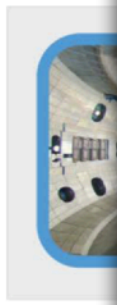
IRI
Integrated
Research
Infrastructure

FUSION: AUTOMATIC BETWEEN-PULSE ANALYSIS OF DIII-D EXPERIMENTAL DATA

PI: Schissel, General Atomics



- Scientists set
  - A pulse is a
  - Scientists co
  - Experimenta
- DIII-D pulses
- ALCF comput
  results for a n

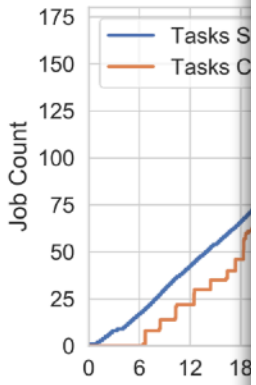
NEAR REAL-TIME PROCESSING OF LIGHT-SOURCE WORKLOADS AT ALCF

Experiment

1. Transfer 40GB† input dataset from APS, ALS, and NSLS-II
2. Process data with
   real-time queue
3. Transfer results to

Results and simultaneously

- Continuously executed for **48+ hours**
- Transferred 23TB input data from APS/ALS/NSLS-II to ALCF



† 40GB dataset was the largest of th

Toward Real-time Analysis of Experimental Science Workloads on Geographically Distributed Supercomputers

