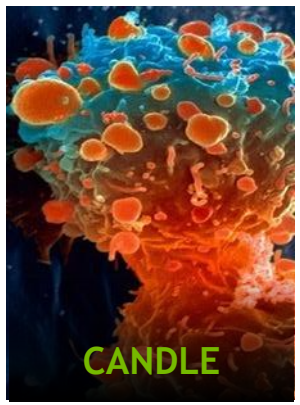
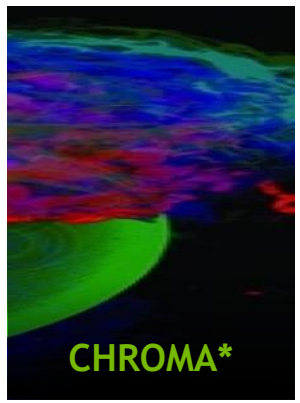
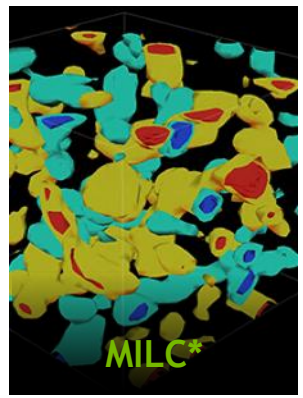
VISUALIZATION CONTAINERS

