

## Benjamin (Ben) Wesley Priest

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### CONTACT INFORMATION

Postdoctoral Researcher  
Center for Applied Scientific Computing  
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### RESEARCH INTERESTS

**Efficient analysis of large, dynamic datasets:** sketching, streaming algorithms, machine learning, high performance computing, graph algorithms, numerical linear algebra, compressed sensing, graph theory, optimization, network analysis, and theory of deep learning.

### RESEARCH EXPERIENCE

**Lawrence Livermore National Laboratory**, Livermore, CA, USA  
**Center for Applied Scientific Computing**. Supervisors: Dr. Geoff Sanders , Dr. Michael Schneider and Dr. Roger Pearce

#### *Postdoctoral Researcher*

**04/2019 – Present**

- Wrote an efficient HPC software library implementing novel algorithms using random matrix projections to approximately cluster graphs according to their spectrum
- Built DegreeSketch, an HPC library for fast local query approximation in labeled graphs
- Designed and implemented software computing Gaussian Process kernels dual to the infinite width limit of deep neural networks
- Utilized GP neural kernels to solve problems in reinforcement learning and image classification, and working on applications to deep learning on quantum computing hardware

#### *Computation Student Intern*

**05/2018 – 01/2019**

- Built novel distributed codes for estimating local triangle counts using cardinality sketches
- Developed sophisticated communication protocols in a big-data environment
- Designed YGM library for improving performance of HPC algorithms with irregular computational load

**Dartmouth College**, Hanover, NH, USA

**Thayer School of Engineering**. Advisor: Professor George Cybenko

#### *Research and Teaching Assistant*

**09/2015 – 02/2019**

- Developed novel sublinear-space sketching algorithms to estimate popular centrality indices and local structural features including triangle counts in large distributed graphs
- Contributed to Moving Target and Adaptive Cyber Defense research, designing game- and graph-theoretic models to quantify and track advanced persistent threats
- Taught courses in applied machine learning, with an emphasis on deep learning while leading a team of TAs

**MIT Lincoln Laboratory**, Lexington, MA, USA

Cyber Analytics and Decision Systems. Supervisor: Dr. Kevin M. Carter

#### *Assistant Research Scientist*

**08/2011 – 07/2015**

- Designed and implemented novel machine learning algorithms to deduce human and machine behavior from network protocol traffic
- Planned and implemented cognitive multi-agent systems to perform high-fidelity network traffic generation for network-scale simulation experiments
- Evaluated moving target cyber defenses by building a multi-agent simulation platform

**Air Force Institute of Technology**, Wright-Patterson Air Force Base, OH, USA

Program Encryption Group. Supervisor: Professor J. Todd McDonald

#### *Engineering Technician GS-05*

**Summer, 2008 & 2009**

- Developed encryption metrics for circuits using abstract interpretation semantic models

EDUCATION	<b>Thayer School of Engineering at Dartmouth College</b> , Hanover, VT, USA	
	Ph.D., Engineering (GPA 4.0)	<b>09/2015 – 02/2019</b>
	<ul style="list-style-type: none"><li>- Advisor: <a href="#">Professor George Cybenko</a></li><li>- Thesis: Sublinear Approximations of Vertex Centrality in Evolving Graphs</li></ul>	
	<b>The Ohio State University</b> , Columbus, OH, USA	
	B.S., Mathematics, (GPA 3.62 <i>Cum Laude</i> )	<b>09/2007 – 06/2011</b>
	B.S., Computer and Information Science, (GPA 3.62 <i>Cum Laude</i> )	<b>09/2007 – 06/2011</b>
AWARDS	<b>HPEC Graph Challenge</b>	
	Graph Challenge Champion, 2020.	<b>The Ohio State University</b>
	Graph Challenge Champion, 2019.	
	<b>SECURITY</b>	Phi Beta Kappa Inductee, 2010
	Best Paper Award, 2018.	Bingham Award in Philosophy, 2010
		Kenneth Cummings Scholarship, 2008–2011
	<b>MIT Lincoln Laboratory</b>	Distinguished Merit Scholarship, 2007–2011
	Lincoln Scholar Fellowship, 2015	Ohio Academic Scholarship, 2007-2011
FUNDED PROJECTS	[1] Co-I, “Interactive Exploratory Graph-Engabled Data Analytics at HPC Scales”, LLNL LDRD 21-ER-020, \$500,000/year. October 1, 2020 to September 30, 2022.	
	[2] Co-PI, “Scalable Approximate Graph Clustering”, LLNL LDRD 20-FS-037, \$150,000. February 1, 2020 to September 30, 2020.	
SELECTED PUBLICATIONS	[3] <b>Benjamin W. Priest</b> , Alec Dunton, and Geoffrey Sanders. Scaling Graph Clustering with Distributed Sketches. In <i>Proceedings of the IEEE High Performance Extreme Computing Conference</i> , HPEC. <b>Graph Challenge Champion</b> . 2020.	
	[4] Trevor Steil, Scott McMillan, Geoffrey Sanders, Roger Pearce, and <b>Benjamin W. Priest</b> . Kronecker Graph Generation with Ground Truth for 4-Cycles and Dense Structure in Bipartite Graphs. In <i>2020 IEEE International Parallel and Distributed Processing Symposium Workshops</i> , IPDPSW. 2020.	
	[5] Roger Pearce, Trevor Steil, <b>Benjamin W. Priest</b> , and Geoffrey Sanders. One Quadrillion Triangles Queried on One Million Processors. In <i>Proceedings of the IEEE High Performance Extreme Computing Conference</i> , HPEC. <b>Graph Challenge Champion</b> . 2019.	
	[6] <b>Benjamin W. Priest</b> , Trevor Steil, Geoffrey Sanders, and Roger Pearce. You’ve Got Mail (YGM): Building missing asynchronous communication primitives. In <i>2019 IEEE International Parallel and Distributed Processing Symposium Workshops</i> , IPDPSW. 2019.	
	[7] Trevor Steil, <b>Benjamin W. Priest</b> , Geoffrey Sanders, Roger Pearce, Timothy La Fond, and Keita Iwabuchi. Distributed Kronecker graph generation with ground truth of many graph properties. In <i>2019 IEEE International Parallel and Distributed Processing Symposium Workshops</i> , IPDPSW. 2019.	
	[8] <b>Benjamin W. Priest</b> , Roger Pearce, and Geoffrey Sanders. Estimating edge-local triangle count heavy hitters in edge-linear time and almost-vertex-linear space. In <i>Proceedings of the IEEE High Performance Extreme Computing Conference</i> , HPEC. 2018.	
	[9] Luan Hoy Pham, Massimiliano Albanese, and <b>Benjamin W. Priest</b> . A quantitative framework to model advanced persistent threats. In <i>Proceedings of the 15th International Conference on Security and Cryptography</i> , SECURITY. <b>Best Paper Award</b> . 2018.	