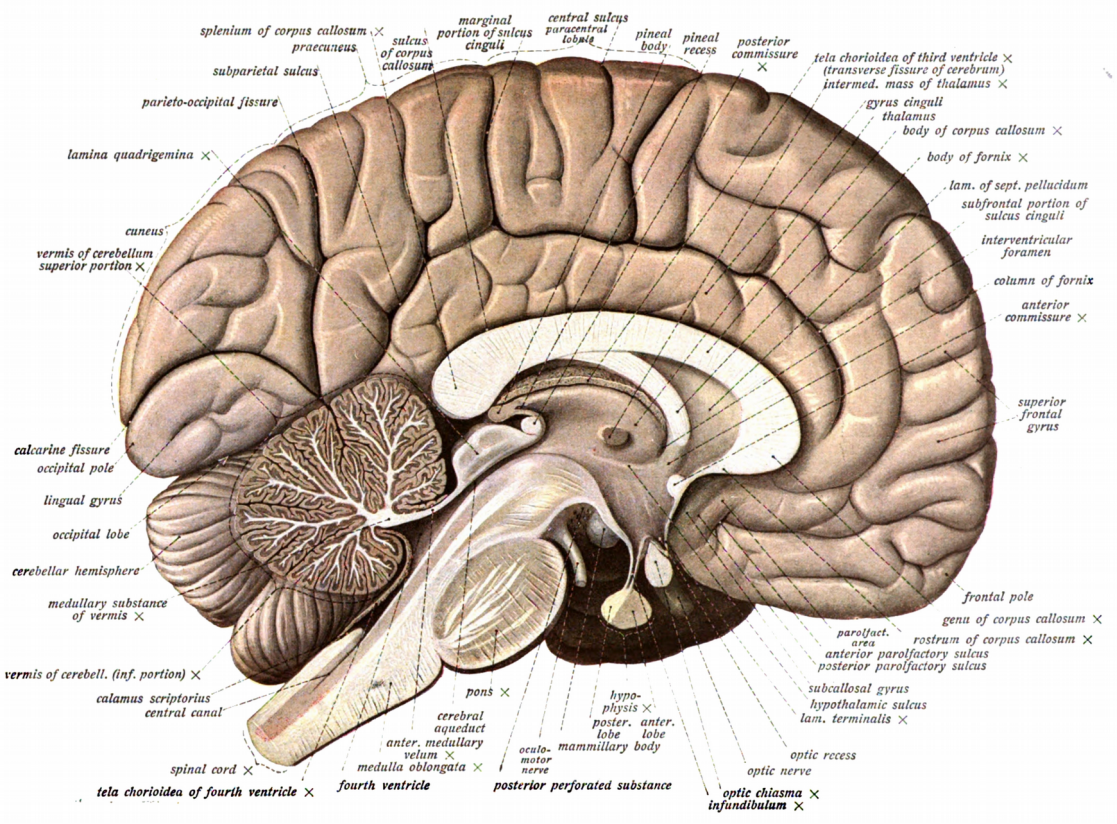
BioDynaMo

A Platform for Large-scale Biological Simulation

Lukas Breitwieser
Ahmad Hesam

Biology Dynamic Modeler

- Large-scale platform for biological simulations
- Provides access to growing computational resources Cloud computing
- Hides complexity of parallel and distributed computing
- Promotes reproducibility of results
- Flexible system that supports different specialities (e.g. neuroscience, immunology, …)



