PACIFIC SYMPOSIUM ON BIOCOMPUTING 2025

2025 marks the 30th Pacific Symposium on Biocomputing (PSB)! As always, we gather on the Big Island to share the latest progress and challenges in biocomputing. In honor of the 30th PSB, we are excited to present a session reviewing the history and scientific impact of the meeting—and the field. We hope you will agree that PSB has impact far beyond what might be expected of a relatively small annual meeting. There has been some suggestion that the rise of Artificial Intelligence (AI) in the last few years may be "hype" and that the promise and impact of AI is overstated. We agree that it is true that in some areas the discussions of AI's promise and impact may be hyperbolic. However, there seems to be little doubt that the impact of AI on science and engineering is profound and has already accelerated discovery in clear ways. One needs to look no further than the 2024 Nobel Prizes where laureates were rewarded for their pioneering work in AI. In Physics, Geoffrey Hinton and John Hopfield were recognized "*for foundational discoveries and inventions that enable machine learning with artificial neural networks.*" In Chemistry, David Baker was recognized *"for computational protein design"* while Demis Hassibis and John Jumper were recognized *"for protein structure prediction."* Of course, the awards rightly go to the scientists, but the awards also illustrate the power and impact that AI is having on science. And the transformation of capabilities is not limited to chemistry and physics but extends to all areas of science and engineering. Every field is taking advantage of tools that can find patterns in data that are not obvious to humans and can generate novel outputs based on deep statistical models of the latent relationships within large datasets. The PSB community celebrates this exciting period of accelerated capabilities. A quick review of the sessions at this year's meeting shows that important uses of AI and machine learning in precision medicine, medical communications, genomics, imaging and health equity are catalyzing progress in these critical areas. Our community has not engaged in hype, but in the responsible use of amazing power tools that allow us to continue addressing the most pressing problems facing biology and medicine. The next thirty years promises to be as amazing as the previous thirty!

In addition to being published by World Scientific and indexed in PubMed, the proceedings from all PSB meetings are available online at http://psb.stanford.edu/psb-online/. Since 1996, all PSB papers are indexed in PubMed. These papers are routinely cited in archival journal articles and routinely represent important early contributions in new subfields—many times before there is an established literature in more traditional journals; for this reason, many papers have garnered hundreds of citations.

The social media handle for PSB is @PacSymBiocomp and the hashtag for PSB 2025 is #PSB25.

The efforts of a dedicated group of session organizers have produced an outstanding program. The sessions of PSB 2025 and their hard-working organizers are as follows:

AI and Machine Learning in Clinical Medicine: Generative and Interactive Systems at the Human-Machine Interface
Organizers: Jonathan Chen, Roxana Daneshjou, Dokyoon Kim, Joseph D. Romano, Fateme Nateghi Haredasht, Geoff Tison

Precision Medicine: Multi-modal and multi-scale methods to promote mechanistic understanding of disease
Organizers: Yana Bromberg, Steven E. Brenner, Hannah Carter

Translating Big Data Imaging Genomics Findings to the Individual: Prediction of Risks and Outcomes in Neuropsychiatric Illnesses
Organizers: Peter Kochunov, Li Shen, Paul M. Thompson, Zhongming Zhao

Overcoming Health Disparities in Precision Medicine
Organizers: Kathleen Barnes, Harris Bland, Francisco De La Vega, Todd L. Edwards, Keolu Fox, Alexander Ioannidis, Eimear Kenny, Rasika Mattias, Bogdan Pasaniuc, Jada Benn Torres, Digna R Velez Edwards

We are excited to present four workshops in which investigators with a common interest come together to exchange results and new ideas in a format that is more informal than the peer-reviewed sessions. For this year, the workshops and their organizers are:

All Together Now: Data Work to Advance Privacy, Science, and Health in the Age of Synthetic Data
Organizers: Lindsay Fernandez-Rhodes, Jennifer K. Wagner

Command Line to PipeLine: Cross-Biobank Analyses with Nextflow
Organizers: Anurag Verma, Lindsay Guare, Katie Cardone, Christopher Carson, Zachary Rodriguez

Leveraging Foundational Models in Computational Biology: Validation, Understanding, and Innovation
Organizers: Steven Brenner, Brett Beaulieu-Jones

Opportunities and Pitfalls with Large Language Models for Biomedical Annotation
Organizers: Fabio Rinaldi, Jin-Dong Kim, Zhiyong Lu, Cecilia Arighi

Finally, we are pleased to have a hybrid session/workshop (with some features of both a session and a workshop):

Earth Friendly Computation: Applying Indigenous Data Lifecycles in Medical and Sovereign AI
Organizers: Keolu Fox, Krystal Tsosie, Kaja Wasik, Alec Calac, Alexander Ioannidis, Eric T. Dawson

The PSB 2025 keynote speakers are Kevin B. Johnson (Science keynote) and Sharon F. Terry (Ethical, Legal and Social Implications keynote).

Tiffany Murray has managed the peer review process and assembly of the proceedings since 2001 and plays a key role in many aspects of the meeting. We are grateful for the long-time support of the National Institutes of Health[1], ISCB, and Cleveland Institute for Computational Biology. PSB 2025 is thankful for the support of Khosla Ventures and PGxAI. This year, the co-chairs are pleased to provide financial support for the opening reception, to thank the community for thirty years of support for PSB. The Research Parasite Awards benefit from support from GigaScience, Jeff Stibel, Mr. and Mrs. Stephen Canon, and Drs. Casey and Anna Greene. The Research Symbiont Awards benefit from support from the Wellcome Trust and the DragonMaster Foundation.

In honor of the 30th Anniversary of PSB, we are pleased to support the local Waikaloa Dry Forest (https://www.waikoloadryforest.org/) dedicated to the preservation of the wiliwili tress in some of the roughest terrain in Hawai'i.

We are particularly grateful to the PSB staff Tiffany Murray, Al Conde, Paul Murray, Mark Woon, Liam Mulhall, Randy Soares, Zach Ritchie, BJ Morrison McKay, Cynthia Paulazzo, Victoria Soares, Jackson Miller, Heather Miller, and Meghann Risell for their assistance. We also acknowledge the many busy researchers who reviewed the submitted manuscripts on a very tight schedule. The partial list following this preface does not include many who wished to remain anonymous, and of course we apologize to any who may have been left out by mistake.

We look forward to a great meeting and to seeing you on the Big Island. Aloha!

Pacific Symposium on Biocomputing Co-Chairs,
October 9, 2024

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