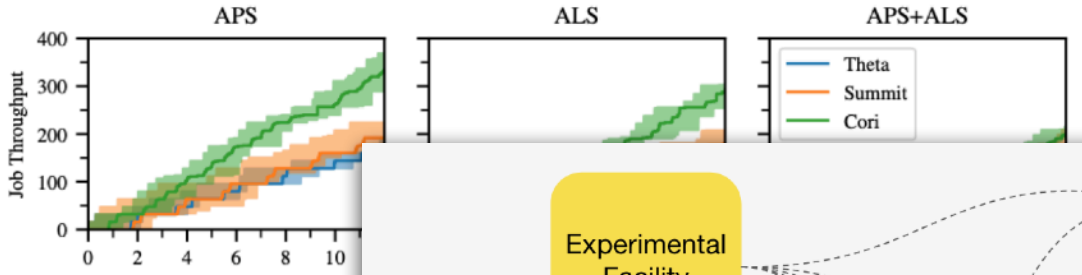
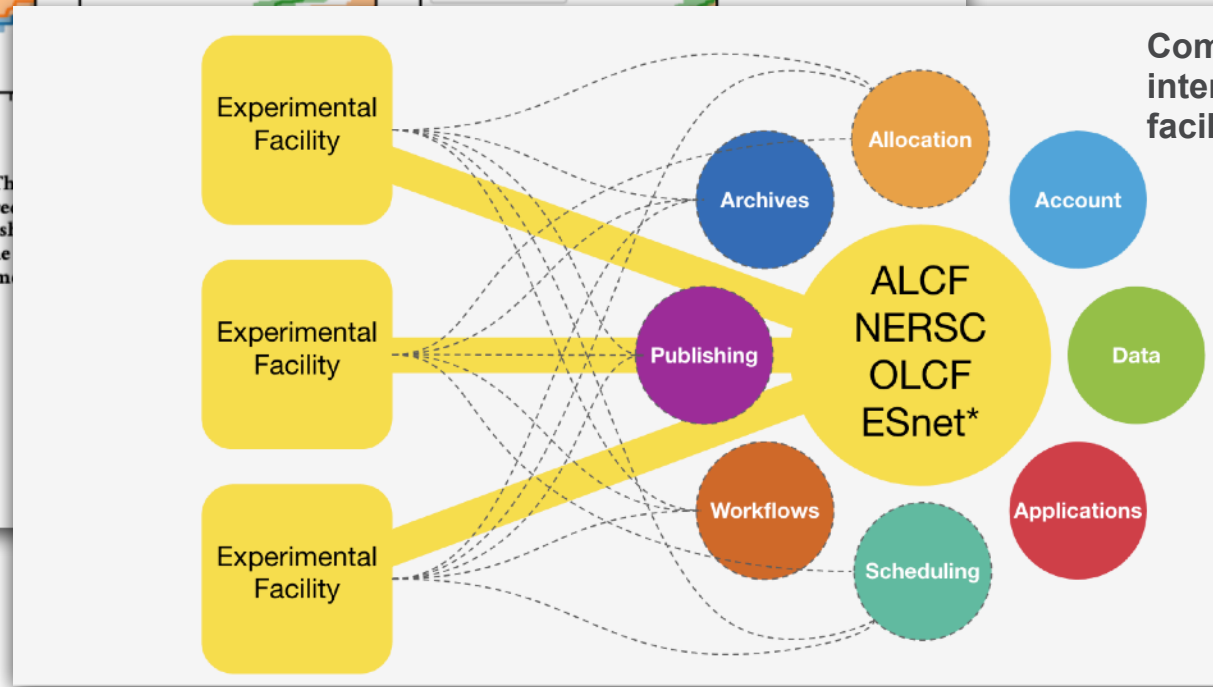
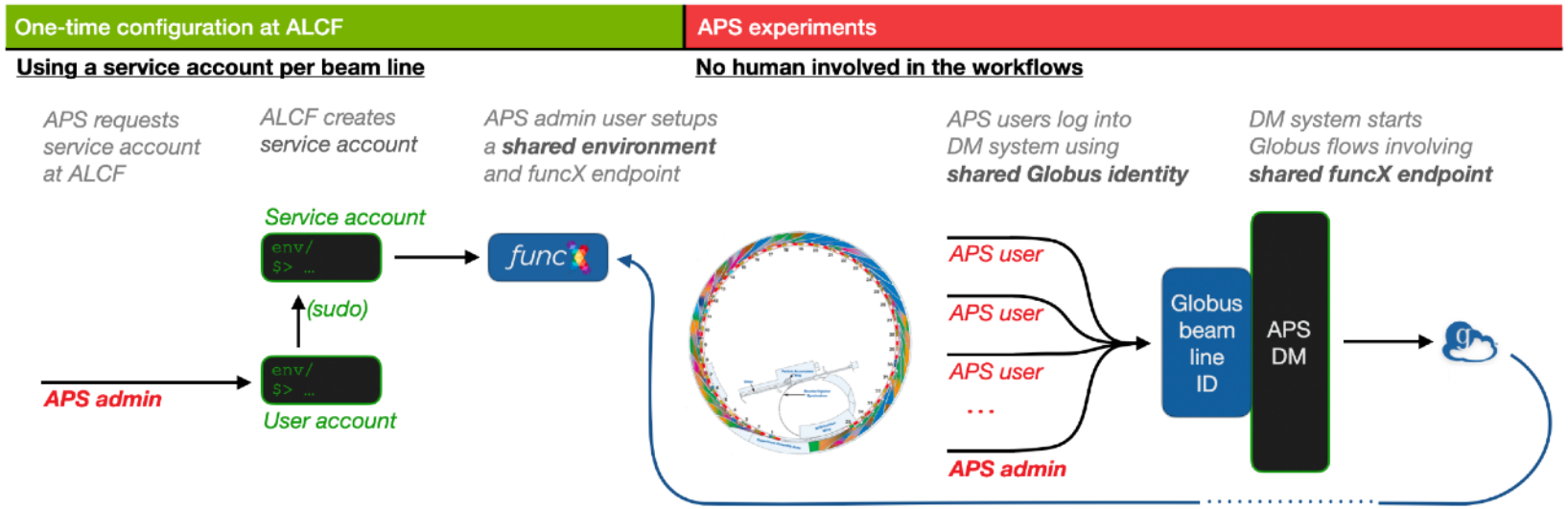


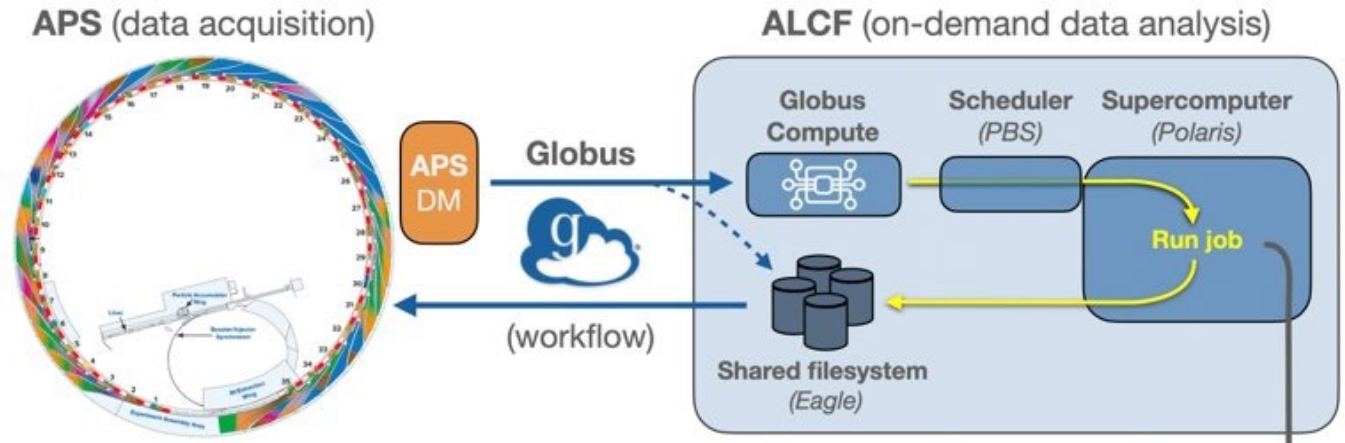
Figure 9: Simultaneous throughput of XPCS analysis on Th experiments in which the 878 MB XPCS dataset is transferre the Balsam API. The *top* boundary of each shaded region sl runs. The *bottom* boundary of the shaded regions shows the system is network I/O-bound: that is, compute nodes becom