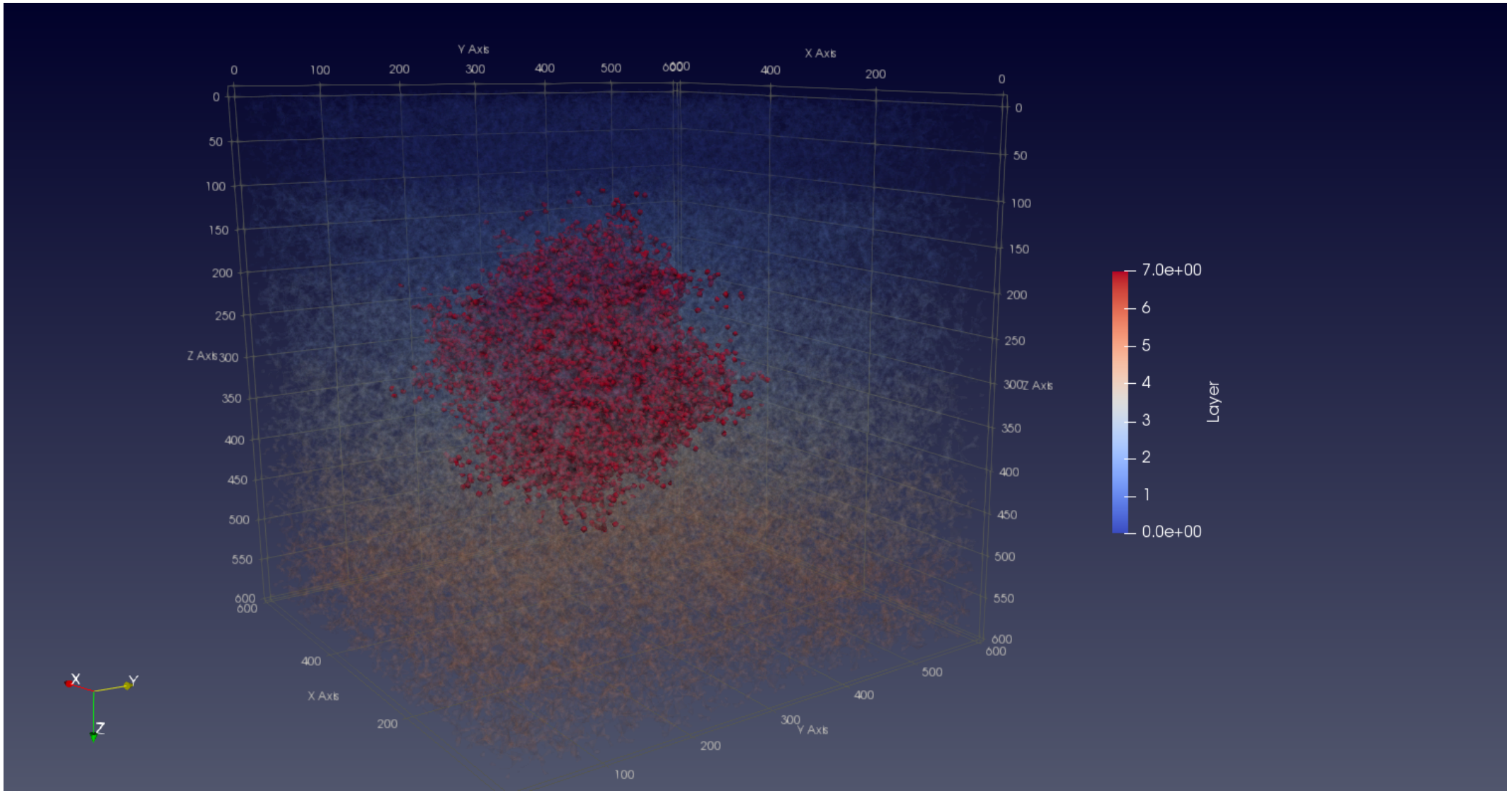
https://commons.wikimedia.org/w/index.php?curid=29135452

CERN openlab

Current Status

- Modular simulation engine
- User defined cell behavior
- Mechanical interactions
- Extracellular diffusion
- Parallelized with OpenMP
- ROOT I/O for simulation backups, …
- Visualization using Paraview
- Prototype of messaging layer using ZeroMQ

Tumor Growth

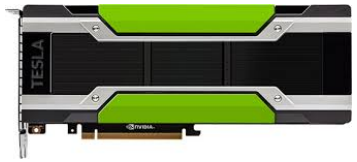


CERN openlab

Jean de Montigny, Newcastle University, UK

Challenges

- Cloud Computing
- Heterogeneous Computing
- Usability



- Parameter sensitivity
- Reproducibility of results

Summary

- BioDynaMo has reached a feature set that allows life-scientists to use it as powerful simulation tool
- Their feedback is important for further development
- Presented challenges form exciting research questions

QUESTIONS?

Lukas.Breitwieser@cern.ch
Ahmad.Hesam@cern.ch