

JNanocubes

On-the-fly generation of HiPS density maps
for exploration and visualization of
large datasets



What is Nanocubes ?

Nanocubes¹ is an **in-memory data structure** developed by AT&T Research for real-time visualization of large datasets. Basically it **generates density maps dynamically**. The user can put constraints on **pre-defined categories** and/or on a **pre-defined discretized parameter**.

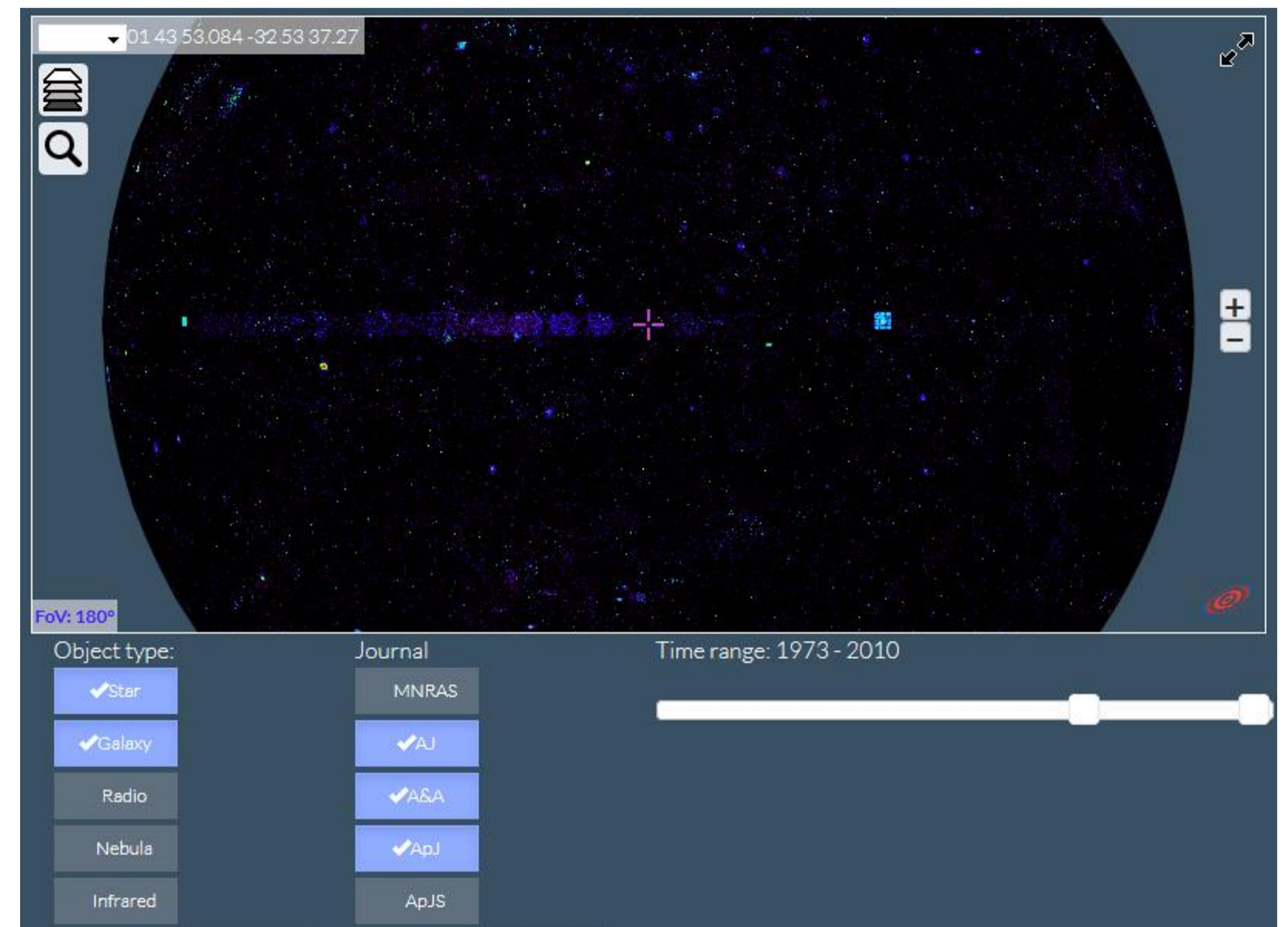
... and technically ?

Nanocubes stores at various spatial resolutions **pre-computed sets of dense cumulative histograms** : one set by pixel. It is very efficient but inherently redundant. Nanocubes is particularly suitable for sparsely distributed data. It is written in C++ and the source code is open.

JNanocubes : Nanocubes at CDS

JNanocubes is the Java prototype implementation of Nanocubes at the CDS. The code has been designed from the reference paper. It is not a translation of the C++ code. JNanocubes uses the HEALPix tessellation and generates **on-the-fly HiPS² density maps** visualized through **AladinLite**.

Example of JNanocubes datastructure applied on SIMBAD data with two categories (Object type and Journal) and one parameter (Year of publication) . Demo made for ADASS XXIV.

