



EGI-InSPIRE

## VisIVO Science Gateway

[U. Becciani](#), V. Antonuccio, M.  
Bandieramonte, A. Costa, M. Krokos,  
P. Massimino,  
C. Pistagna, S. Riggi, E. Sciacca, F. Vitello

[ugo.becciani@oact.inaf.it](mailto:ugo.becciani@oact.inaf.it)





# VisIVO @ Projects



## SCI-BUS (<http://www.sci-bus.eu/>)

- VisIVO Portlet Liferay+Workflows
- VisIVO Mobile

## EDGI project (<http://edgi-project.eu/> )

- Porting on DG Infrastructure (2012)

## EGI-Inspire (<http://www.egi.eu/projects/egi-inspire/> )

- Porting on gLite
- MPI and CUDA on the grid

## Muon Portal (MIUR)

- Nuclear Screening Portal Prototype, Designed To Identify the Contraband of Nuclear Devices and Materials

Man Power	
<u>INAF</u>	<u>3 Staff Pers.</u> + 5 Temp. Pers.
<u>UoP</u>	<u>1 Staff Pers.</u> + 1 Temp. Pers.



# SCI-BUS Motivations



- There are many user communities who would like to access several DCIs (grids, clouds, hpc, clusters) in a transparent way
- They do not want to learn the peculiar features of the used DCIs
- They want to concentrate on their scientific application
- Therefore they need a **science gateway**

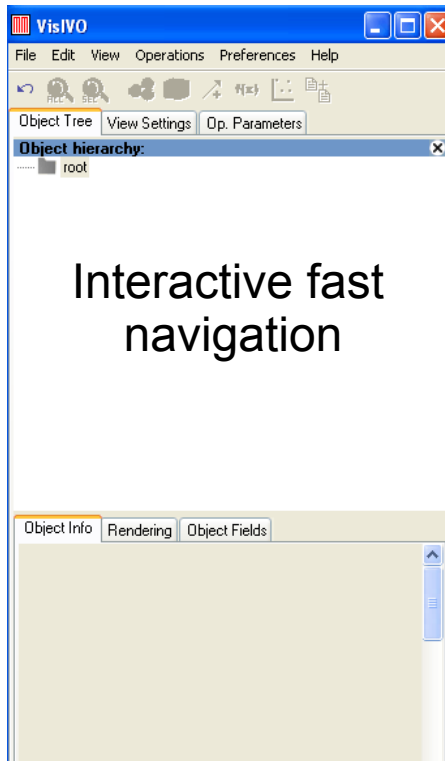


# VisIVO Tools



- Multidimensional Data Exploration →
  - Discovery of unknown data characteristics
  - Searching for:
    - ***Outliers***
    - ***Characteristic regions***
    - ***Special properties***
- Large astrophysical datasets as well as any other multidimensional tabular data from other communities.
- VisIVO is designed to deal with large datasets. It supports many types of data formats:
  - HDF5, VOTables, Binary Tables, Ascii , csv, fits...

# VisIVODesktop



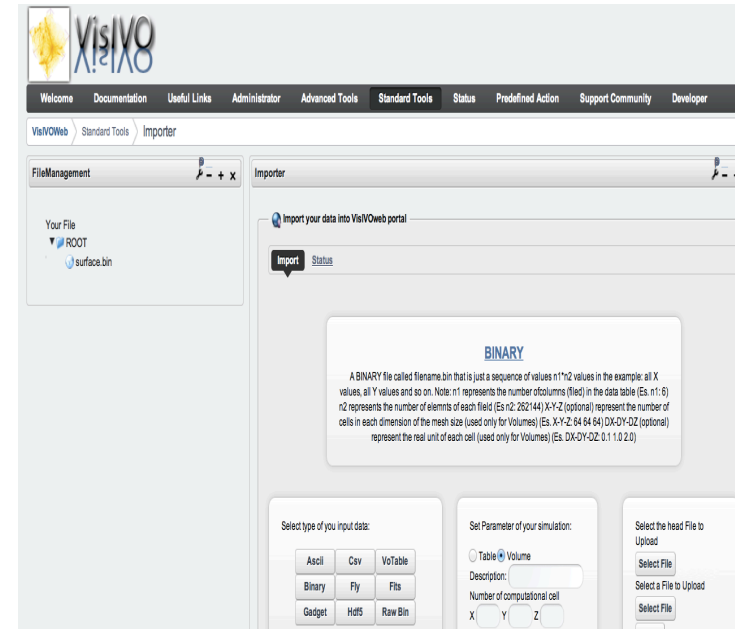
# VisIVO Science Gateway

## VisIVO Server

```
--fformat votable /home/user/  
demo/vizier.xml
```

```
.....  
--x x --y y --z z --color --colortable  
--colorscalar scalar0 --glyphs  
sphere
```

