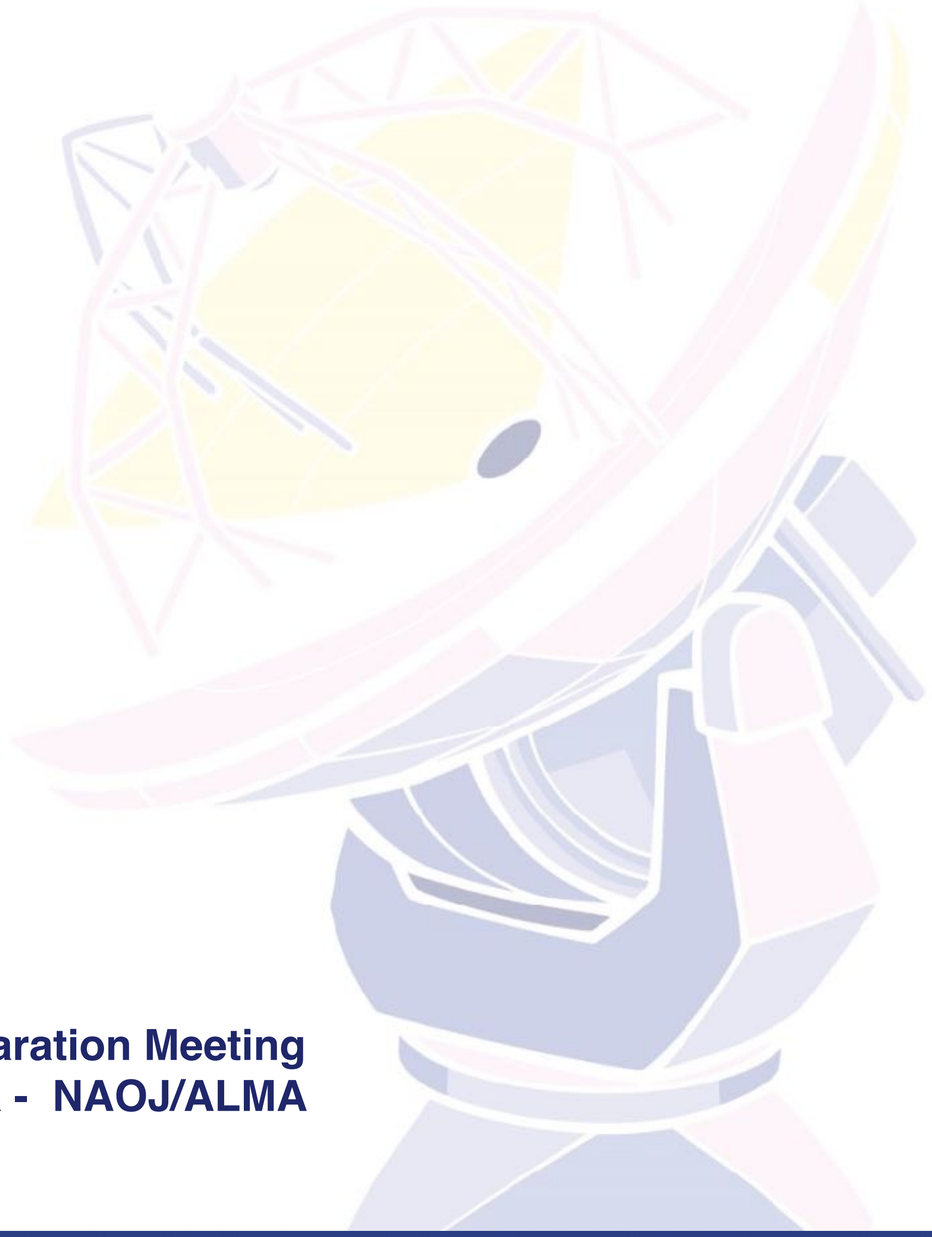
Observing Tool

Quick guide and new features - Cycle 10



ALMA Cycle 10 Proposal Preparation Meeting
Jorge A. Zavala - NAOJ/ALMA

- Note that in order to submit proposals you will have to **register** with the ALMA Science Portal beforehand

- Proposers **must** use the appropriate version of the OT for the cycle 10

https://almascience.nao.ac.jp/proposing/observing-tool

About | Science | Proposing | Observing | Data | Processing | Tools | Documentation | Help

Tools menu:
- Observing Tool
- Sensitivity Calculator
- CASA Simulator
- Observation Support Tool
- Splatalogue
- Science Ready Data Products
- Toyama Microwave Atlas
- Community-Developed
- EU ARC network
- Staff Tools
- Japanese Virtual Obs.
- Solar Ephemeris

Observing Tool

The ALMA Observing Tool (OT) is a Java desktop application used for the preparation and submission of ...als (Scheduling Blocks). It is also used for preparing and submitting Director's Discretionary Time (DDT) proposals and Su... f the OT is configured for the present capabilities of ALMA as described in the Cycle 9 Call For Proposals. Note that ...ce Portal beforehand.

