QuickViz : a 3D viewer for IFU data cubes

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http://lsiit-miv.u-strasbg.fr/paseo/cubevisualization.php

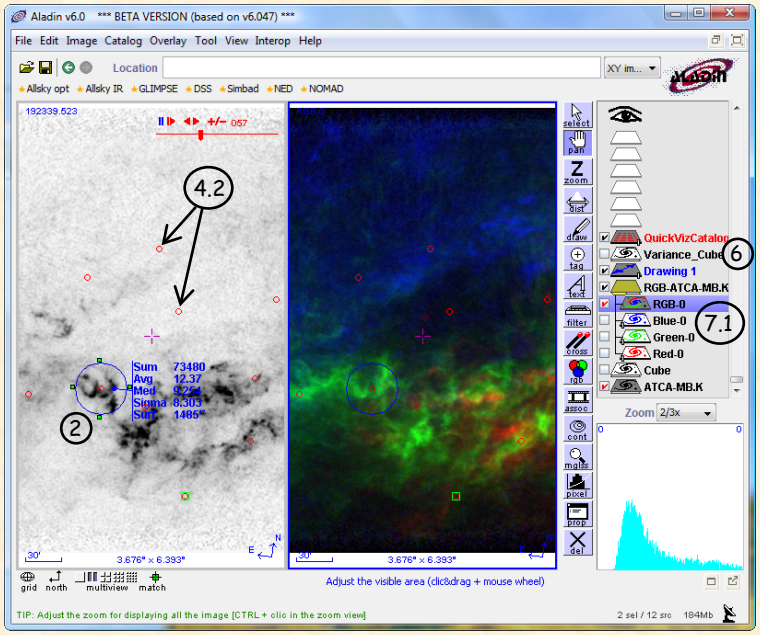
- **Hyperspectral observations** (2D + λ) and their related **parameters** (variances, PSF, metadata…) are large data whose **visualization**, **analysis** and **handling** are crucial for observational sciences in astronomy but can no longer be tackled by existing softwares
- Indeed, the **size**, the **complexity** and the **heterogeneity** of such image cubes require new tools for data exploration and understanding
- We then propose a new **cross-platform visualization and analysis software** named **QuickViz** based on the **Aladin** software (developed at the CDS, Strasbourg) providing a set of basic and advanced features that ease the **exploration of hyperspectral data cubes**. 2D visualization and astronomical features (calibration management, catalogs…) are provided by Aladin whereas spectral processing is performed by QuickViz

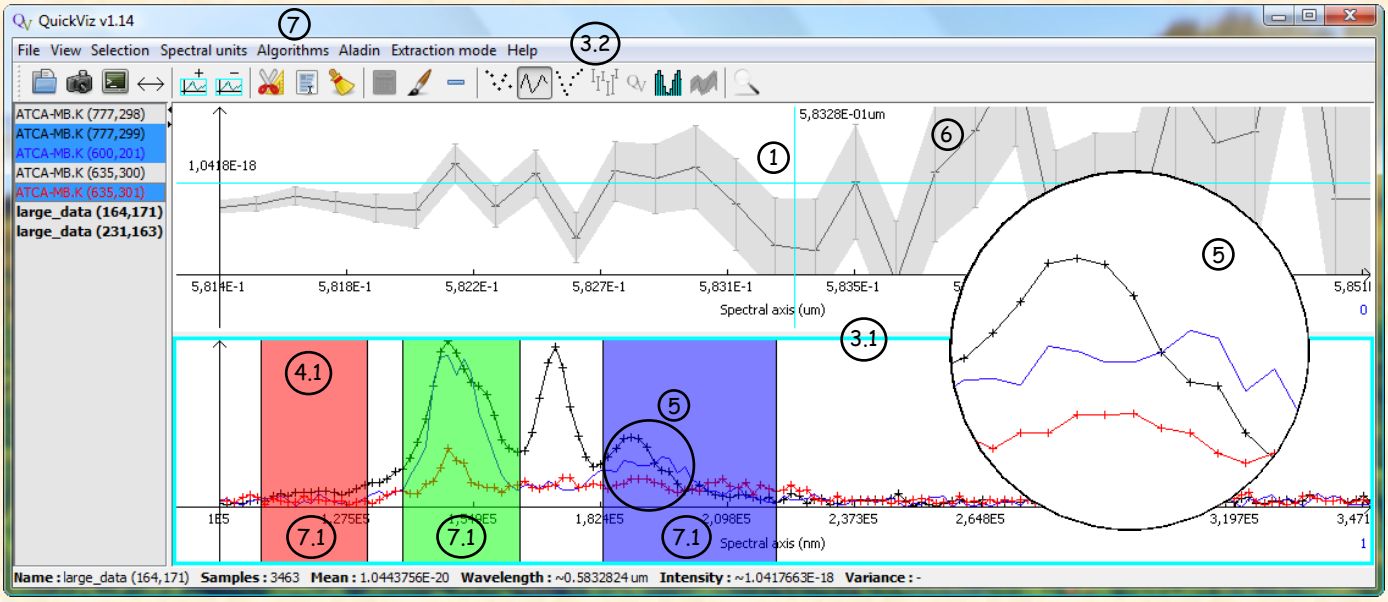
Functionalities

1. **Navigation coupling** between spatial and spectral axes with real-time update on spatial and **spectral cursor**
2. **Spectral extraction** within the cube with multithread support for data upload : single spectrum under cursor or the averaged spectrum over a user-defined region
3. **Spectrum visualization**
   1. **Superposition, multiview** (synchronized or not), properties and spectral calibration edition
   2. **Display customization** for spectra : several modes, units, representations available
4. **Management of crossed selections**
   1. Band selection → average, sum image…
   2. Position selection → average, single spectrum comparison
5. **Zoom** in and out on a spectral range
6. **Variance visualization** associated to spectra if available (PSF visualization is still in development)
7. **Data processing** on selected data
   1. **RGB composition**
   2. **Spectrum and frame operations** (mean, sum, variance weighted sum…), cube cut-outs computation
   3. **User customized algorithms**

Application Design

- **Written in Java** for portability
- **Plugin architecture** docked on Aladin platform : **VO interaction, image and catalog handling** inherited
- **Extensible classes for new algorithms and visualization modes**





Development Perspectives

- **Statistical or instrumental parameters visualization in 2D** (like cube associated variance or PSF variation) is currently being tested and will be available in a future release
- **Support of the HDF file format** for handling very large data cubes with complex metadata (only FITS format is supported so far)
- **Virtual Observatory interaction** : the finer astronomical analysis of spectra will be delegated to other VO tools (like SPLAT or VOSpec) thanks to the implementation of the SAMP protocol
- Suggestion for **VO compliant** description of metadata for observed data cubes in collaboration with the IVOA Datamodel working group

This work is funded by the French Research Agency (ANR) as part of the DAHLIA project (http://dahlia.oca.eu)

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