Linux Mac Windows



## VisIVOMobile

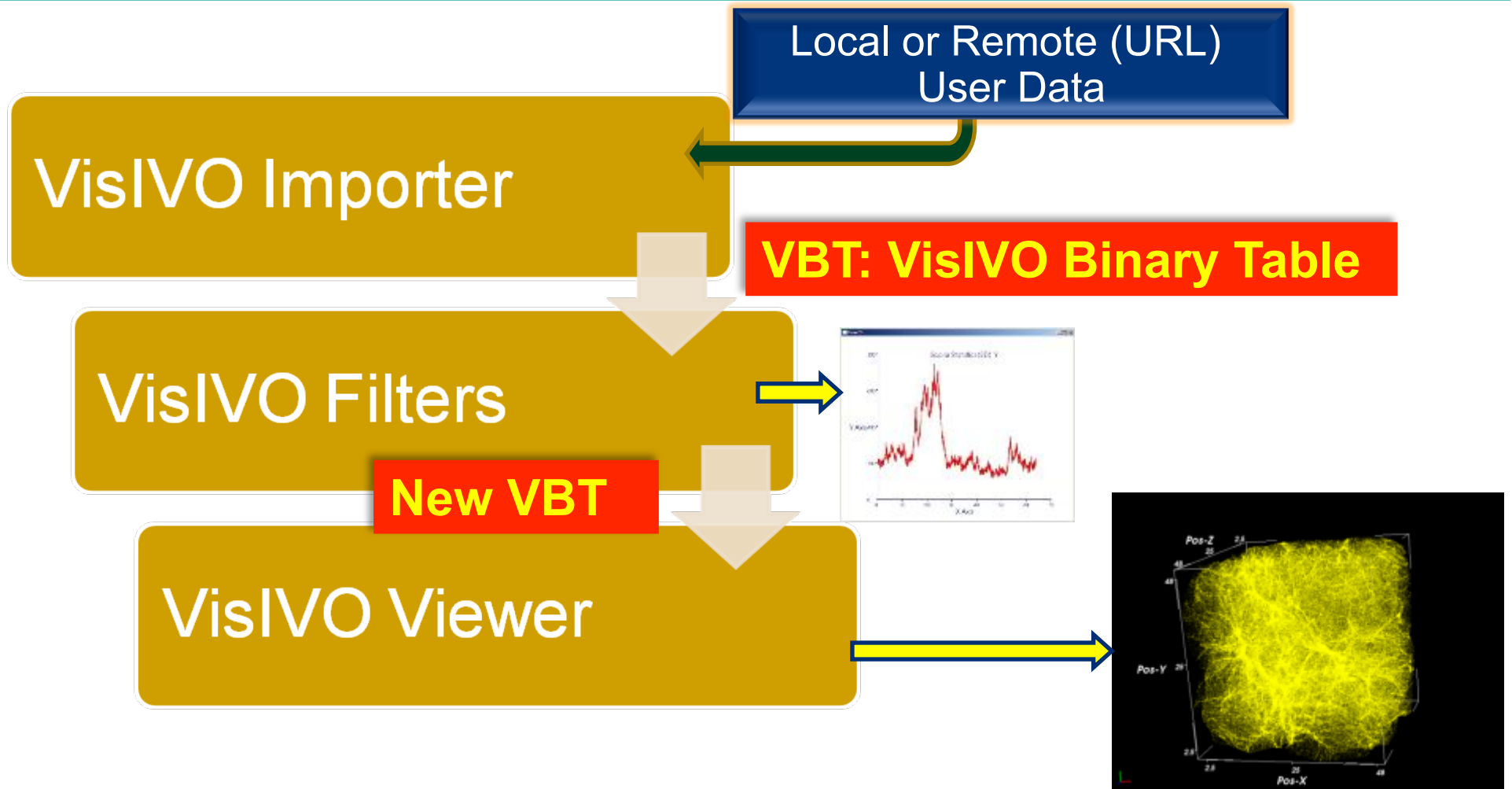
## VisIVO C/C++ Library

*Closely integrated, complementary  
and independent !*



# VisIVO Server

## Basic Architecture





# VisIVO Filters



- **MLR**: Different level of randomization can be given, creating more detail table in the inner sphere and lower detail in the outer regions, or vice versa
- 
- **Extract Subregion**: Creates a new table from an input table: sub-box or sphere extraction.
- 
- **Extract Subvolume**: Produces a table which represents a subvolume from the original volume
- 
- **Math. Operations**: Creates new fields in a data table as the result of a mathematical operation between existing fields
- 
- **Point Distribution**: Creates a volume using a field distribution on a regular mesh
- **Select Rows**: Creates a new table using limits on one or more fields of a data table



# VisIVO Viewer



## VisIVO Viewer

is a command line application that produces 3D images from the binary internal data format table (VBT)

The user must specify three fields of the table for 3D representation.

The user can also customize the view by choosing values such as:

- Camera (azimuth/elevation or position, zoom)
- Opacity
- Point shape (pixel/sphere, cube, cone etc..)
- Palette
- .....
- Alternatively, but in a more intuitive way. A view can be generated by giving the camera and focal point position