Download & Installation

The OT should run on all common operating systems and depends on a version of Java being available. I... that a suitable version of Java was installed, but the Cycle 9 version of the OT will come with its own version of Java 11 ... Unfortunately, as Java 11 does not include Web Start, this version of the OT is no longer available. The Cycle 9 OT can be ... h a tarball distribution.

It is recommended that the OT be installed using the ALMA **OT Installer**. This uses a modern graphical in... nge various settings from their defaults, including the amount of memory the OT may use. The installation will produce an exe... ... the tool are no longer possible, but the OT will detect if an update is available at start-up and inform the ...

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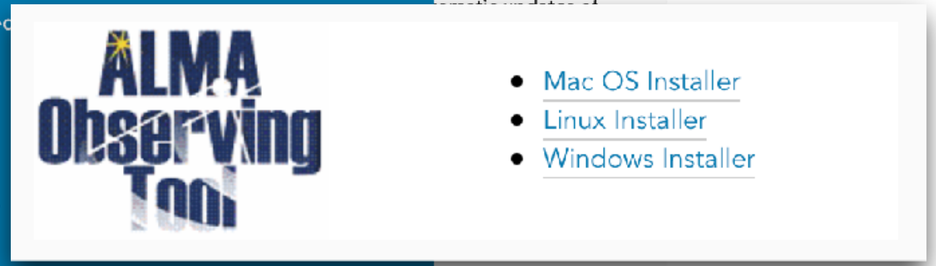
Installer



Documentation

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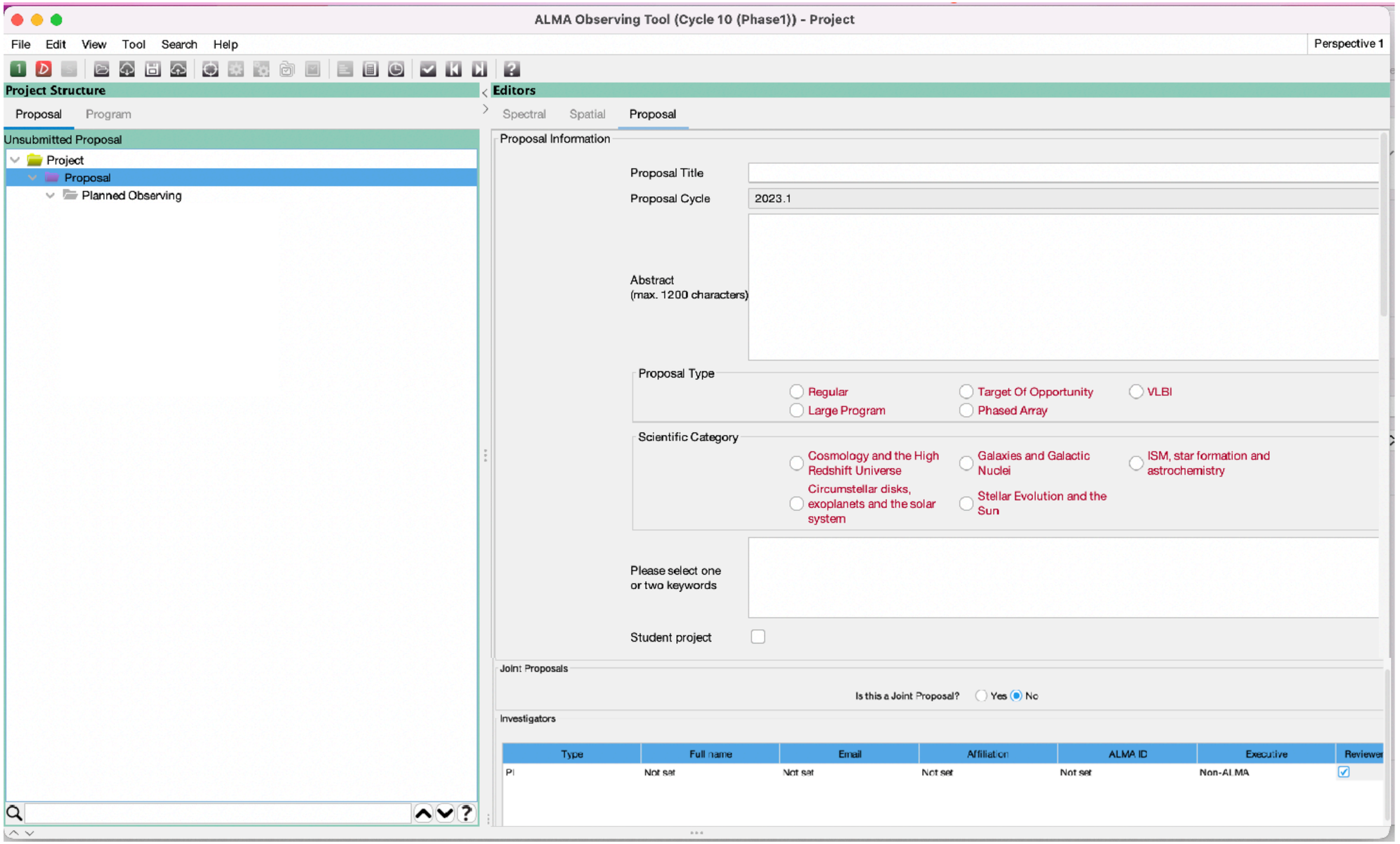
1 What's new in Cycle 10?

