The role of interactive visualization in blind surveys of *HI* in galaxies

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 university of groningen APERTIF: data rate 10 cubes/week. We will enter in the *Big* data domain for two reasons:



Overview



3-D in Qualitative visualization of a HI dataset

Zoom of a galaxy in the Perseus-Pisces super-cluster mosaic (Ramatsoku et al. in prep.).





3-D advantages:

Overview of coherent structures along the velocity (e.g. Tails); Discovering sublte structure (very low singnal-to-noise data).

linked 2-D/3-D views in 3-DSlicer

3-D disadvantages

Input issues: Mouse interaction (e.g.data probe);

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Output issues: projection (rendering) effects.

Input solution: Retrieve pixels value from 2-D.

Output solution: Interactive ColorTrasferFunction blue surface: data with 15" resolution at 3σ

green surface: data with 30" resolution at 3σ



The 2-D Slices are linked with the 3-D.





3-DSlicer → SlicerAstro

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Snapshot of 3-DSlicer interface

Why 3-DSlicer?

- Open-Source;
- Volume Rendering (VTK);
- Modern interface (QT);
- High level of modularity (C++);
- Presence of documentation and long-term maintainability.

Punzo et al., submitted

3-DSlicer → SlicerAstro

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Snapshot of 3-DSlicer interface

TO DO List:

- Proper visualization of astronomical data cubes;
- Interactive quantitative analysis of HI sources;
- Interactive HI data modelling coupled to visualization;
- Interoperability with Topcat, other VO tools and catalogues.

Punzo et al., submitted

Final Remarks

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99% of the APERTIF datacube will be noise. The sub-regions of meaningful information will be of typical size of $\sim 10^5$ voxels;

Visual Analytics can boost the inspection process;

A combination between 1-D/2-D/3-D and High-dimensional visualization can be a powerful tool;

The key features are interactive visualization in all its aspects and supervised semi-automated analysis.