OUTPUT: VTK / SPLOTCH

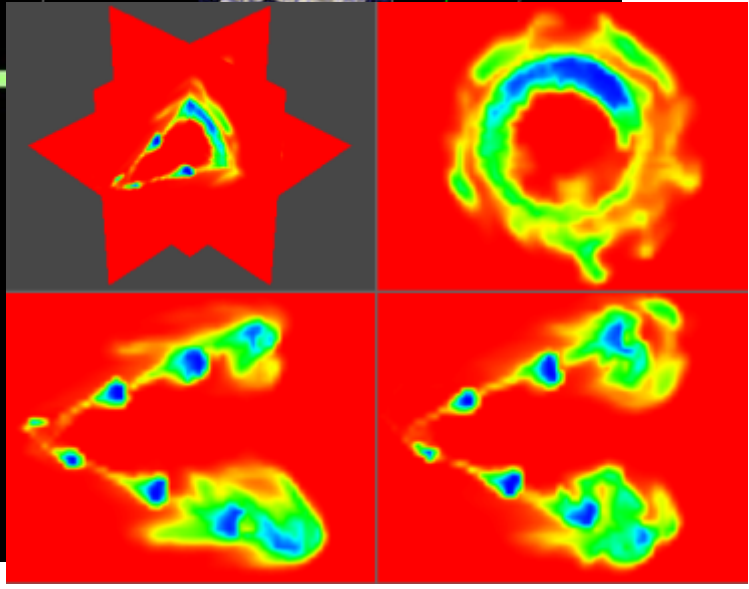
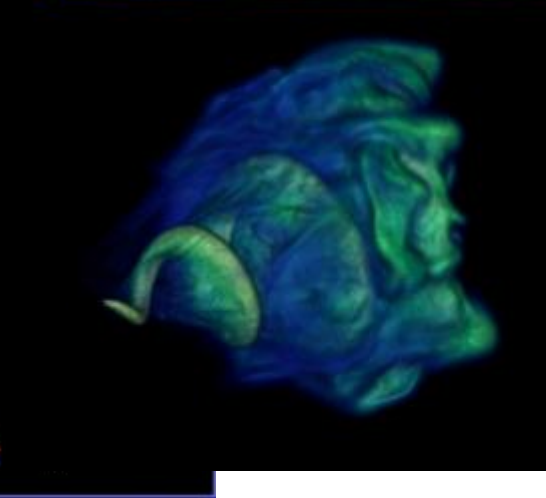
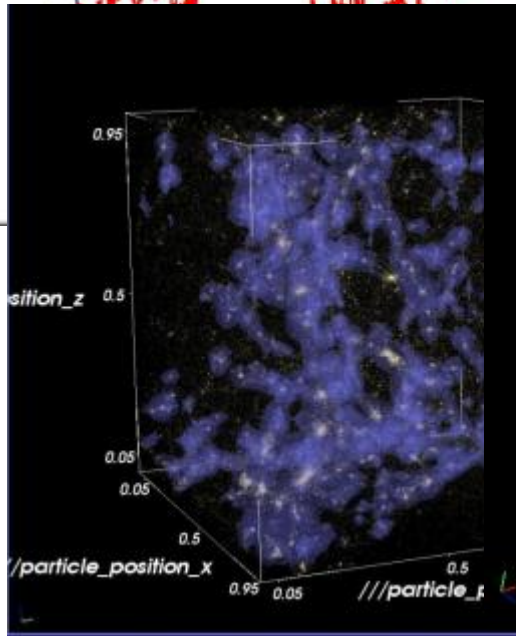
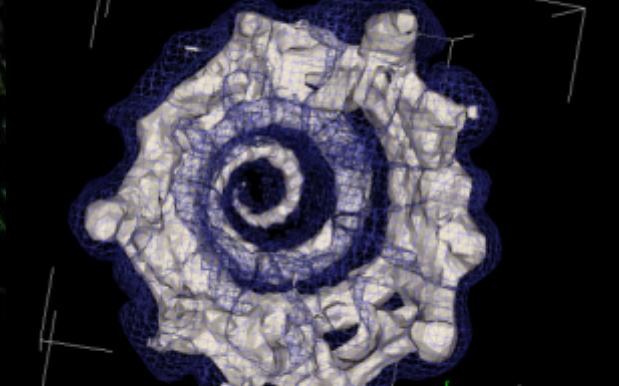