The most important changes to the OT since the last release are the following.

- **New capabilities:**
  - Joint Proposals with other facilities, including JWST, VLA and VLT (see Sec. 4).
  - Band 1 on the 12-m Array and for Stokes I only (no Stokes Q/U/V). This is anticipated to be available from March 2024.
  - Spectral scans that include Total Power observations (see Sec. 7.3).
  - 4x4-bit spectral modes for improved sensitivity on the 12-m Array (dual polarization, see Sec. 7.1).
  - Solar observations in full polarization in Band 3 using only the 12-m Array (see Sec. 7).
  - Phased array mode in Bands 1, 3, 6 and 7 (see Sec. 4).
  - VLBI in Bands 1, 3, 6 and 7, including flexible tuning for spectral lines (see Sec. 4 and 6).
- Band-to-band phase calibration will be available for high frequency observations on both the 7-m Array and all 12-m Array configurations. The decision as to whether band-to-band observing is required is now based on a search of the calibrator catalogue (see Sec. 7).
- A warning will be triggered by the OT if line width entered by the PI in the Field Setup is much larger that the requested Spectral Resolution.
- A new text box in the Technical Justification section is presented whenever the proposed observations require either high spectral dynamic range or high continuum/line imaging dynamic range.
- Source names that are composed of only numbers are no longer allowed.
- The standard Ctrl-Z (undo) and Ctrl-Y (redo) functionality are now available in several OT fields.

Starting the OT….



