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Quantitative comparison between cosmic web and brain network of neurons.

This page collects the datasets used for the quantitative comparison between the (simulated) cosmic web and microscope samples of the human brain (cortex and cerebellum).

The datasets are used in [Vazza & Feletti](#) and were analyzed with routines as detailed in the paper.

The simulations have been produced on [Piz-Daint at CSCS](#) using the cosmological MHD [ENZO](#) code, as explained in these [project pages](#).

The brain tissue samples of 4 micrometers were obtained with a microtome, formalin-fixed, and paraffin-embedded, and imaged with a Nikon eclipse 50i microscope with a x40 magnification.

The adjacent matrix for each field gives the distance to the nodes, in units of pixels.

All data are shared via the [INAF OWN CLOUD REPOSITORY](#).



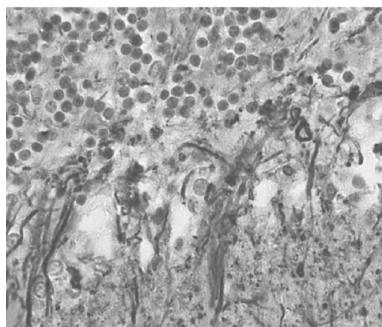
BRAIN SAMPLES

Examples of 4 micrometers were obtained with a microtome, formalin-fixed, and paraffin-embedded. Neuronal

using the Neurofilament (2F11) Mouse Monoclonal Antibody (Ventana/CellMarque/Roche), and the target amplified with the Avidin-Biotin Complex (ABC) method. We used peroxidase-labeled avidin, and diamine to produce the colored label. Samples were automatically processed by Ventana BenchMark Ultra Immunostainer. A 50i microscope was then used to visualize the samples. Magnification higher than 40x was avoided in order to maintain optical depth resolution. We gratefully acknowledge Dr. Elena Zunarelli (Department of Anatomic Pathology, Ospedale Policlinico di Modena, Modena, Italy) for the production of these microscope samples.

BRAIN CORTEX

- 1600x1200 FITS - MICROSCOPE(x 40)
- 1858 x 1858 FITS - ADJACENT MATRIX



CEREBELLUM

- 1600x1200 FITS - MICROSCOPE(x 40)
- 1464x1464 FITS - ADJACENT MATRIX



COSMIC WEB SAMPLES

synthetic samples of the cosmic web, extracted from one of the cosmological numerical simulation with the highest ever resolution elements (2400^3 cells and dark matter particles), performed with the grid code ENZO. You can find more information on [these project pages](#).

This simulation produces a realistic distribution of dark matter, ordinary matter and magnetic fields at the present time, over a representative cosmic volume of 100^3 Mpc^3 .

The simulation gives the projected gas density (g/cm^3) and the projected Dark Matter density (g/cm^3) in the first and second columns of its file, respectively, for 4 slices ($\text{dz}=25\text{Mpc}$) through our simulated volume at redshift 0.

DARK MATTER & GASWEB

- [2400x2400x2 FITS -100 Mpc\(dx=25 Mpc\)](#)
- [2400x2400x2 FITS - 100 Mpc\(dx=25 Mpc\)](#)
- [2400x2400x2 FITS -100 Mpc\(dx=25 Mpc\)](#)
- [2400x2400x2 FITS - 100 Mpc\(dx=25 Mpc\)](#)

DARK MATTER WEB

- [3862x3862 FITS - ADJACENT MATRIX](#)
- [4722x4722 FITS - ADJACENT MATRIX](#)
- [4774x4774 FITS - ADJACENT MATRIX](#)
- [4551x4551 FITS - ADJACENT MATRIX](#)

COMPARISON NETWORKS

In order to provide a simple comparison with other complex structures in Nature, we include sample images (randomly obtained via various methods) of sky cloud formations, tree branches, water turbulence and atmospheric turbulence (in the latter case, obtained from a [MHD simulation](#) by us).

All images are available as .fits files and have been renormalized to an intensity range from 0 to 256.

- [GOTO REPOSITORY](#)



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To the authors' shock, this work has gone viral. See a complete list of media picking up the news [here.](#)