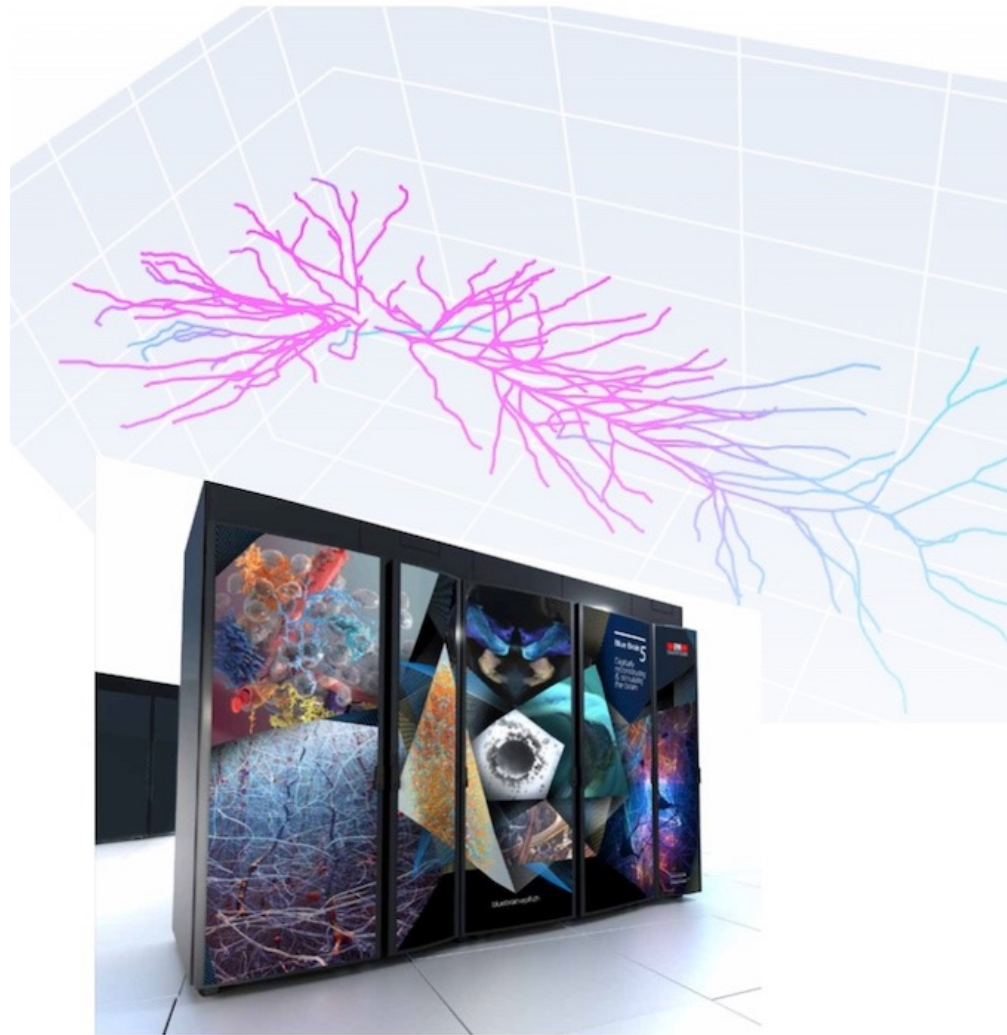


NEURON tutorial

2022-06-28

Robert A. McDougal
Ted Carnevale

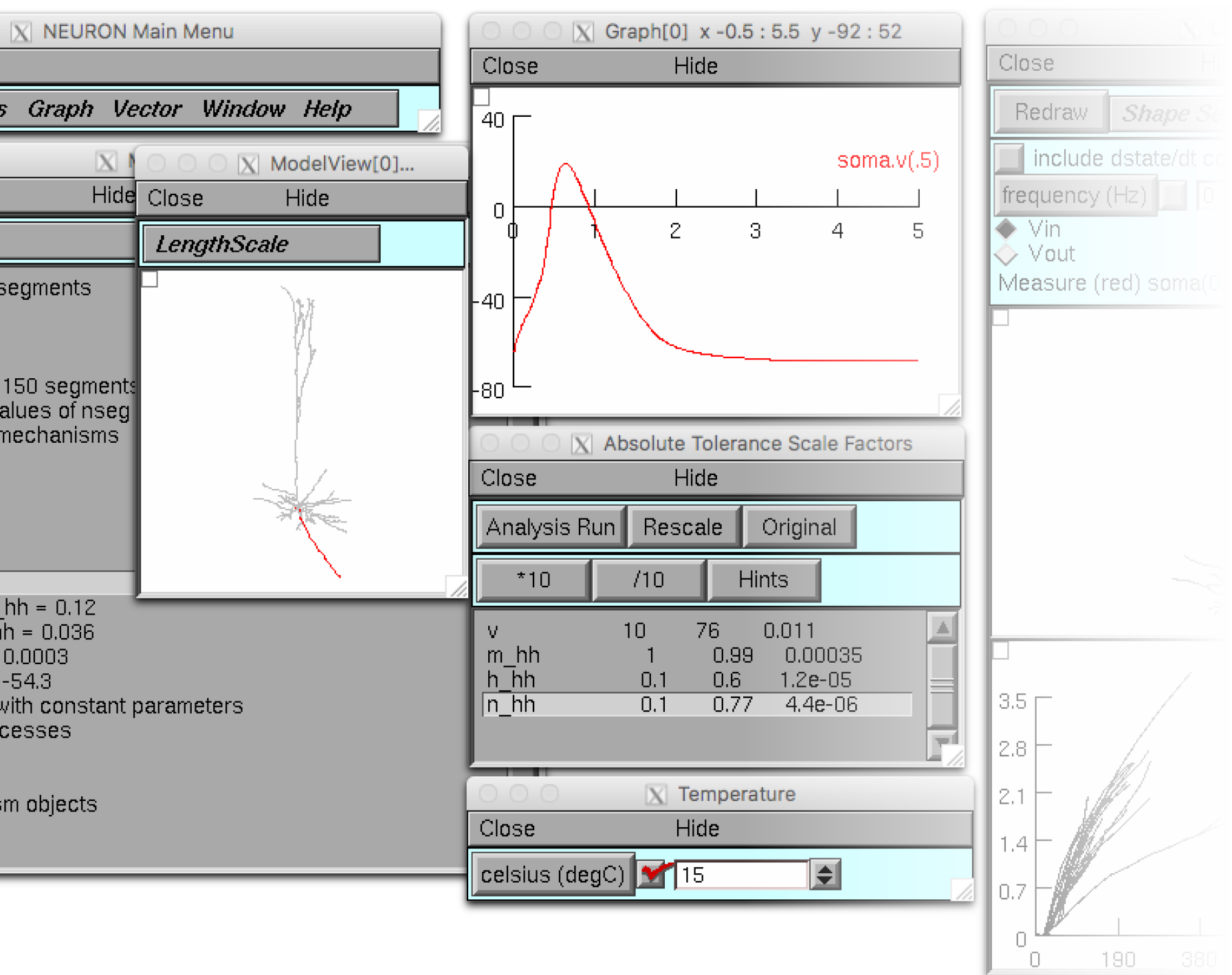


```
from neuron import h
from neuron.units import sec, m
from neuron.hoc import load_model
h.load_model('model.neuron.hoc')
h.load_model('91662.s')
h.hh.hoc('allsec(
ic = h.Section()
ic.define('soma(
ic.define('ms
ic.define('ms
ic.define('ms
h.finish('55 * m
h.compile(' * ms)
ps = h('False')
ps.var('False')
```

Today's agenda

9:00 EDT / 15:00 CEST	Welcome
9:05 EDT / 15:05 CEST	NEURON concepts
9:20 EDT / 15:20 CEST	Using NEURON's GUI to build and simulate cells
10:30 EDT / 16:30 CEST	Break
10:40 EDT / 16:40 CEST	Using NMODL to add new biophysical mechanisms
10:55 EDT / 16:55 CEST	Using resources from ModelDB and NeuroMorpho.org
11:30 EDT / 17:30 CEST	Networks: spike-triggered synaptic transmission, events, and artificial spiking cells

12:15 EDT / 18:15 CEST	Lunch/Dinner
13:15 EDT / 19:15 CEST	Numerical methods: accuracy, stability, speed
13:30 EDT / 19:30 CEST	Scripting NEURON
14:45 EDT / 20:45 CEST	Break
15:00 EDT / 21:00 CEST	Numerical methods: adaptive integration
15:15 EDT / 21:15 CEST	Reaction-diffusion simulations
15:45 EDT / 21:45 CEST	Other resources and wrap-up




NEURON overview

- Used in over 2600 publications.
- Source code for 750+ published models on ModelDB.
- Powerful GUI tools.
- Fully Python scriptable.
- For morphologically and biophysically detailed cells, integrate-and-fire cells, and anything in between.
- Runs simulations on single core, in the cloud, or on massive HPC systems.

nrn.readthedocs.io

- Installation downloads and instructions
- Video and text tutorials
- Programmer's reference
- More...