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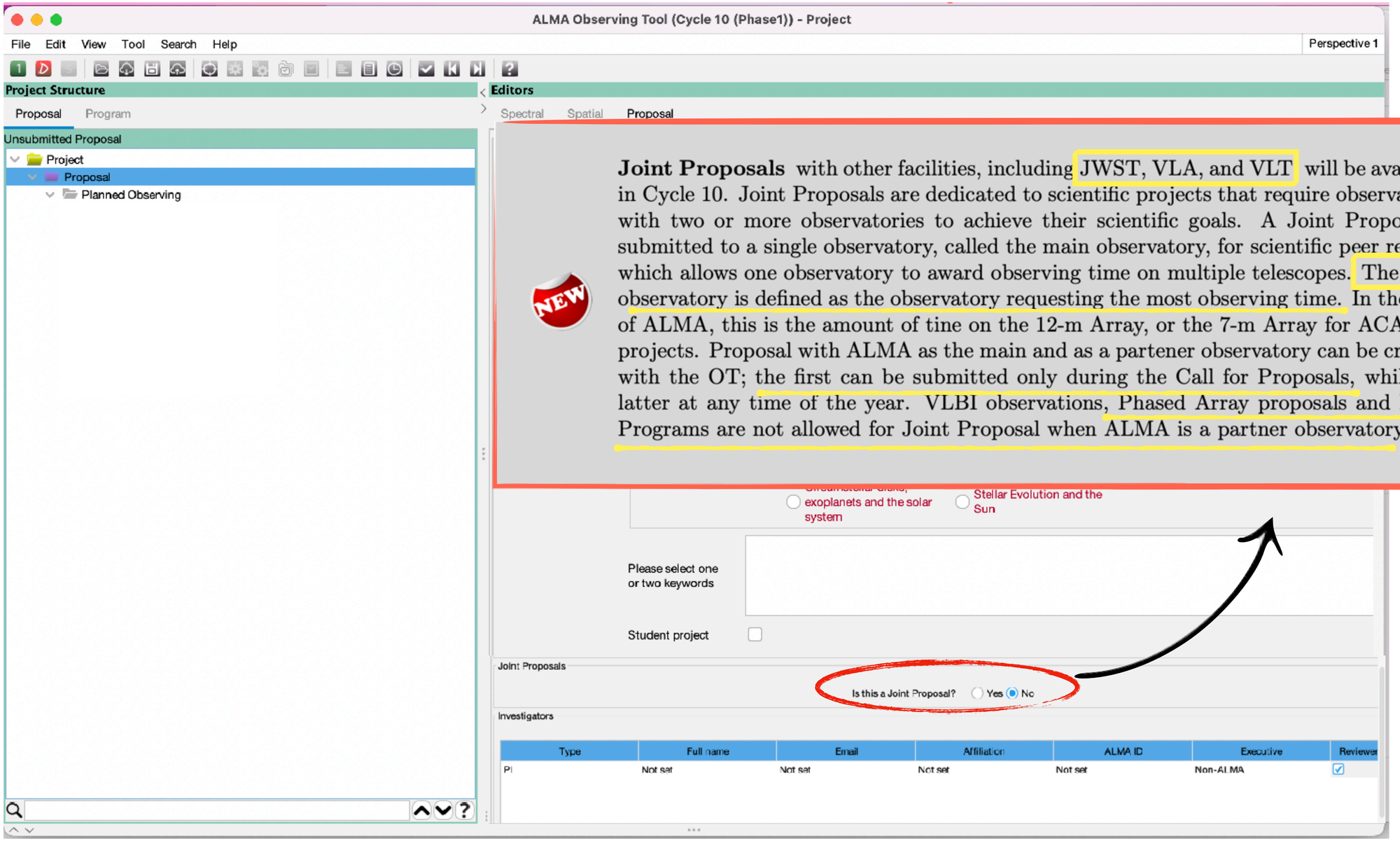