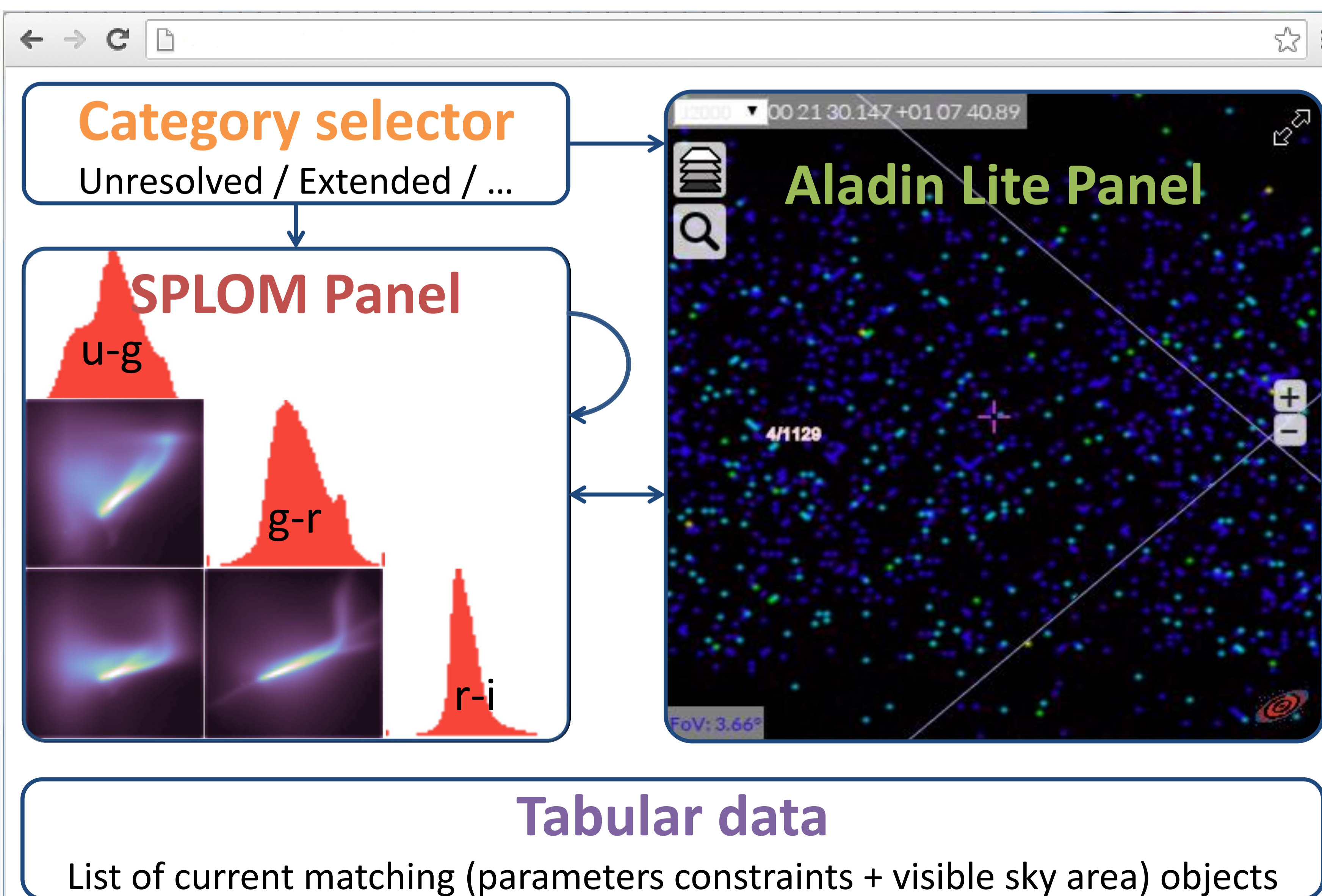


HiPS showing the number of Stars and Galaxies published in AJ, ApJ and A&A between 1973 and 2010.

What's new ?

We have been designing a **serialized version enabling the creation of data structures larger than the available RAM**. It allows persistence and the use of various JNanocubes on a same machine. This also allowed us to add **support for additional parameters in the JNanocubes data structure**. The user can put **constraints in the scatterplot matrice (SPLOM)** used to visualize the multidimensional set of parameters. Technically, we internally resort to cumulative histograms made on space-filling curves indices. One space-filling curve is created for each possible subset of parameters.

Web browser layout design and panel interactions



Select a set of categories

- Updates the SPLOM panel
- Updates Aladin Lite density map

Draw constraints on parameters in the SPLOM panel : select histogram(s) range(s), select heat map(s) region(s)

- Updates the SPLOM panel
- Updates Aladin Lite density map

Zoom and pan in Aladin Lite

- Automatically updates the SPLOM panel
- Ask for original sources matching constraints on parameters in the current AladinLite view
- Fill tabular data panel

Références:

1. www.nanocubes.net
2. [2015A&A...578A.114F](https://arxiv.org/abs/2015A&A...578A.114F)



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