

U.S. Department of Homeland Security
U.S. Citizenship and Immigration Services
03.01.2023

Dear Sir/Madam,

I write to recommend the designation of Dr. Ryan-Rhys Griffiths as an outstanding machine learning research scholar. Dr. Griffiths has achieved international recognition in the machine learning subfields of Bayesian optimization, Gaussian processes, and applications of artificial intelligence in the natural sciences, namely in physics and chemistry. Dr. Griffiths's work at the University of Cambridge and subsequently Meta Research serves to push the boundaries of research in Bayesian optimisation methodology and has already garnered significant usage in industrial applications.

To provide further details on my own credentials, I am currently Full Professor at the Department of Computer Science and Technology at the University of xxxxx where I am a member of the Artificial Intelligence Group and the xxxxx. My research interests lie in developing artificial intelligence and computational biology models to understand diseases and complexity as well as to address personalised and precision medicine. My current focus is on graph neural network modeling. I have an MA from the University of Cambridge, a PhD in Complex Systems and Nonlinear Dynamics (School of Informatics, Dept. of Engineering of the University of xxxxx) and a PhD in (Theoretical) Genetics (University of xxxxx). In my other roles, I am a member of the xxxxx, the committee of the MPhil in Computational Biology (Stakeholder Group for the CCBI), the steering committee of xxxxx, a Fellow and member of the Council of xxxxx, a member of xxxxx, and a member of the xxxxx. I have published over 500 journal and conference articles and my research in machine learning and artificial intelligence has featured in premier international venues such as NeurIPS, ICLR, and ICML, as well as premier scientific journals such as Nature.

In 2022, I was the internal examiner for Dr. Griffiths's PhD thesis entitled, "Applications of Gaussian Processes at Extreme Lengthscales: From Molecules to Black Holes". During Dr. Griffiths's PhD from 2018-2022 he published extensively: 9 journal articles (4 of which as first

and corresponding author), 5 conference publications, and several workshop contributions. The core subject matter of Dr. Griffiths’s PhD pertained to Gaussian processes, a machine learning model that produces calibrated uncertainty estimates in its predictions. In his PhD, Dr. Griffiths tackled an impressive variety of interdisciplinary problems using the Gaussian process framework, ranging from modelling the accretion discs of supermassive black holes to discovering novel photoswitch molecules that will undergo further testing for applications in renewable energy and as anti-cancer therapeutics. Dr. Griffiths’s first author work was published in prestigious international journals in their respective fields: The Astrophysical Journal (Impact Factor: 5.874), Chemical Science (Impact Factor: 9.969), and Machine Learning: Science and Technology (Impact Factor: 6.013). Dr. Griffiths was also a core contributor to several other papers during his PhD published in venues such as The International Conference on Machine Learning (h5-index: 237) and The Accounts of Chemical Research (Impact Factor: 24.47). Furthermore, Dr. Griffiths released a number of open-source software packages during his PhD, the most notable of which have been the GAUCHE and FlowMO libraries which are currently being used internationally for research in machine learning for chemistry and chemical reaction optimization, as well as in the pharmaceutical industry. The libraries combined have over 100 GitHub stars.

In terms of his career progression following his PhD at the University of Cambridge, Dr. Griffiths, in early 2022, attained a scholarship to work at the Montreal Institute for Learning Algorithms (MILA) in the Tang group, a world-leading research team in my own field of graph-based machine learning. Dr. Griffiths then went on to become a postdoctoral research scientist at in the Adaptive Experimentation team at Meta where he continues to work on world-leading research in Bayesian optimisation.

Discussing Dr. Griffiths’s research in detail, I am best positioned to talk about the works comprising his PhD thesis. His first contribution, modeling the accretion discs of supermassive black holes, showcases a technique for inferring the values of missing data arising from unavoidable celestial occlusions in the line of sight of space telescopes. Dr. Griffiths interpolates gaps in the light curves (emission spectra) of the narrow-line Seyfert Galaxy Markarian 335. Through a subsequent cross-correlation analysis, a lag between the X-ray and UV bands of the accretion disc surrounding Markarian 335 is obtained. Such a lag feature provides information about the structure of the accretion disc and can be used to help validate current theoretical models of accretion disc phenomena. In turn, knowledge about such phenomena may be ultimately used to shed light on the origins of the early universe in modeling and understanding the formation and behavior of black holes. Secondly, Dr. Griffiths introduces a Bayesian optimization scheme capable of minimizing aleatoric uncertainty in the suggested points. Such a technology is useful in prioritising materials for large-scale manufacture and synthesis based on their robustness properties. To do this, Dr. Griffiths introduces a novel Bayesian optimization scheme. His paper, “Achieving Robustness to Aleatoric Uncertainty with Heterosceastic Bayesian Optimisation” has attained over 20 citations to date. Thirdly, Dr. Griffiths introduces a Gaussian process library that operates on molecular representations. Dr. Griffiths subsequently uses the machinery developed in his library to discover novel photoswitch molecules in collaboration with an experimental research group at Imperial College London. This pinpoints a concrete success for the proposed methodology in discovering a novel molecular material that will undergo further testing as a candidate for cancer therapeutics.

To conclude, I was very impressed by the quality and breadth of Dr. Griffiths’s research output and I strongly believe that Dr. Griffiths will continue to make outstanding contributions

in his role as a researcher at Meta. His work has achieved significant international recognition in the machine learning community and beyond as evidenced by his stellar publication record, and has also begun to receive much attention in the pharmaceutical and technology industries. I have no hesitation in recommending that Dr. Griffiths be awarded an O-1 visa based on his outstanding track record of research.

Yours Truly,

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Professor, xxxxx