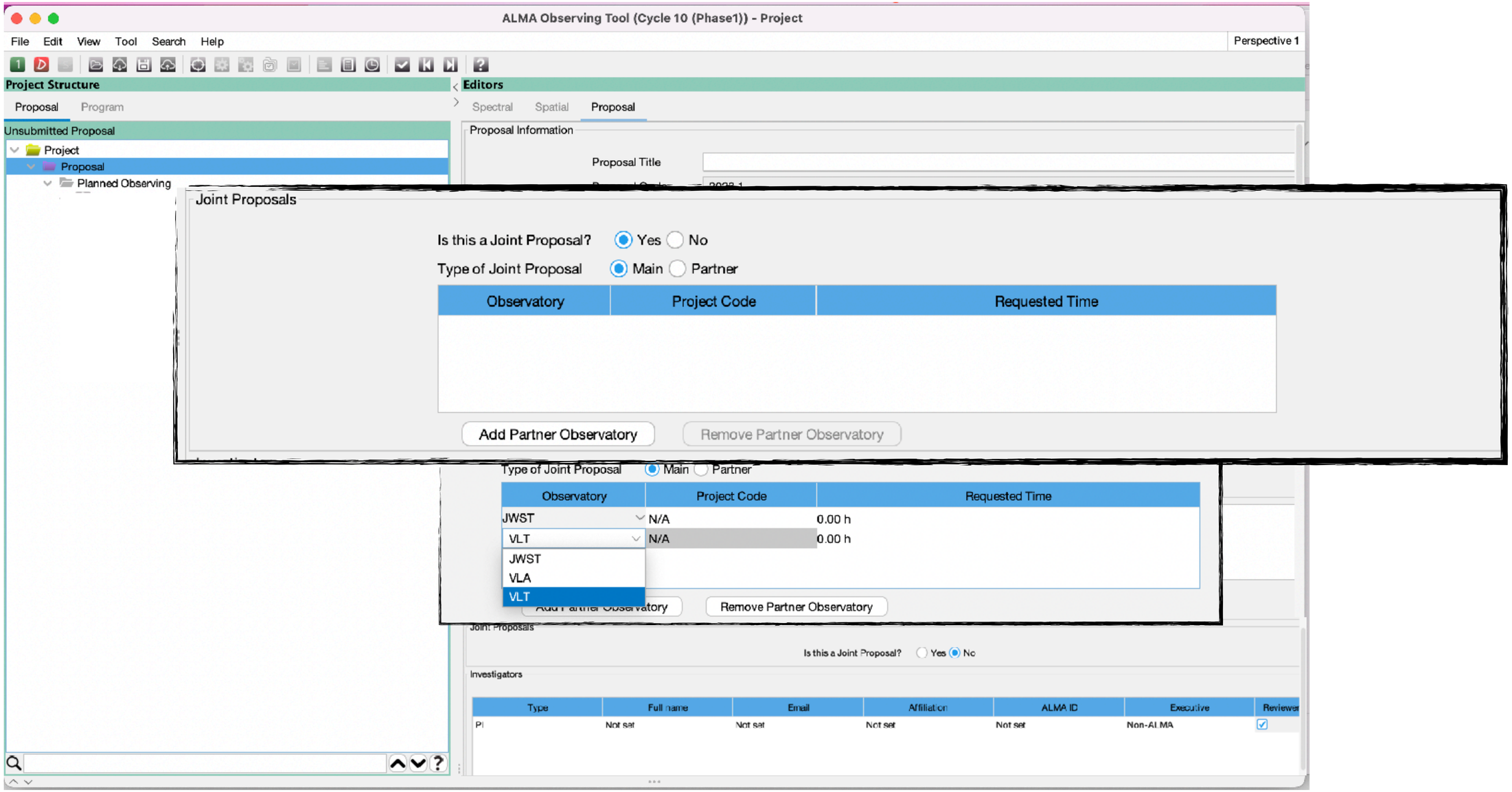
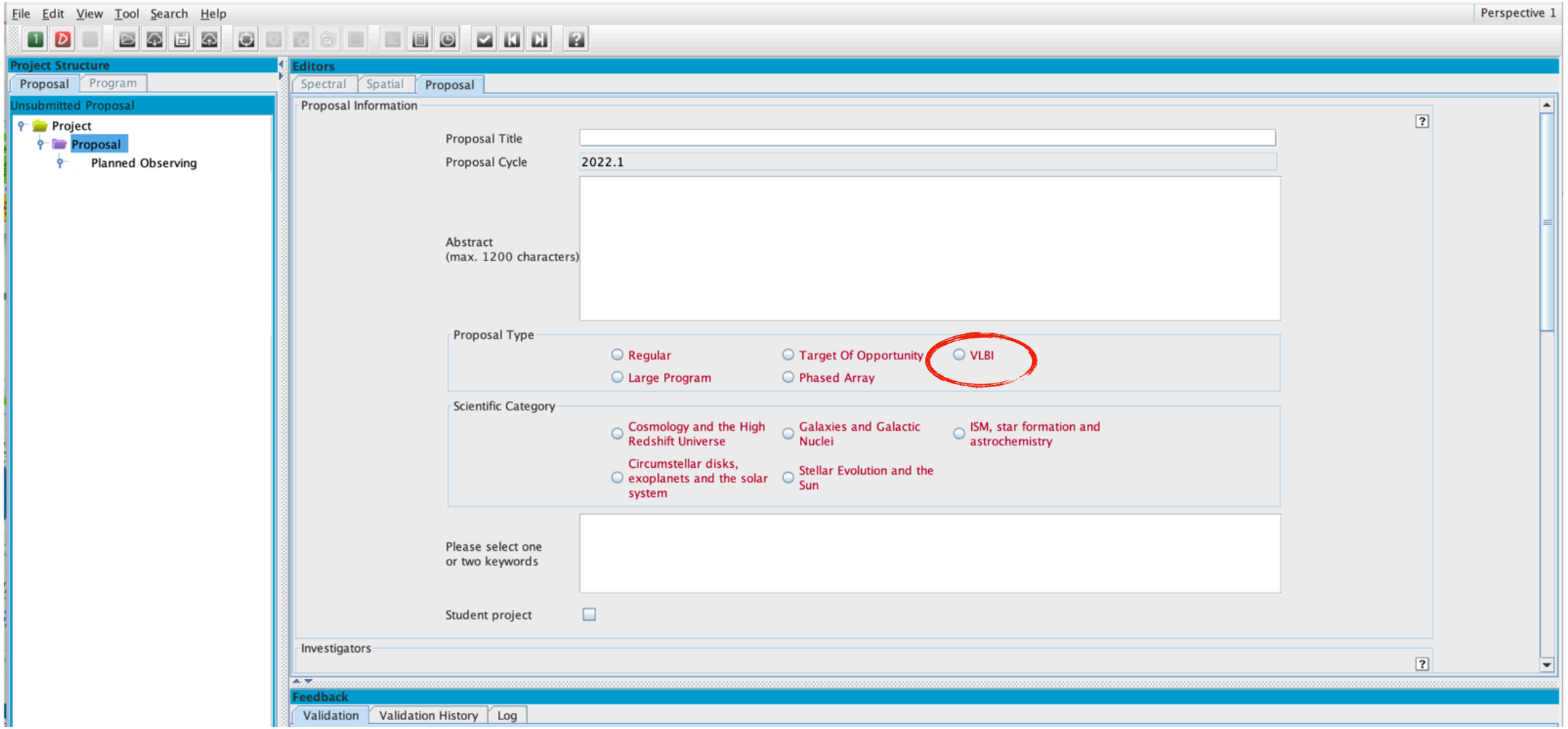