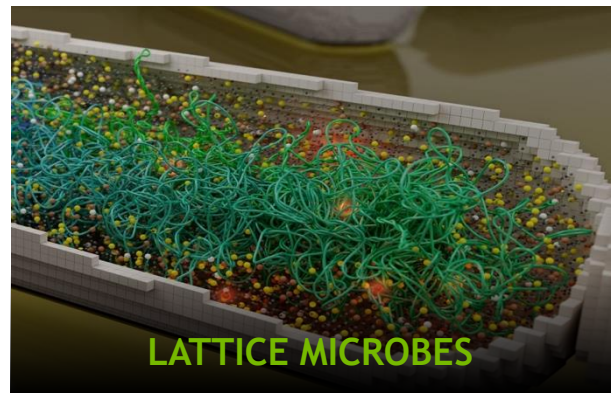
Peter Messmer, 6/15/2018

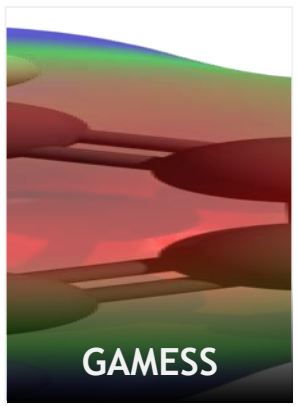
HPC APPS CONTAINERS ON NVIDIA GPU CLOUD

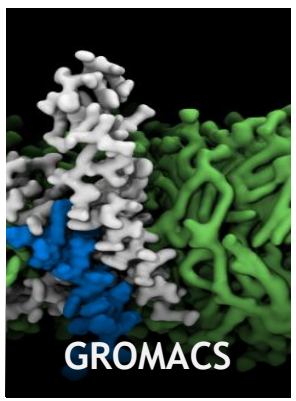


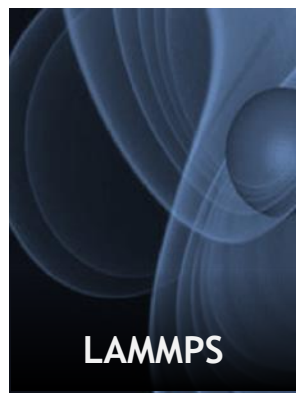


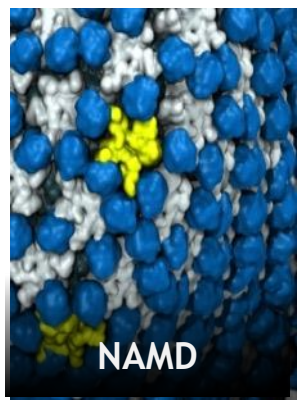


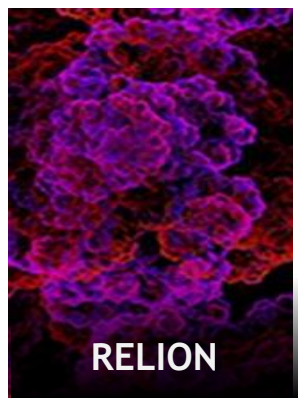












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JOHNS HOPKINS UNIVERSITY

KAUST

京都大学 KYOTO UNIVERSITY

MONASH University

Pfizer

PennState

Schlumberger

Stanford University

UNIVERSITY OF CAMBRIDGE

東京大学 THE UNIVERSITY OF TOKYO

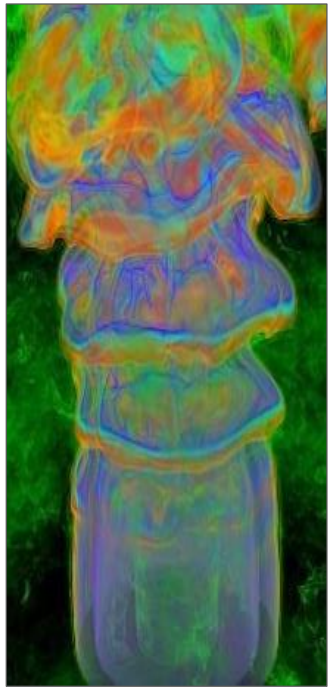
YONSEI UNIVERSITY

RAPID CONTAINER ADDITION

RAPID USER ADOPTION

*Coming soon

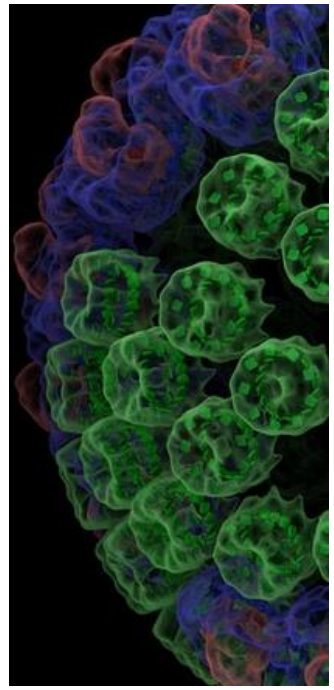
NVIDIA GPU CLOUD FOR HPC VISUALIZATION



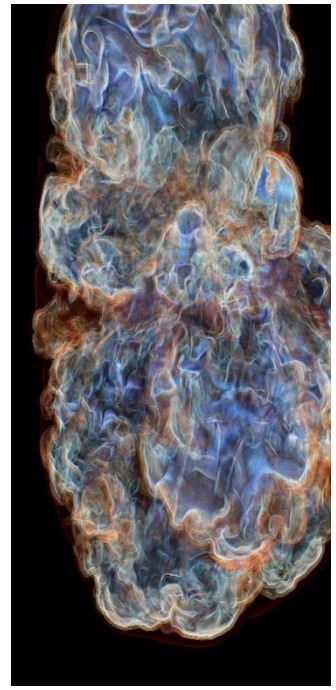
ParaView with NVIDIA IndeX

ParaView with NVIDIA OptiX

