It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong.

- Richard Feynman
Optogenetic, tissue clearing, and viral vector approaches to understand and influence whole-animal physiology and behavior

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Optogenetics

CLARITY & delivery vectors

Deep Brain Stimulation
Key challenges and opportunities

• Data Analysis at multiple levels
  – Imaging (example to follow)

• Extracting Meaning from Large Data, identifying patterns

• Moving experiments (at least in part) *in silico*
Direct Pathway: Diffusion Tensor Imaging in Parkinson's Patients
Broadly transducing viruses permit brain-wide transgene expression and facilitate neurite tracing.
Whole tissue clearing and labeling for morphology

K. Chan et al. 2017 Nature Neuroscience
Whole tissue clearing and labeling for morphology studies of specific cell types
Engineering tools for neuroscience (e.g. proteins for cellular control, readout, delivery)

Moving experiments (at least in part) *in silico*
Key challenges and opportunities

• Data Analysis at multiple levels
  – Imaging (example to follow)

• Extracting Meaning from Large Data, identifying patterns

• Moving experiments (at least in part) *in silico*

• *Innovation / Invention*
  – *People* creating *value* by *implementation* of new *ideas*