Starting the OT… (a joint proposal?)



Proposal editor…



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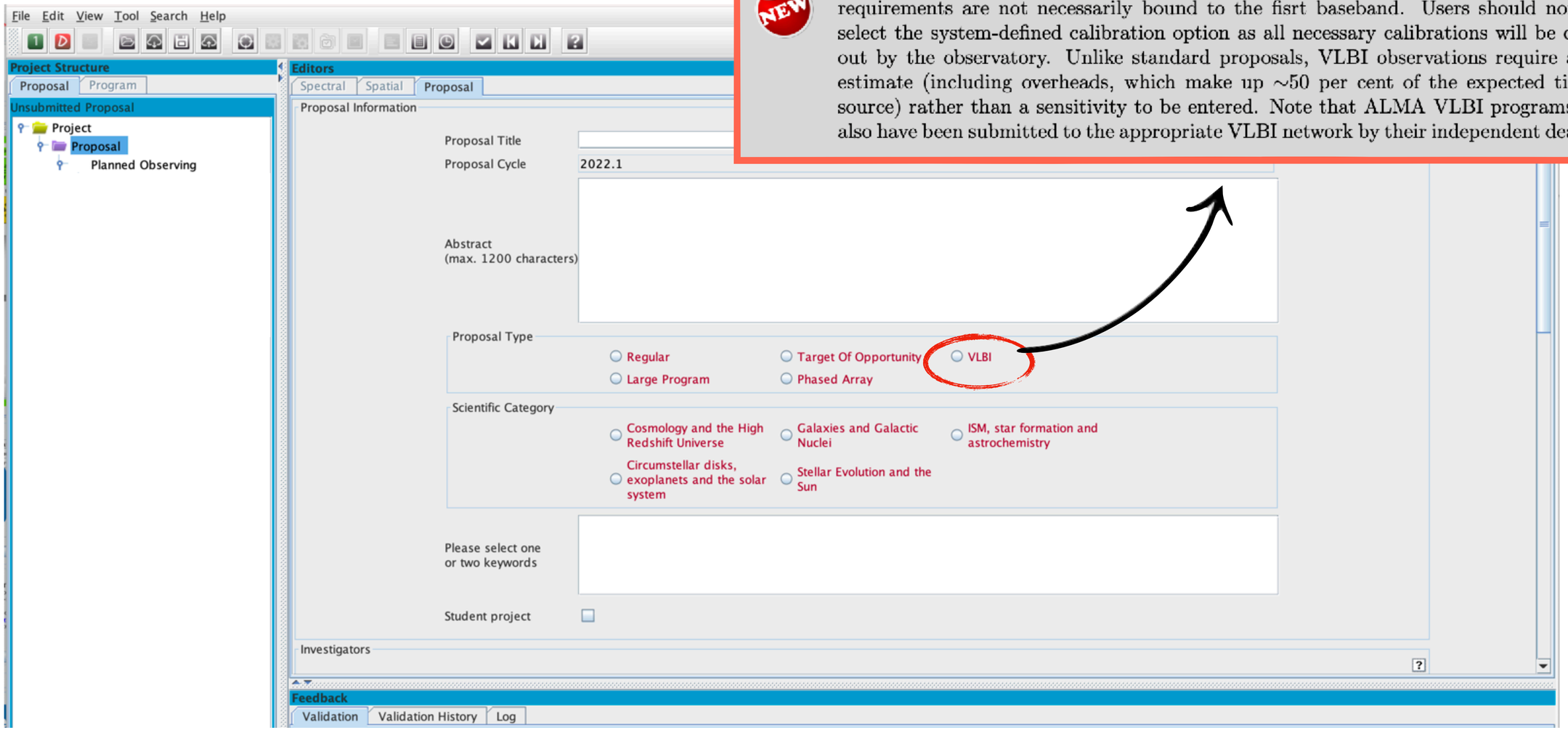
VLBI proposals use ALMA in conjunction with VLBI telescopes around the world and more flexible tunings are available starting from Cycle 10. They have a special VLBI proposal interface at the Science Goal level and the spectral setup is limited to pre-defined continuum and spectral-line observing setups in Bands 1, 3, 6, and 7. For line-observing, In Band 1 and 3 the first baseband's bandwidth will be fixed to 1875 MHz and only onw spectral window will be allowed. The same holds for Band 6 and 7, but such requirements are not necessarily bound to the fisrt baseband. Users should normally select the system-defined calibration option as all necessary calibrations will be carried out by the observatory. Unlike standard proposals, VLBI observations require a time estimate (including overheads, which make up ~50 per cent of the expected time on source) rather than a sensitivity to be entered. Note that ALMA VLBI programs must also have been submitted to the appropriate VLBI network by their independent deadline.