ParaView with NVIDIA Holodeck



VMD



IndeX

NEW CONTAINERS

CONTAINERS DRAMATICALLY SIMPLIFY APPLICATION DEPLOYMENTS

Open Source Frameworks

Libraries and Dependencies

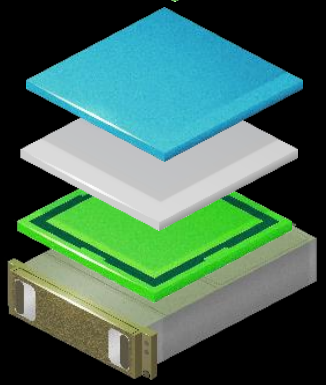
NVIDIA Driver

Host OS

NVIDIA GPU

DIY Complexity

Container
Packaged with all the dependencies to run an application



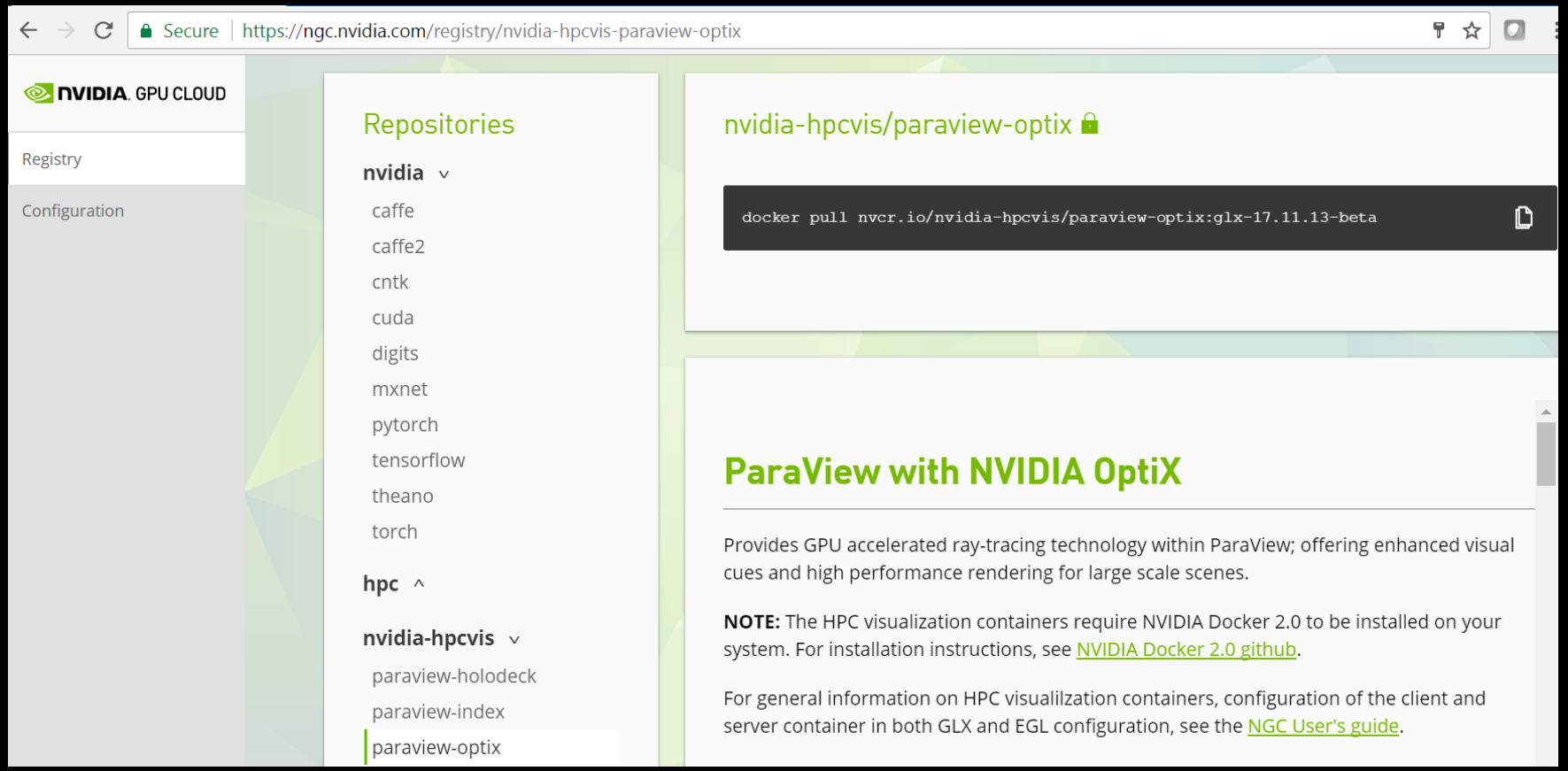
Docker Engine

Host OS

System Hardware

Container Simplicity

HPC VISUALIZATION CONTAINERS ON NGC



CONTAINERS IN A DISTRIBUTED ENVIRONMENT

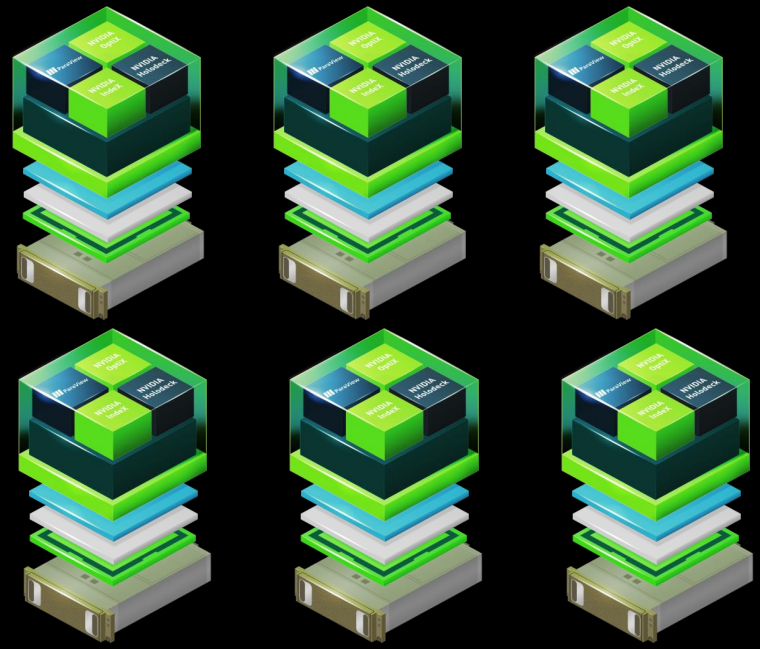
User Interface

Pre-packaged Plugins

GPU accelerated Encoding

GLX and EGL

Client Side Container



Server Side Container

WORKFLOW FOR HPC VIS CONTAINERS

SERVER CONTAINER (EGL)

Pull container

```
docker pull nvcr.io/nvidia-hpcvis/paraview-optix:egl-17.11.13-beta
```

Launch Container