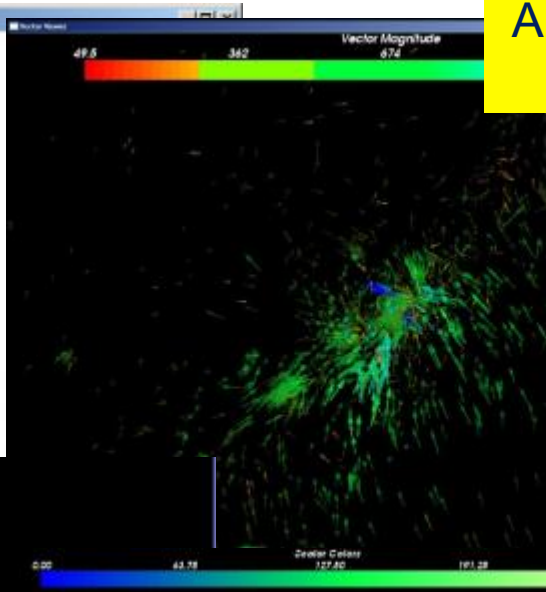
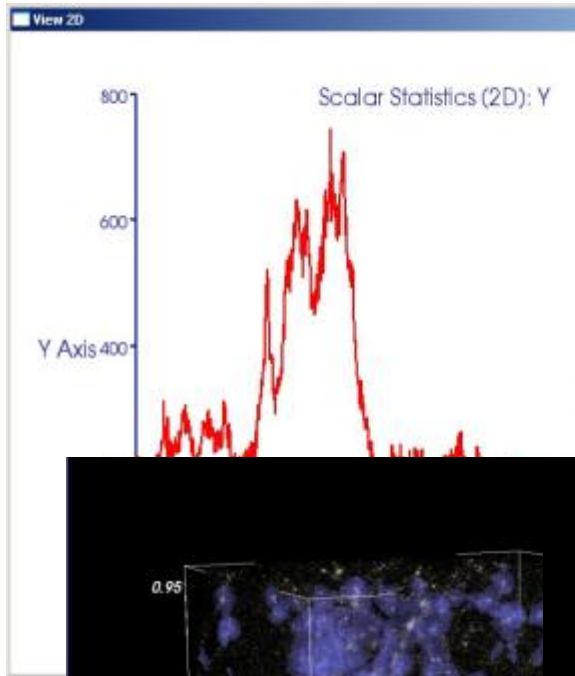




# Visualization



Navigation -- Zoom -- Palette -- Algorithms -- Data selection -- Picker op.