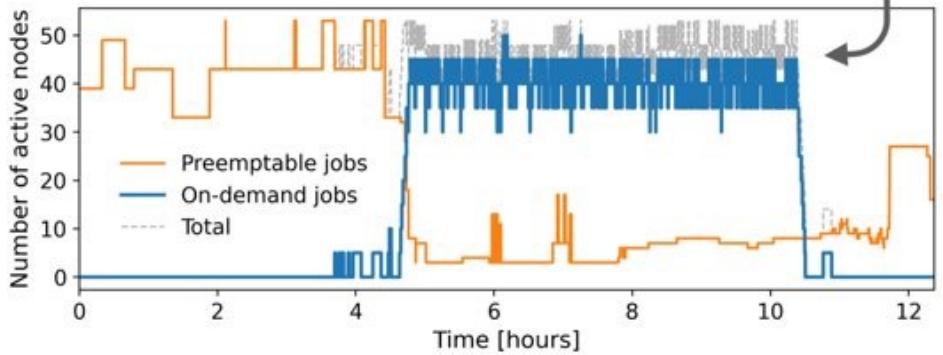
Nexus@ALCF

1. Instrument accounts to provide identities
2. Demand and preemptable queues enable on-demand access
3. Allocations and suballocations empower facilities to manage resources
4. Fully automated