```
docker run --runtime=nvidia -p 11111:11111 --rm -it \
nvcr.io/nvidia-hpcvis/paraview-optix:egl-17.11.13-beta sh -c pvserver
```

Considerations: file system mount points, ports

WORKFLOW FOR HPC VIS CONTAINERS

CLIENT CONTAINER (GLX)

Pull container

```
docker pull nvcr.io/nvidia-hpcvis/paraview-optix:glx-17.11.13-beta
```

Grant access to X

```
XSOCK=/tmp/.X11-unix; XAUTH=/tmp/.docker.xauth;
touch /tmp/.docker.xauth;
xauth nlist :0 | sed -e 's/^..../ffff/' | xauth -f /tmp/.docker.xauth nmerge -
```

Launch Container

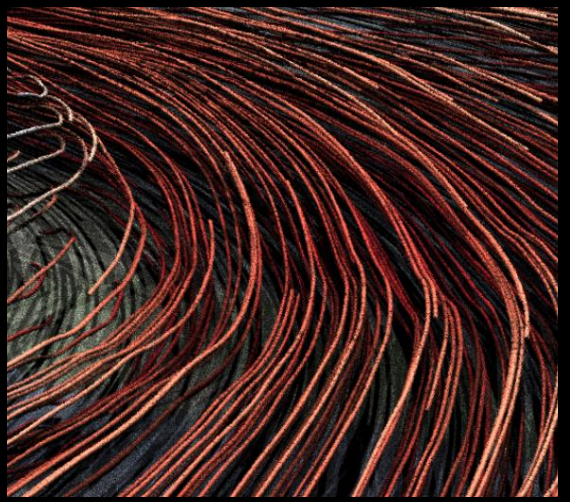
```
docker run --rm -it --runtime=nvidia \
-v /tmp/.X11-unix:/tmp/.X11-unix -v /tmp/.docker.xauth:/tmp/.docker.xauth \
-e XAUTHORITY=/tmp/.docker.xauth -e DISPLAY=:0 \
nvcr.io/nvidia-hpcvis/paraview-optix:glx-17.11.13-beta \
sh -c paraview\ --server-url=cs://your.server.address:11111
```