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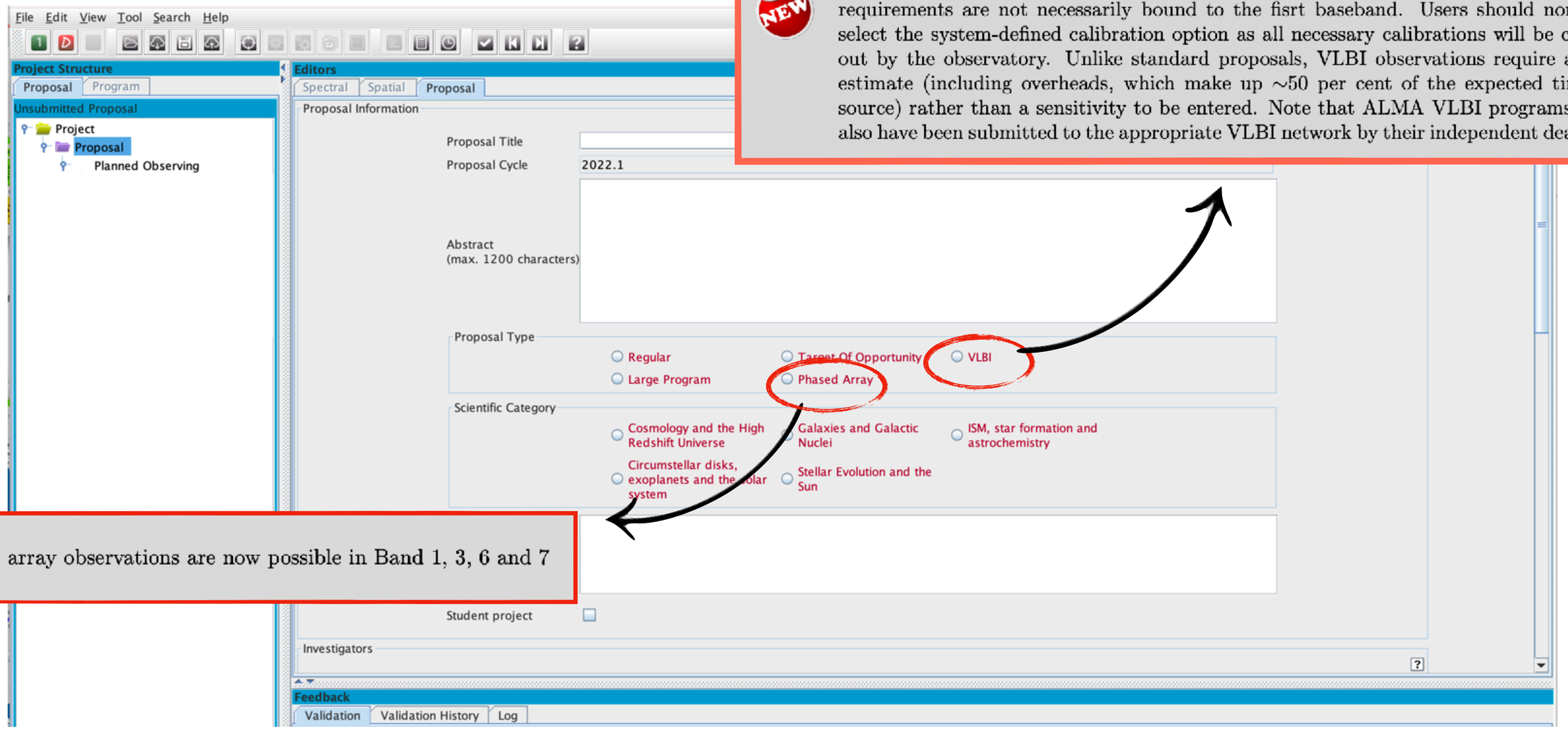
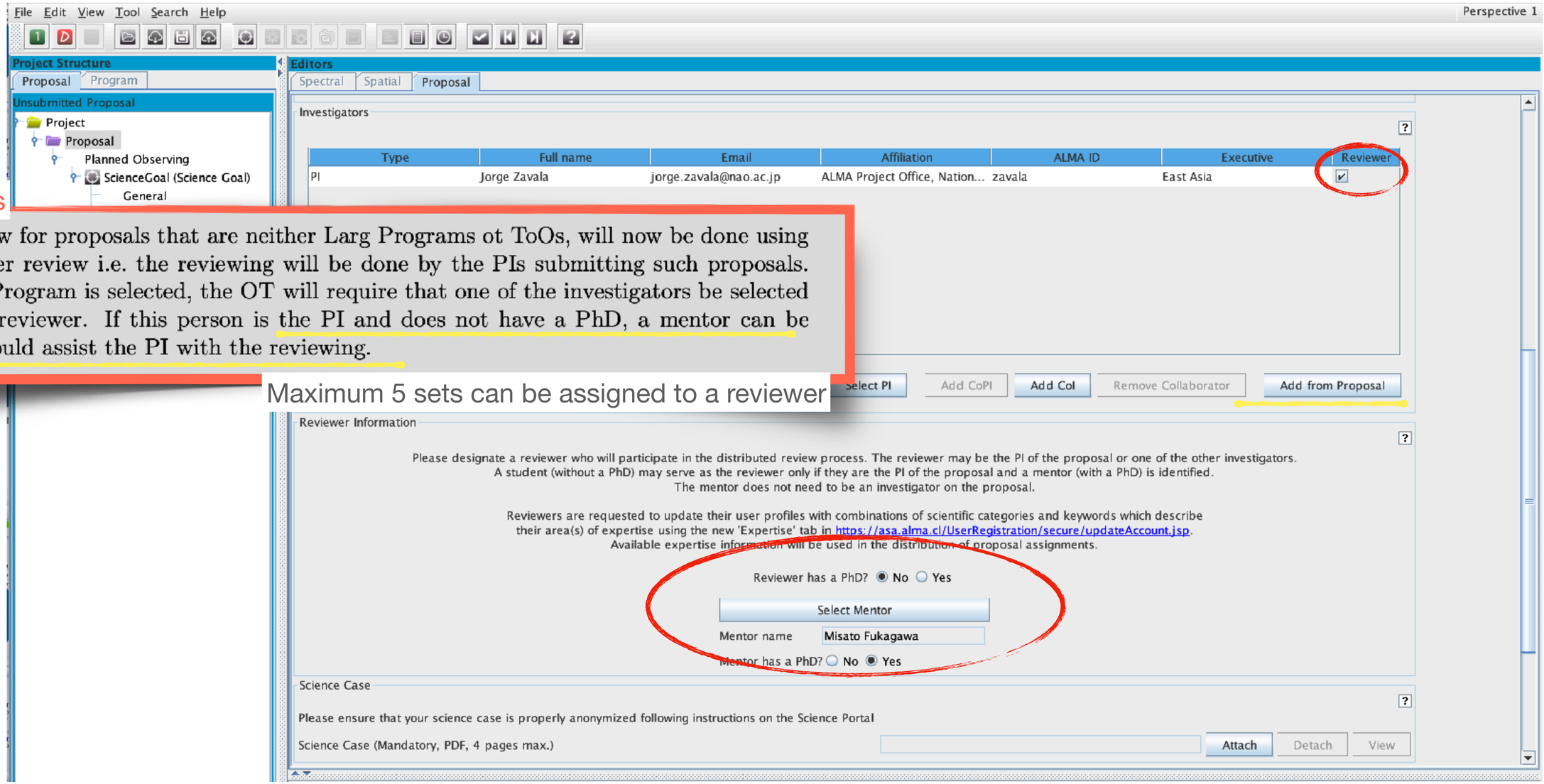