# VisIVO Library: Basic concepts



INAF ISTITUTO NAZIONALE DI ASTRONOMIA E FISICA SPAZIALE

VisIVO Library sets one or more environment variables for each VisIVO component: Importer, Filters and Viewer. The *VisIVO APIs* are used to set the variable attributes

Environments Declaration

**VisIVOImporter** *lenvVariable*

**VisIVOFilter** *FenvVariable*

**VisIVOViewer** *VenvVariable*

Filter Environment Setting

**VF\_SetAtt(FenvVariable, int code, char \*value)**

codes: VF\_SET\_OPERATION, VF\_SET\_OUTVBT,  
VF\_SET\_FIELDS ...

values: randomizer, /home/user/newtab, X Y Z ...

Importer Environment Setting

**VI\_SetAtt(lenvVariable, int code, char \*value)**

codes: VI\_SET\_FFORMAT,  
VI\_SET\_ENDIANISM, VI\_SET\_FILEPATH ...  
values: ascii, bigendian, /home/usermytab, ...

Viewer Environment Setting

**VV\_SetAtt(VenvVariable, int code, char \*value)**

codes: VV\_SET\_CAMERA VV\_SET\_COLORTABLE,  
VV\_SET\_OUT ...

values: camerapos, mypalette, /home/user/myImages  
...




# VisIVO Gateway

<http://visivo.oact.inaf.it:8080>



INAF



 [Sign In](#)

[Welcome](#) [Documentation](#) [Useful Links](#)

VisIVOPortal > Welcome

Welcome

**VisIVO Web Portal** aims to create an astrophysical gateway based on the generic-purpose [gUSE/WS-PGRADE portal](#) family to access **VisIVO** software tools. It has been developed thanks to the [Sci-Bus Project](#).

**VisIVO** is a suite of software tools for creating customized views of 3D renderings from astrophysical data tables. These tools are founded on the **VisIVO Desktop** functionality ([visivo.oact.inaf.it](http://visivo.oact.inaf.it)) and support the most popular Linux based platforms (e.g. [www.ubuntu.com](http://www.ubuntu.com)). Their defining characteristic is that no fixed limits are prescribed regarding the dimensionality of data tables input for processing, thus supporting very large scale datasets.

VisIVO Server websites are currently hosted by the University of Portsmouth, UK ([visivo.port.ac.uk](http://visivo.port.ac.uk)), the INAF Astrophysical Observatory of Catania, Italy ([visivo.oact.inaf.it](http://visivo.oact.inaf.it)) and in the near future by CINECA, Italy ([visivo.cineca.it](http://visivo.cineca.it)). These web sites offer data management functionality for registered users; datasets can be uploaded for temporary storage and processing for a period of up to two months. The sites can also be utilized through anonymous access in which case datasets can be uploaded and stored for a maximum of four days; to maximize available resources a limited dimensionality is only supported.

Assuming that datasets are uploaded, users are typically presented with tree-like structures (for easy data navigation) containing pointers to **files**, **tables**, **volumes** as well as **visuals**.

**Files** point to single, or possibly several (for distributed datasets), astrophysical data tables;

**Tables** are highly-efficient internal VisIVO Server data representations; they are typically produced from importing datasets uploaded by users using VisIVO Importer (see below);

**Volumes** are internal VisIVO Server data representations; they are produced either from direct importing of user datasets or by performing operations on already existing tables;

**Visuals** are collections of highly customized, user-produced views of 3D renderings of volumes

**Sign In**

Email Address

Password

[Facebook](#) [OpenID](#) [Create Account](#)  
[Forgot Password](#)



# VisIVO Gateway

## VisIVO Importer



### VisIVO Importer

VisIVO Importer      VisIVO Filters      VisIVO Viewer

#### ASCII

ASCII files are expected to be in tabular format. The file can contain N variables organised in columns. Each column represent a different array. Columns are separated by blank characters (space, tab, etc.). In the first row the names of the variables are stored.