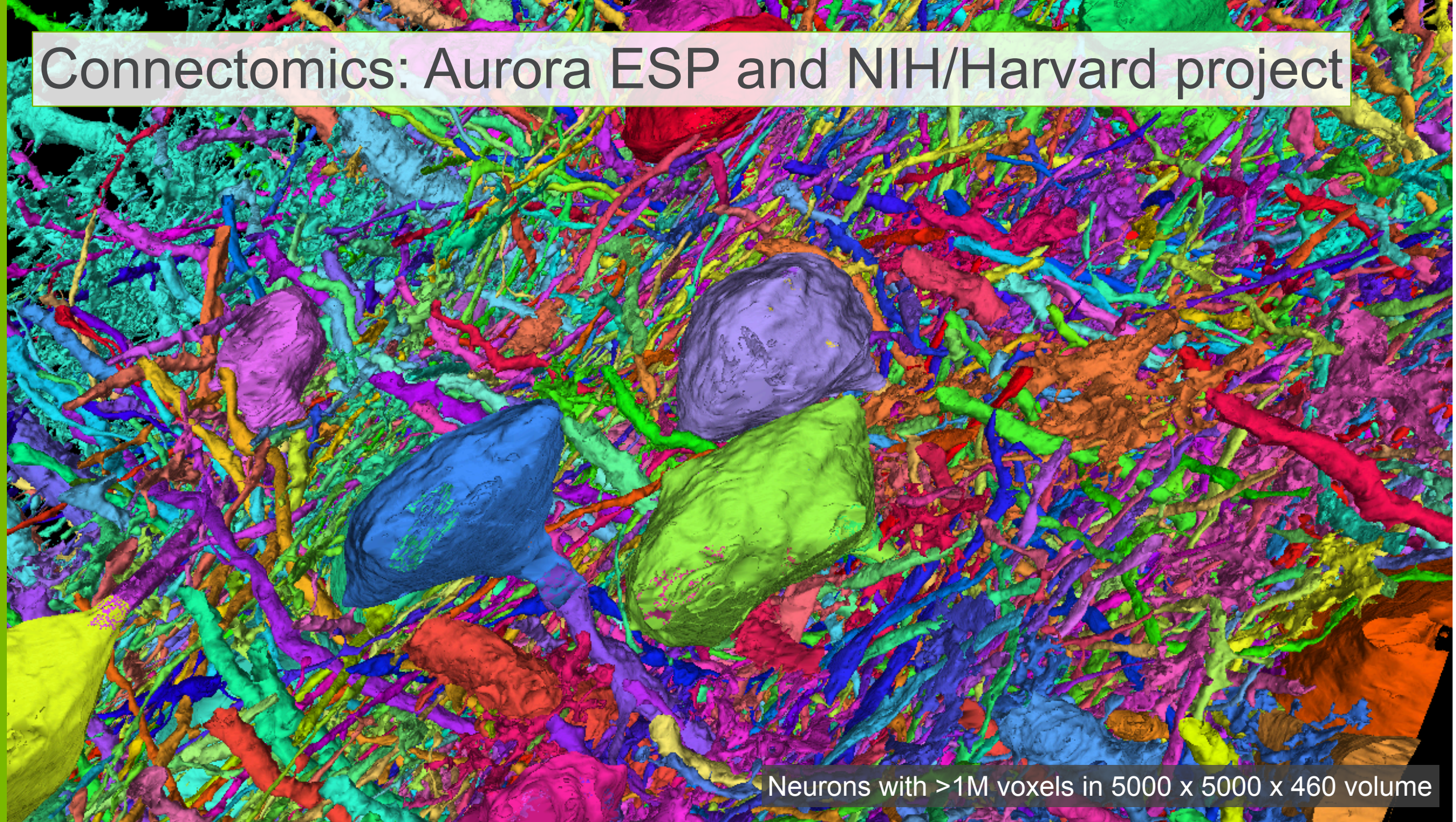




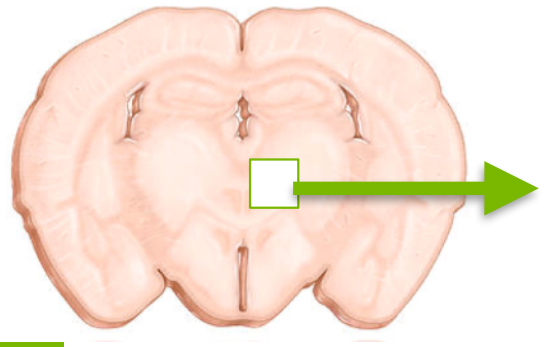
Computation example
(Part of Laue experiment)
April 1st, 2023



Connectomics: Aurora ESP and NIH/Harvard project



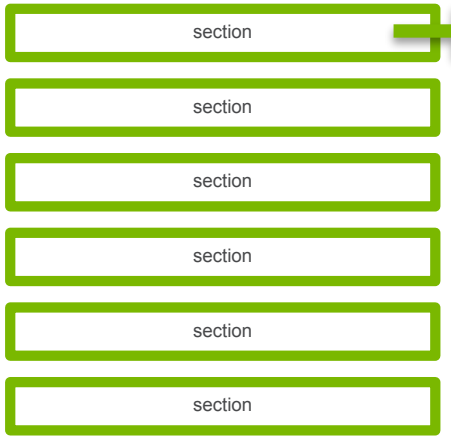
Neurons with >1M voxels in 5000 x 5000 x 460 volume



