity on the simulation outcome

Honors & Awards

Outstanding Undergraduate Graduates of Suzhou ;
Institute-level outstanding student cadres at Renmin University of China

Skills

Language Proficiency
- **Mandarin** : Native
- **English** : Advanced Level
- **French** : Advanced Level
- **German** : Beginner Level

Computer Literacy
Python, LaTex, Matlab, Word, PowerPoint, Excel, Photoshop

Extra-curricular Activities

Leisure activities : Reading, writing, sports (badminton, swimming, climbing, equitation)
Journey abroad : France, USA, Finland, Norway etc.