PARAVIEW WITH NVIDIA OPTIX

GPU RAYTRACING IN PARAVIEW

Based on VTK/OptiX backend

Seamless integration into ParaView



PARAVIEW WITH NVIDIA INDEX

PARALLEL VOLUME RENDERING

Large-scale Volumetric Rendering

Seamless integration with ParaView

Single node support packaged

Contact us for multi-node support

PARAVIEW WITH NVIDIA HOLODECK

HIGH END RASTERIZATION

Target: outreach, education

Advanced shaders, highly responsive interface

Seamless integration into ParaView workflow

Environment known to artists


ADVANCED
VISUALIZATION SAMPLES

OptiX for Visualization

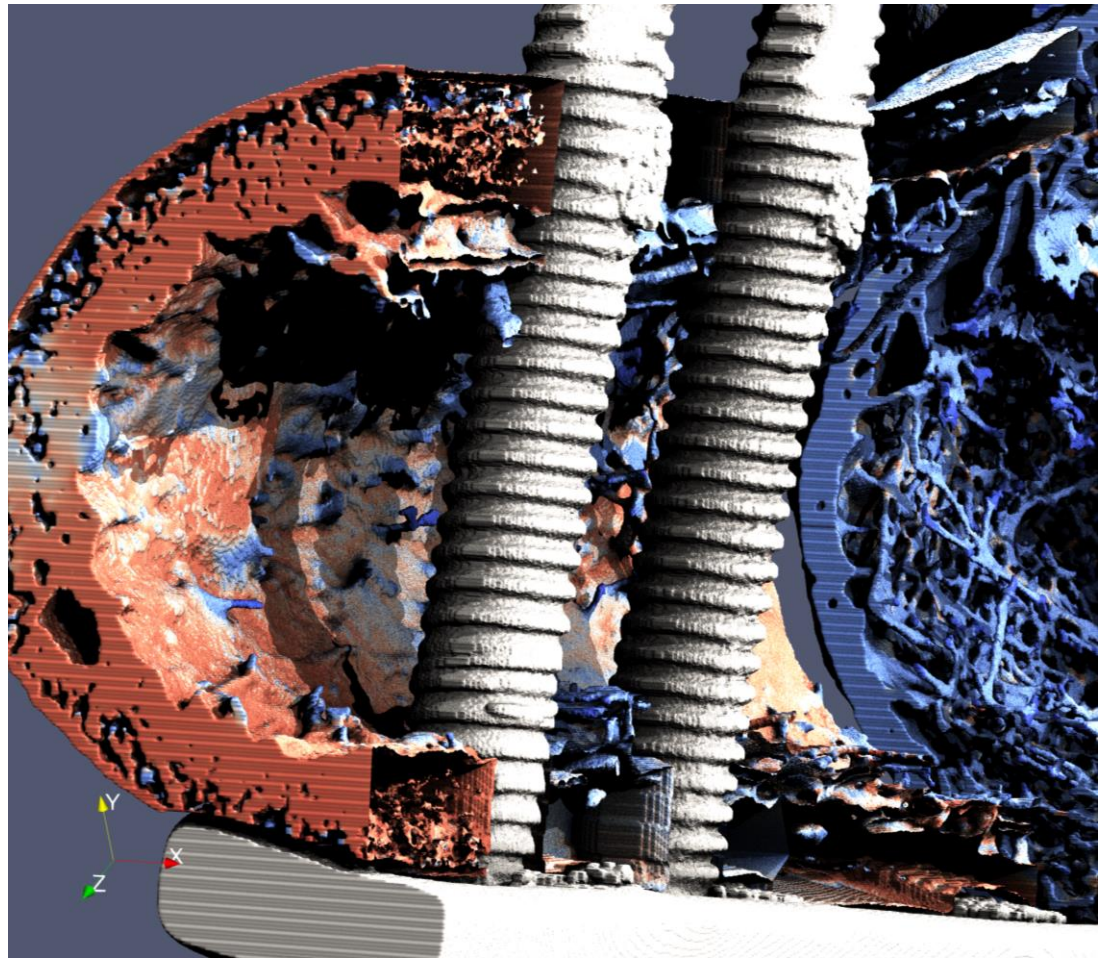
VTK, ParaView

VMD

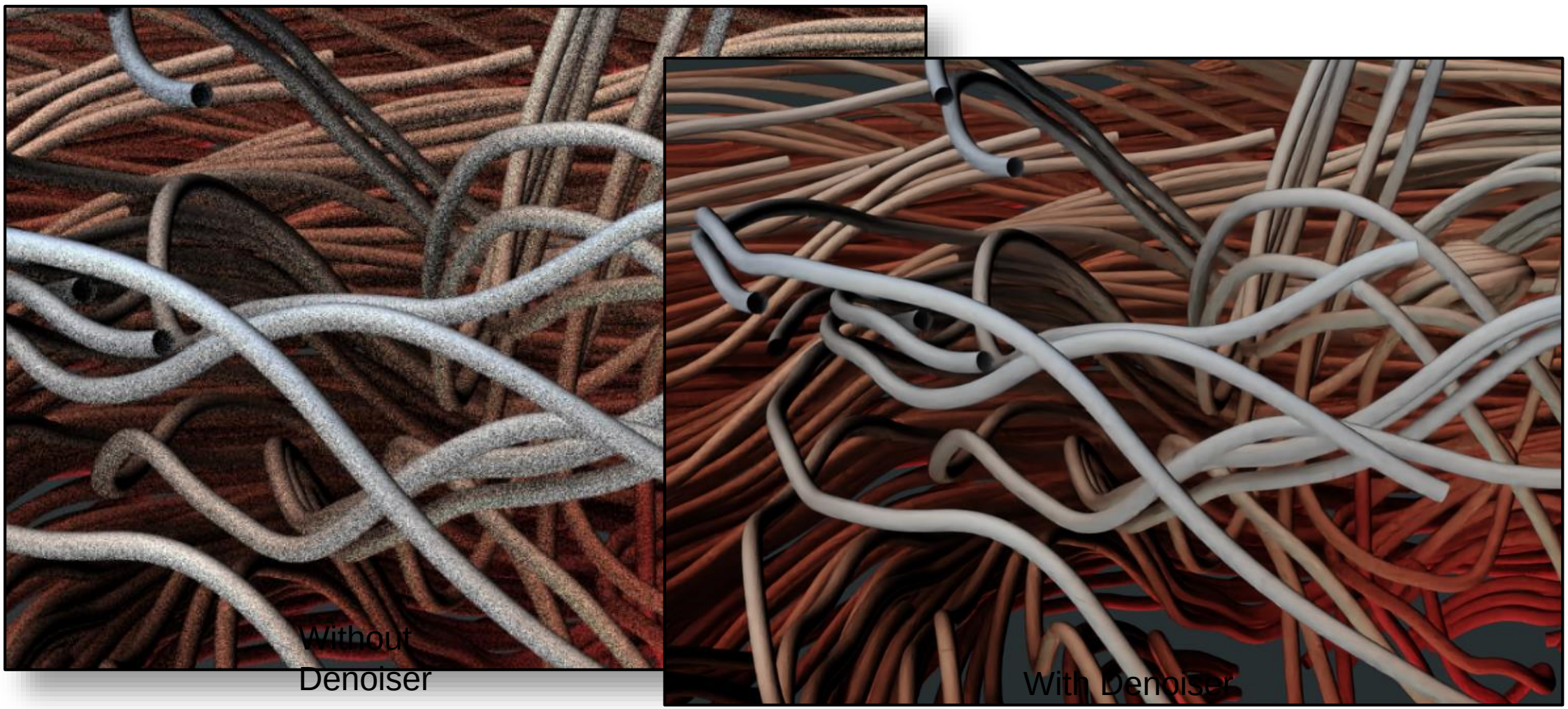
Sight (ORNL)

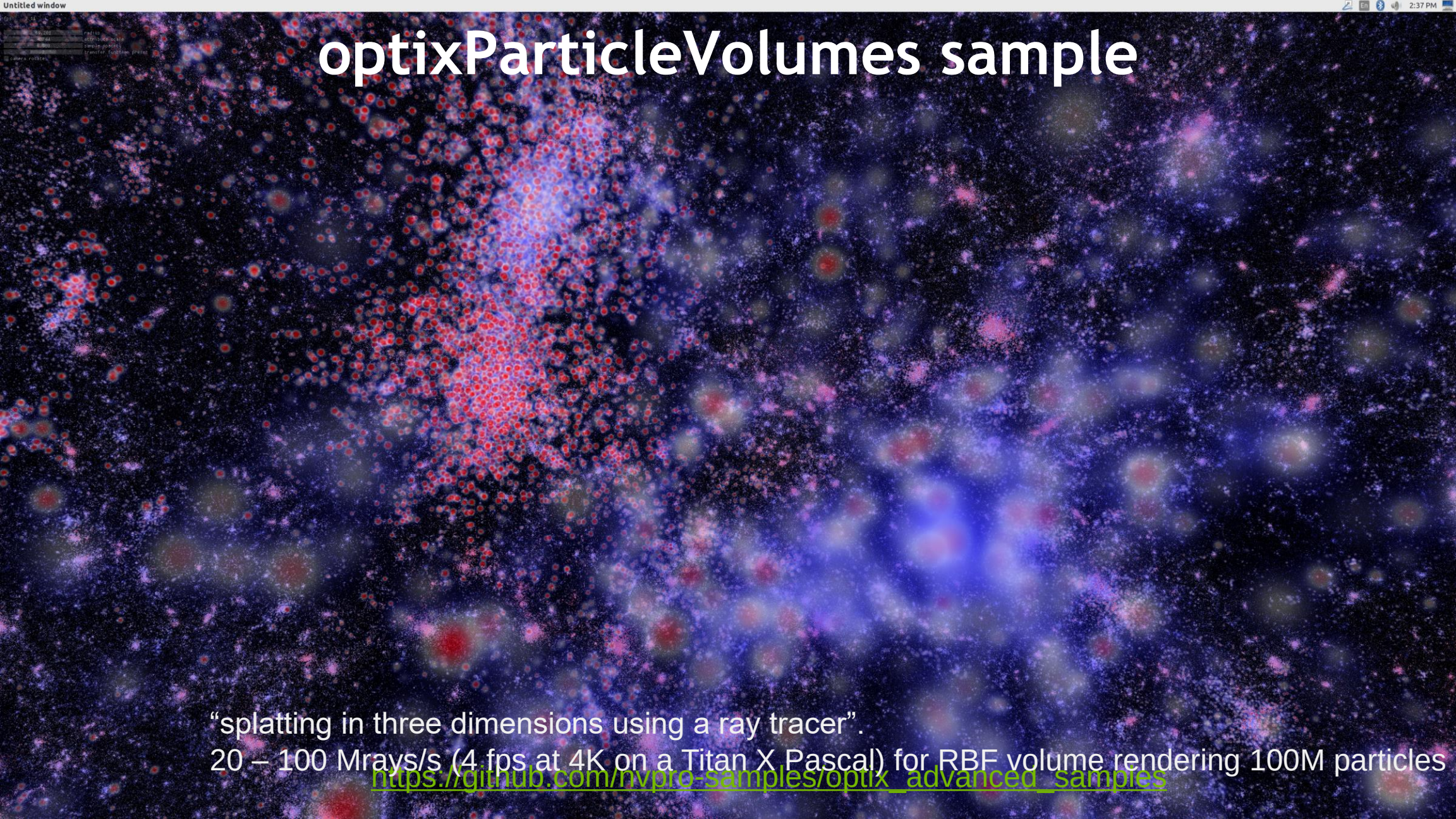
NVIDIA OptiX applications:
- IndeX unstructured volumes
- GVDB
- optixParticleVolumes