#### Select the type of your input data

Ascii	Csv	VoTable
Binary	Fly	Fits
Gadget	Hdf5	Raw Bin

#### Set parameter of your simulation

Description

Table  
 Volume

#### Select a File to Upload

Remote

Select File

File Name



# VisIVO Gateway

## VisIVO Viewer



INAF

INAF - Osservatorio Astronomico di Brera  
NATIONAL INSTITUTE FOR Astrophysics



Welcome VisIVO Tools Advanced Tools Predefined Workflows Community Documentation Useful Links

VisIVO Gateway VisIVO Tools VisIVO Viewer

FileManagement

Help

Your Files

- ROOT
  - myfile.out
  - RamsesStandard.bin
  - RamsesStandard.bin\_Decimator
  - RamsesStandard.bin\_Decimator1
  - RamsesStandard.bin\_Decimator\_Grid2Point
  - RamsesStandard.bin\_Decimator\_Grid2Point\_1.png
  - RamsesStandard.bin\_Decimator\_Grid2Point\_1.png.mp4
  - RamsesStandard.bin\_PointDist
  - scattPoint\_run011\_ext.out
  - scattPoint\_run011\_ext.out.1.ona

VisIVO Viewer

VisIVO Importer

VisIVO Filters

VisIVO Viewer

View your data into VisIVOweb portal : RamsesStandard.bin\_Decimator

Points Vectors Splotch

On Line Help

Select the coordinates:

X: X Log Scale:   
Y: Y Log Scale:   
Z: Z Log Scale:

Scale

Opacity 0.06

Shape Pixel Radius: null Height: null

Scale Shape:

View

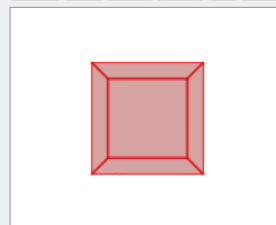
Basic Palette Advanced Palette Palette

BackColor: Black

Show Palette  Show Box  Show Axes  Stereo

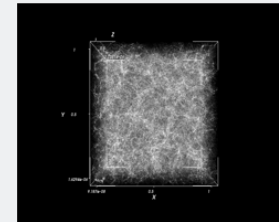
Image size Medium

Azimuth: 0 Elevation: 0 Zoom: 1  
FRONT LEFT RIGHT DOWN UP BACK



Change Azimuth and Elevation values using your mouse to drag the 3-d cube.  
To zoom in and out, hold the shift button and again drag the model.

Save



Viewer Param File



# VisIVO Gateway

## Panoramic View



**FileManagement** [ - + x ]

Your File

- ▼ ROOT
  - vectorView
  - ▼ my data
    - clusterfields4.ascii
    - myData
    - surface.bin
    - starmap.out
  - ▼ Movie
    - ▶ myMovie1
    - ▶ myMovie2
    - ▶ dataMovie
    - ▶ vectorView
  - ▼ Pictures
    - point
    - surfa
    - splotchV

**Generate Movie**

The movie is being created

A 3D visualization of a star field or galaxy cluster. The axes are labeled X, Y, and Z. The X-axis ranges from 0 to 1, with a tick at 0.5. The Y-axis ranges from 0 to 1, with a tick at 0.5. The Z-axis ranges from 0 to 1, with a tick at 0.5. The visualization shows a dense field of stars or points, with a central region highlighted by a white box. Numerical labels are present: 1.0341e-06 near the top center, 1.6294e-06 near the bottom left, and 9.187e-08 near the bottom center.

Rename  
Properties  
Delete  
View  
Movie



# VisIVO Gateway

## Infrastructures



- **Trigrig Cluster** - AMD Dual Opteron 280 2.4 GHz, 14 Blades with 4 cores with 8 GB RAM / Blade (**52 CPU core**) - Total storage: 3.7 TB (lsf)
- 2 X Server Intel Xeon 3060 2.4 GHz, Dual-Core, 2 GB RAM - Total storage: 23 TB
- Server Intel Xeon 3050 2.13 GHz, Dual-Core, 2 GB RAM - Total storage: 8 TB
- **Hybrid system** cpu-GPU, N 2: Intel(R) Xeon(R) CPU E5620 @ 2.40GHz, **24 GB RAM** DDR3-1333 NVIDIA TESLA C2070, **448 cuda core** + 6 GBRam
- **COMETA grid** – gLite nodes ~1500 CPU/core (**250 hosted at INAF-OACT**) AMD Dual Opteron 280 2.4 GHz (**jdl**)



