

# SIU LUN CHAU, DPHIL

**Postdoctoral Researcher at CISPA Helmholtz  
Center for Information Security**

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## RESEARCH INTERESTS

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My research focuses on **Uncertainty** and **Explainability** in machine learning, studying ways to model uncertainty, incorporate them to improve learning, and develop techniques for explaining algorithms and learning through explanations.

## EDUCATION

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**DPhil in Statistical Science** | St.Peter's College, University of Oxford 📅 2018 – 2023

Supervisor: Prof. Dino Sejdinovic, Prof. Mihai Cucuringu, and Prof. Xiaowen Dong.

- Thesis: *"Towards Trustworthy Machine Learning with Kernels"*
- Published 8 papers with 6 first authored. Selected research contributions include:
  - (Bayesian Kernel methods) Proposed Bayesian Conditional Mean embeddings, Causal Bayesian Conditional Mean Embeddings, and Deconditional Gaussian processes to model uncertainty while learning distributional representations in the RKHS. This resulted in 2 first authored NeurIPS publications.
  - (Explainable Kernel methods) Proposed the first kernel methods specific SHAP-based explanation framework RKHS-SHAP; Extended RKHS-SHAP to model non-parametric preference model and proposed PREF-SHAP. This resulted in 2 first authored NeurIPS publications.

**MMATH in Mathematics and Statistics** | Lady Margaret Hall, University of Oxford 📅 2014 – 2018

Supervisor: Prof. Mihaela Van Der Shaar, Prof. Geoff Nicolls

- First Class Honors, ranked 2<sup>nd</sup> in 4<sup>th</sup> year and 1<sup>st</sup> in 3<sup>rd</sup> year.

## WORK EXPERIENCES

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**Postdoctoral Researcher** | CISPA Helmholtz Center for Information Security, Germany 📅 Sep.2023 – Present

Supervisor: Dr. Krikamol Muandet

- Conducted research and supervised students on topics related to uncertainty modelling and explainability:
  - (Uncertainty) Proposed a collaborative and explainable Bayesian optimisation framework (accepted for AIS-TATS 2024); Developed an imprecise learning framework for OOD generalisation that allows the model operator to specify their generalisation strategy at test time.
  - (Explainability) Developed the first Gaussian process specific SHAP-based explanation framework (accepted for NeurIPS 2023 as spotlight); Studied the strategic behaviour of utility-maximising agents when exposed to model explanations under the causal strategic learning framework (accepted for AAAI 2024 as Oral).

**Research Assistant** | CISPA Helmholtz Center for Information Security, Germany 📅 Mar.2023 – Aug.2023

- Completed my DPhil thesis while helping PhD students from the Rational Intelligence Lab with their research.

**Data Scientist** | Ravio (HR Tech Startup), London UK 📅 Dec.2022 – Mar.2023

Project: *Job title alignment using LLMs, Compensation modelling*

- Utilised pre-trained language models to align heterogeneous job titles across companies for standardisation.
- Developed a tree-based quantile regression with monotonic constraints to model compensations.

**Applied Scientist II Intern** | Amazon, London UK 📅 Jun – Dec.2022

Project: *Coherent Multi-granularity Forecasting for the Amazon Transportation Service Outbound Network*

- Developed deep probabilistic coherent demand forecasting models for the EU transportation network. Solutions developed in and deployed into production-ready AWS infrastructure.

**Research Intern** | Max Planck Institute of Intelligent System, Tübingen Germany 📅 Oct.2021 – June.2022

Project: *Interface between Machine Learning and Economics (Supervised by Dr. Krikamol Muandet)*






- Researched relaxing restrictive assumptions in Instrumental variable regression and examined potential non-parametric hypothesis testing framework for regression discontinuity designs.

**Machine Learning Consultant** | Catalyst AI, Cambridge UK 📅 Apr.2019 – Oct.2020

- Worked closely with SDEs to develop forecasting models for clients from fashion tech and agricultural companies.