Works on Power9/Volta



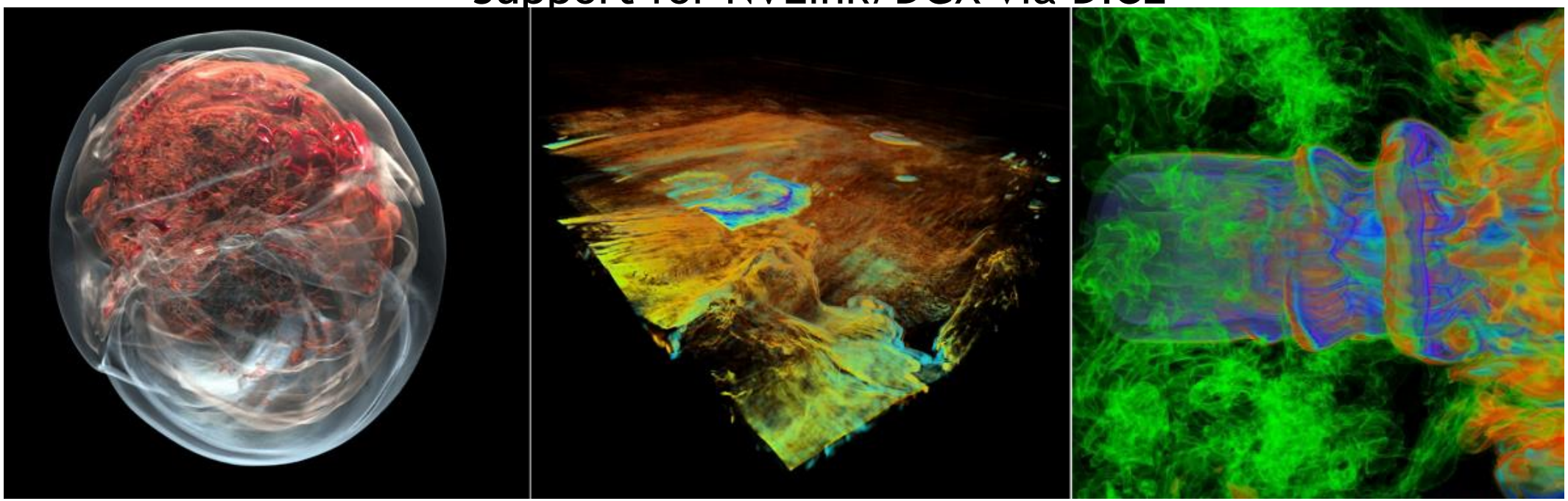
OptiX Denoiser in ParaView

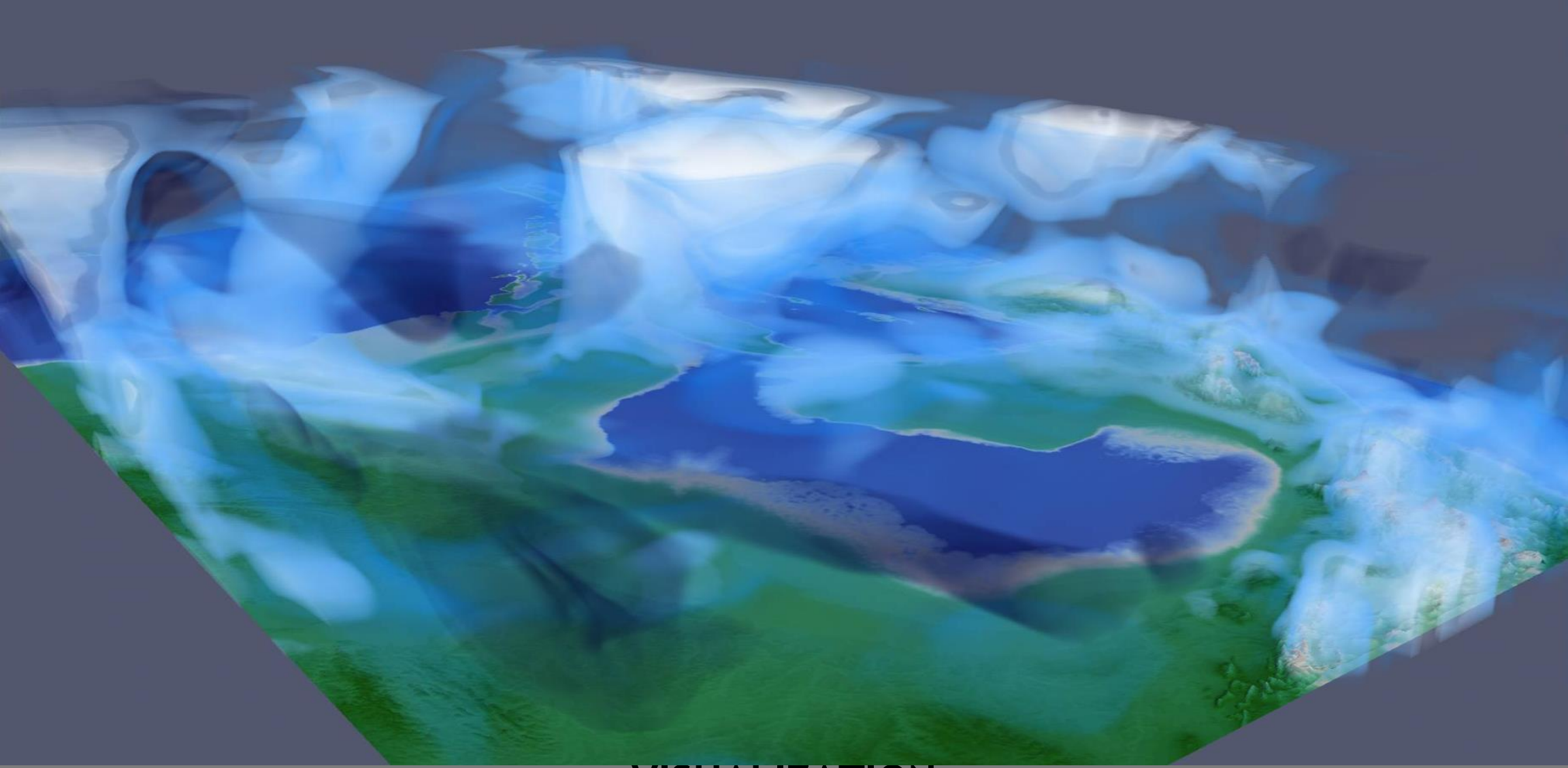



Untitled window
2:37 PM
optixParticleVolumes sample
“splatting in three dimensions using a ray tracer”.
20 – 100 Mrays/s (4 fps at 4K on a Titan X Pascal) for RBF volume rendering 100M particles
https://github.com/nvpro-samples/optix_advanced_samples

NEW IN INDEX 2.0

- User-programmable kernel interface (ex: single scattering)
- Unstructured (tet mesh) volumes using OptiX
- Support for NVLink/DGX via DICE





VISUALIZATION

UFUK TURUNCOGLU, ISTANBUL TECHNICAL UNIVERSITY


NVIDIA