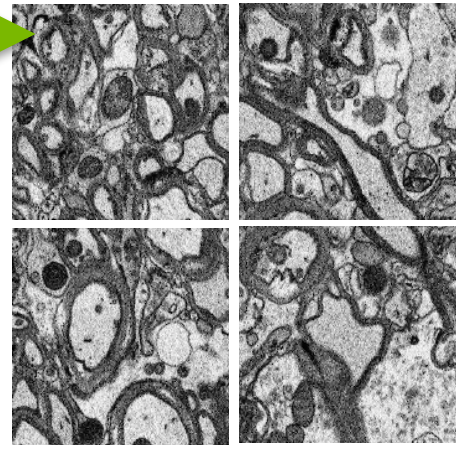
Mouse brain:
70M neurons
~1cm^3

sample

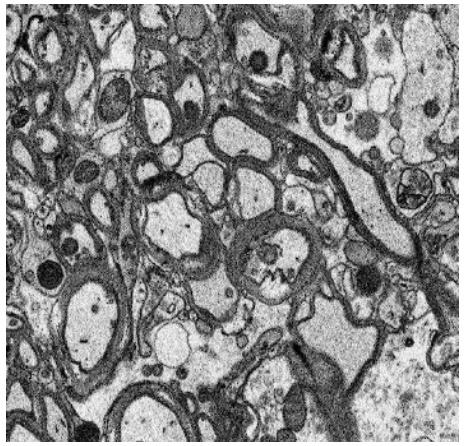
~1mm^3



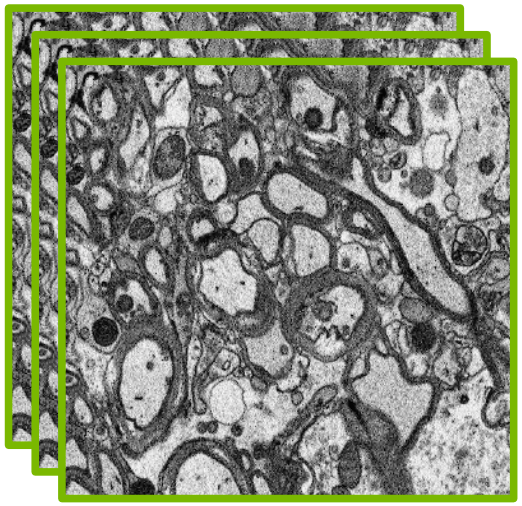
25000
40nm sections
1mm x 1mm
(4nm resolution)



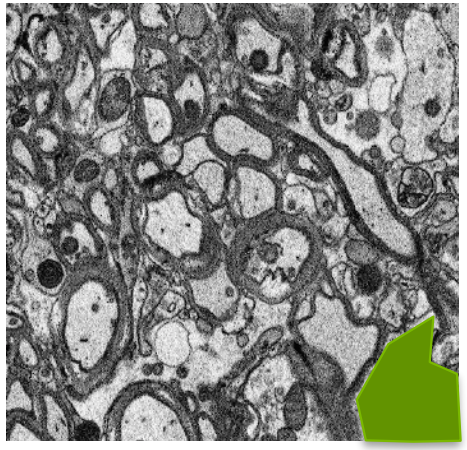
Each section
imaged with EM as
N tiles (8 bit)



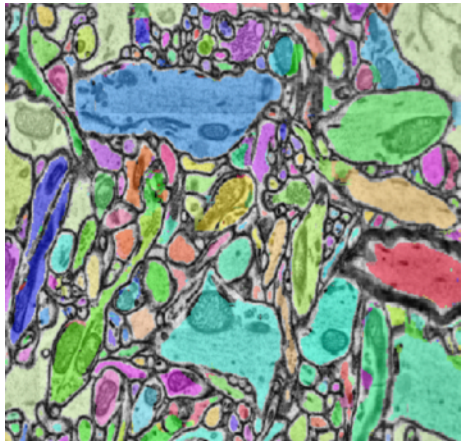
Sections stitched
together (CV-based)



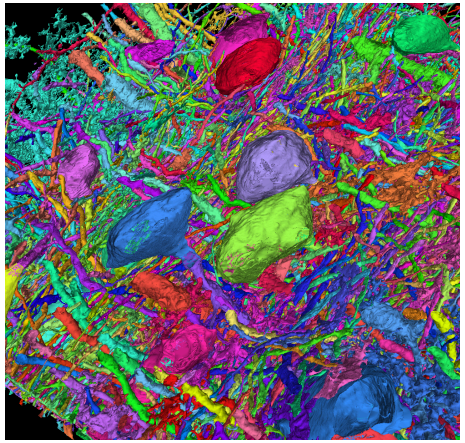
Aligned sections
(CV-based)



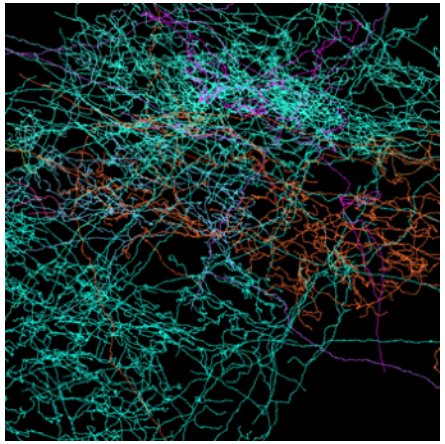
Mask out
non-target
objects



Segment
target
objects



Reconstructed 3D
neurons with >1M
voxels
(NN-based)



Skeletonize to
produce connectivity
graph for analysis