## RESEARCH FUNDING AND AWARDS

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- [AAAI 2024 Oral paper](#)  Feb.2024
- [NeurIPS 2023 Spotlight paper](#)  Dec.2023
- [Helmholtz Association Postdoc funding](#)  Sep.2023
- [EPSRC and MRC Studentship for DPhil in Statistics and Machine Learning](#)  2018
- [Department Prize for FHS Mathematics and Statistics Part B \(Top of the year\)](#)  2017

## PUBLICATIONS











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- [14. Domain Generalisation via Imprecise Learning](#) | Submitted  
Anurag Singh, **Siu Lun Chau**, Shahine Bouabid, Krikamol Muandet
- [13. Collaborative and Explainable Bayesian Optimisation](#) | AISTATS 2024    
Masaki Adachi, Brady Planden, David A. Howey, Krikamol Muandet, Michael A. Osborne, **Siu Lun Chau**
- [12. Causal Strategic Learning with Competitive Selection](#) | AAAI 2024 (Oral)    
Kiet Vo, Muneeb Aadil, **Siu Lun Chau**, Krikamol Muandet
- [11. Stochastic Shapley values for Gaussian Process Models](#) | NeurIPS 2023 (Spotlight, top 3%)    
**Siu Lun Chau**, Krikamol Muandet, Dino Sejdinovic
- [10. Gated Domain Units for multi-source domain generalisation](#) | TMLR 2023    
Simon Föll<sup>†</sup>, Alina Dubatovka<sup>†</sup>, Eugen Ernst\*, **Siu Lun Chau\***, Martin Maritsch, Patrik Okanovic, Gudrun Thäter, Joachim M. Buhmann, Felix Wortmann, Krikamol Muandet
- [9. Towards Trustworthy Machine Learning with Kernels](#) | DPhil Thesis   
**Siu Lun Chau**
- [8. Giga-scale Kernel Matrix-Vector Multiplication on GPU](#) | NeurIPS 2022    
Robert Hu, **Siu Lun Chau**, Dino Sejdinovic, Joan Alexis Glaunès
- [7. Explaining Preference with Shapley Values](#) | NeurIPS 2022    
**Siu Lun Chau\***, Robert Hu\*, Jaime Ferrando Huertas, Dino Sejdinovic
- [6. RKHS-SHAP: Shapley Value for Kernel Methods](#) | NeurIPS 2022    
**Siu Lun Chau**, Robert Hu, Javier Gonzalez, Dino Sejdinovic
- [5. Spectral Ranking with Covariates](#) | ECML PKDD 2022    
**Siu Lun Chau**, Mihai Cucuringu, Dino Sejdinovic
- [4. Learning Inconsistent Preference with Gaussian Processes](#) | AISTATS 2022   
**Siu Lun Chau**, Javier Gonzalez, Dino Sejdinovic
- [3. BayesIMP: Uncertainty Quantification for Causal Data Fusion](#) | NeurIPS 2021   
**Siu Lun Chau\***, Jean Francois Ton\*, Yee Whye Teh, Javier Gonzalez, Dino Sejdinovic
- [2. Deconditional Downscaling with Gaussian Processes](#) | NeurIPS 2021    
**Siu Lun Chau\***, Shahine Bouabid\*, Dino Sejdinovic
- [1. Kernel-Based Graph Learning From Smooth Signals: A Functional Viewpoint](#) | IEEE 2020   
Xingyue Pu, **Siu Lun Chau**, Xiaowen Dong, Dino Sejdinovic

## INVITED TALKS

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- [“Stochastic Shapley values for Gaussian process models”](#) | Australian Data Science Network 2023  Dec.2023
- [“Stochastic Shapley values for Gaussian process models”](#) | Australian National University  Nov.2023
- [“Collaborative and Explainable Bayesian Optimisation”](#) | Data 61 CSIRO Melbourne  Nov.2023
- [“Collaborative and Explainable Bayesian Optimisation”](#) | University of Melbourne  Nov.2023
- [“Stochastic Shapley values for Gaussian process models”](#) | Australian Institute for Machine Learning  Nov.2023
- [“Stochastic Shapley values for Gaussian process models”](#) | ETH Zurich  Sep.2023

- “Stochastic Shapley values for Gaussian process models” | ETH AI Center  Sep.2023
- “Stochastic Shapley values for Gaussian process models” | Oxford-Man Institute  Sep.2023
- “Explaining kernel methods and preference models with RKHS-SHAP” | CISPA  Feb.2023
- “Spectral Ranking with Covariates” | ECML PKDD 2022  Sep.2022
- “Explainability for Kernel Methods” | ELISE Theory Workshop on ML Fundamentals  Sep.2022
- “Deconditional Gaussian Processes” | S-DCE Alan Turing Institute seminar  Jun.2022
- “Explaining Kernel methods with RKHS-SHAP” | UCL Gatsby Unit  Apr.2022
- “Deconditional Downscaling with Gaussian Processes” | the UCL SML group  Feb.2022
- “Shapley Values for Model Explanations” | Imperial & Oxford StatML seminar  Feb.2022
- “Uncertainty Quantification for Causal Data Fusion” | the Warwick ML group  Jun.2021