# VisIVOMobile



INAF



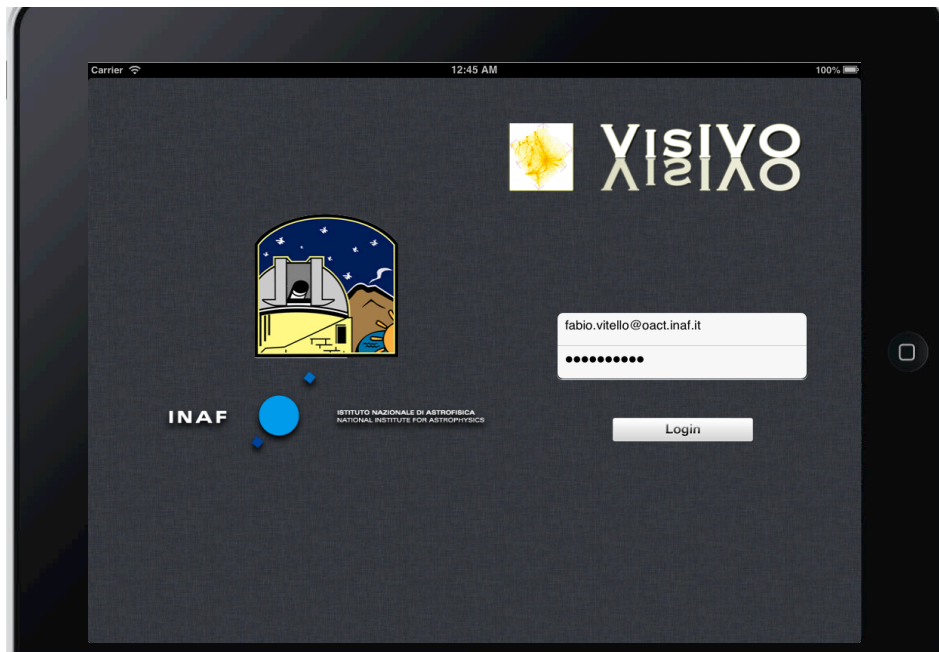
VisIVOMobile is an iOS universal application







# VisIVOMobile



VisIVOMobile iOS application allows user to log in into VisIVO Gateway to:

- Manage his data
- View/create image/movie
- Execute and create new WFs



# Demo Movie



INAF



ISTITUTO NAZIONALE DI ASTROFISICA  
NATIONAL INSTITUTE FOR ASTROPHYSICS



# VisIVO in the future



Oriented to → collaborative environments: a new VisIVO Desktop, social networks, user forum, communities support etc

Cloud → Horizon 2020 (Follow up of SCI-BUS, EDGI, TOK etc)

Visual Analytic (Via Lactea FP7) : extended features

Science Gateway: extended portlets

Back to the Future  
VisIVO extension → Virtual Observatory





80,000 Visitors each year

- < Return Home
  - [Visitor Admission Prices](#)
  - [Map, Directions & Public Transport](#)
  - [Events](#)
  - [About Gift Aid](#)
  - [About Us](#)
  - [Birthday Parties](#)
  - [Contact Details](#)
  - [Frequently Asked Questions \(FAQ\)](#)
  - [INTECH supporters](#)
  - [Visitor Facilities](#)
- Site Tools
- [Print this page](#)
  - [Site map](#)

Contact Details

By Post  
INTECH, Telegraph Way, Morn Hill, Winchester, Hampshire, SO21 1HZ

By Telephone  
General Enquiries: 01962 863791  
School Bookings: 01962 891900  
Corporate Hire: 01962 891904

By Fax  
General: 01962 868524

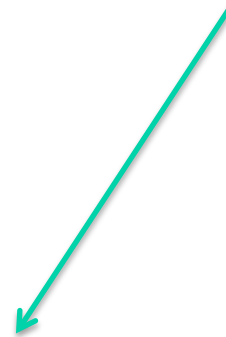
By E-mail  
General: [hctb@intech-uk.com](mailto:hctb@intech-uk.com)

Last Modified: 24/06/2010

EDGI  
SCIBUS

VisIVO Corner

Awards for using  
VisIVO SG



iPads

2013-2014  
INTERNATIONAL  
COMPETITION

Awards for  
Scientific  
movie

3,000/6,000 Euros  
for the most  
challenging  
movies