 NEURON

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[NEURON Course Exercises](#)

[Publications about NEURON](#)

[Publications using NEURON](#)

NEURON SCRIPTING:

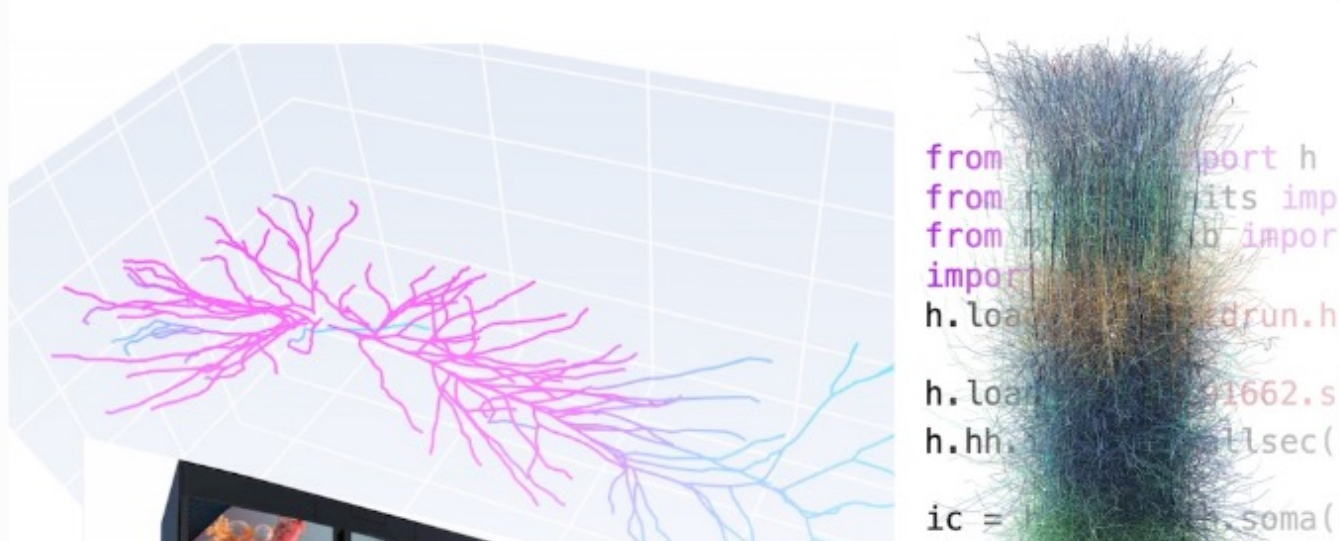
[NEURON Python documentation](#)

[NEURON HOC documentation](#)

 » The NEURON Simulator

The NEURON Simulator

NEURON is a simulator for neurons and networks of neurons that runs efficiently on your local machine, in the cloud, or on an HPC. Build and simulate models using Python, HOC, and/or NEURON's graphical interface. From this page you can watch recorded NEURON classes, read the Python or HOC programmer's references, browse the NEURON forum, explore the source code for over 750 NEURON models on ModelDB, and more (use the links on the side or search).



Efficient Simulation of 3D Reaction-Diffusion in Models of Neurons and Networks

Robert A. McDougal^{1,2,3*}, Cameron Conte^{2,4,5}, Lia Eggleston⁶, Adam J. H. Newton^{1,2,7} and Hana Galijasevic⁶

¹ Department of Biostatistics, Yale School of Public Health, New Haven, CT, United States, ² Center for Medical Informatics, Yale University, New Haven, CT, United States, ³ Program in Computational Biology and Bioinformatics, Yale University, New Haven, CT, United States, ⁴ Department of Neurosciences, Yale University, New Haven, CT, United States, ⁵ Department of Psychology, Yale University, New Haven, CT, United States, ⁶ Department of Neuroscience, Yale University, New Haven, CT, United States, ⁷ Department of Neurobiology, Yale University, New Haven, CT, United States

Modernizing the NEURON Simulator for Sustainability, Portability, and Performance

Omar Awile^{1†}, Pramod Kumbhar^{1†}, Nicolas Cornu¹, Salvador Dura-Bernal^{2,3}, James Gonzalo King¹, Olli Lupton¹, Ioannis Magkanaris¹, Robert A. McDougal^{4,5,6}, Adam J. H. Newton^{2,4}, Fernando Pereira¹, Alexandru Săvulescu¹, Nicholas T. Carnevale^{7‡}, William W. Lytton^{3‡}, Michael L. Hines^{7‡} and Felix Schürmann^{1*‡}

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www.frontiersin.org/articles/10.3389/fninf.2022.884046

Twitter: [@neuronsimulator](https://twitter.com/neuronsimulator)

Course material:

github.com/mcdougallab/neuron-course-june-2022

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NEURON course June 2022

Time	Topic
9:00 EDT / 15:00 CEST	Welcome

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