

# 1<sup>st</sup> Workshop on High-Performance Computing in Neuroscience

National Brain Mapping Laboratory  
May 2019

آزمایشگاه ملی نقشه برداری مغز  
برگزار می کند

آزمایشگاه ملی نقشه برداری مغز  
NBML  
National Brain Mapping Lab

کارگاه پردازش سریع  
در علوم اعصاب

سرفصل ها:  
• مقدمه ای بر لینوکس  
• تئوری پردازش موازی  
• پردازش موازی در شبیه سازی عصبی  
• پردازش موازی در تصویربرداری مغزی  
• شیوه استفاده از سرور محاسباتی  
• آزمایشگاه ملی نقشه برداری مغز

زمان: یکشنبه ۱۵ اردیبهشت ماه ۱۳۹۸  
ساعت: ۸ الی ۱۸  
مکان: آزمایشگاه ملی نقشه برداری مغز

تازه های نقشه برداری مغز  
سمپوزیوم  
سومین  
3RD IRANIAN SYMPOSIUM  
ON BRAIN MAPPING UPDATES  
ISBM  
2019

هزینه ثبت نام: ۱۵۰ هزار تومان  
(۵۰٪ تخفیف)  
و دوره ۱۵ هزار تومان  
در روز دوم

# Computation in NBML



- Where we were
  - Need to national high-tech computational equipment
  - Need to development of computational approach in brain studies

# Computation in NBML



- Where we are
  - Setting up two computational server
    - 256 logical core( 2 server x 4 socket x 16 physical core x 2 threat)
    - 256 gigabyte RAM
    - 18 terabyte storage
    - RAID 5 for redundant array of independent disks configuration
    - Dedicated configuration
    - Powerful last version of multitask and multiuser operating systems
    - Access to servers from Ethernet and Internet
    - The most useful software which a computational neuroscientist may need such as:
      - MATLAB, python, R, FSL, Freesurfer, SPM, AFNI, ANTS, Brian, Neuron, ...
    - Preparation of automatic parallel processing pipelines

# Computation in NBML



- Where we will go
  - Technical developments and maintenance
  - Promotions
    - Organizing workshops and seminars
    - Organizing computational competitions
    - Establishing forums
  - Production
    - Pre-processed neuroimaging data
    - Extracted activity pattern of functional images
    - Educational media

# High-Performance Computing(HPC)




**High Performance Computing** most generally refers to the practice of aggregating **computing** power in a way that delivers much **higher performance** than one could get out of a typical desktop **computer** or workstation in order to solve large problems in science, engineering, or business. (<https://insidehpc.com>)



# High-Performance Computing in Neuroscience




 Human Brain Project

YOUNG RESEARCHERS EVENT

**BRAIN MODELS AND  
COMPUTATION FOR  
BRAIN MEDICINE**

Bulgarian Academy of Sciences, Sofia, Bulgaria  
18 April 2018



## High Performance Computing for neuroscience: Hands-on introduction to supercomputing usage, tools and applications

3<sup>rd</sup> HBP Curriculum Workshop Series - ICT for non-specialists  
9-11 July 2019 | Forschungszentrum Jülich, Germany



## Division High Performance Computing in Neuroscience

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**PERSPECTIVES**

## International Neuroscience Initiatives through the Lens of High-Performance Computing

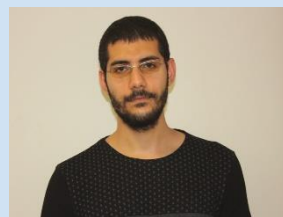
Kristofer E. Bouchard, Lawrence Berkeley National Laboratory and UC Berkeley  
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Oliver Kuhn and Hagen D. Simon, Lawrence Berkeley National Laboratory  
P. Sommes, UC Berkeley

Many international neuroscience initiatives are in different stages of progress—although they have different goals, they will all produce large amounts of data. Much attention has been focused on the technological challenges of measuring and manipulating neural activity from large numbers of sites for long periods, but much less attention has been paid to the computing challenges associated with the vast amounts of data these technologies will generate. As a result, potential advances offered by neurotechnologies are threatened by a lack of computing tools. The neuroscience community is not alone in this challenge, as other science fields are being transformed by advanced analysis being applied to ever-increasing volumes of experimental data. Collaboration of massive datasets hosted in open repositories with high-performance computing (HPC) will allow the community-driven exploratory analysis and integration with simulations. This is required to extract meaningful design principles of biological computation, which might

Neuroscience initiatives aim to develop new technologies and tools to measure and manipulate neuronal circuits. To deal with the massive amounts of data generated by these tools, the authors envision the co-location of open data repositories in standardized formats together with high-performance computing hardware utilizing open source optimized analysis codes.

2 COMPUTER PUBLISHED BY THE IEEE COMPUTER SOCIETY

# 1<sup>st</sup> High-Performance Computing in Neuroscience Workshop



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# Acknowledgment



Dr. Hossein Ghadiri



Hesam Kharazi



Dr. Hossein-zadeh

and NBML staff



**Thanks**  
**Have a great day!**