Phased array observations are now possible in Band 1, 3, 6 and 7

Proposal editor…



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Proposal review for proposals that are neither Larg Programs ot ToOs, will now be done using distributed peer review i.e. the reviewing will be done by the PIs submitting such proposals. Unless Large Program is selected, the OT will require that one of the investigators be selected as a proposal reviewer. If this person is the PI and does not have a PhD, a mentor can be named who would assist the PI with the reviewing.

Maximum 5 sets can be assigned to a reviewer

Proposal editor…

> The fonts used in the PDFs must have a minimum size of 12 points. The OT will issue an **error** if >15 per cent of the text is smaller than 12 points. Be aware that an image cropped from another PDF may contain text that lay outside of the cropped area, even though this is not displayed.

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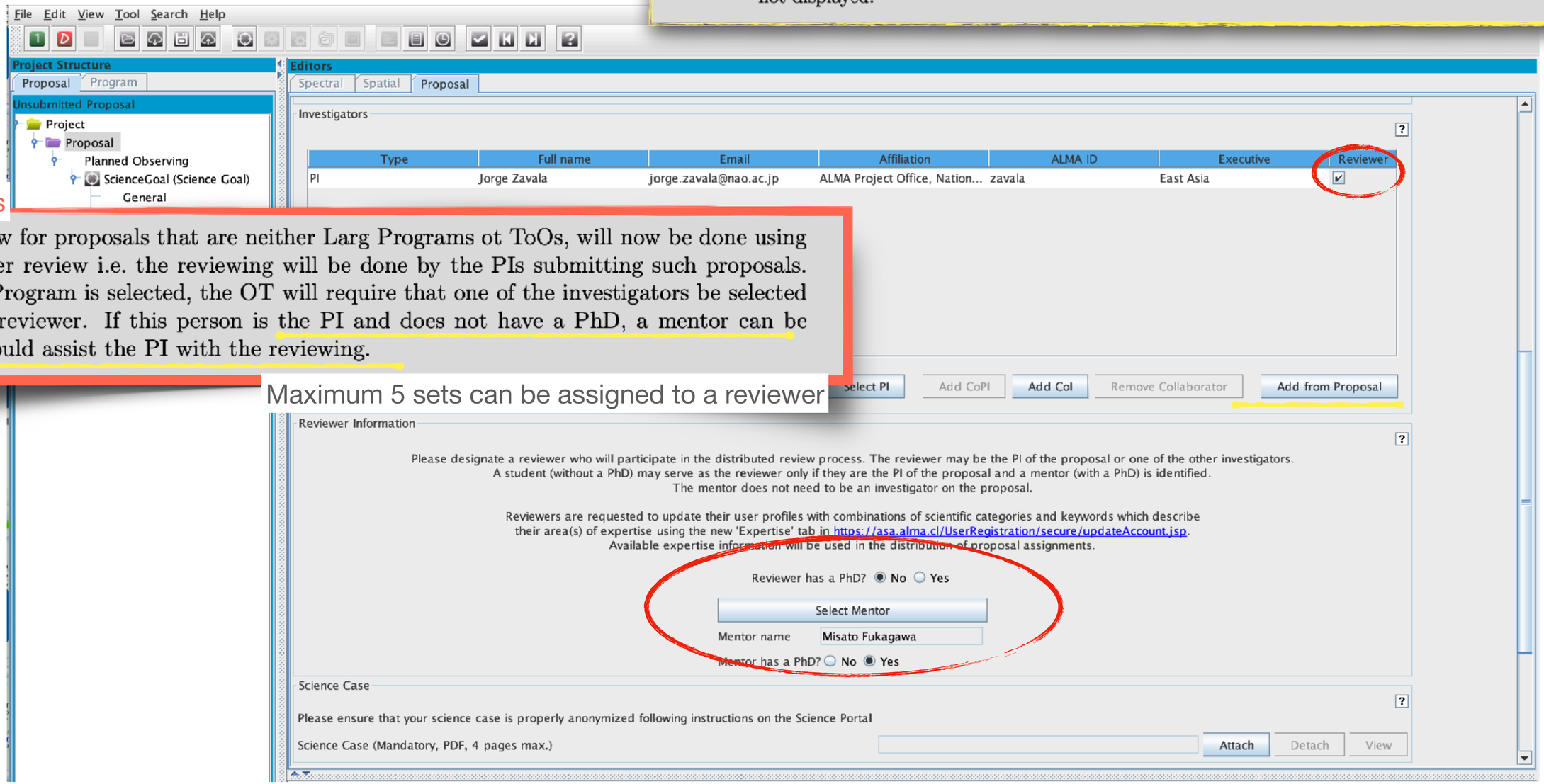

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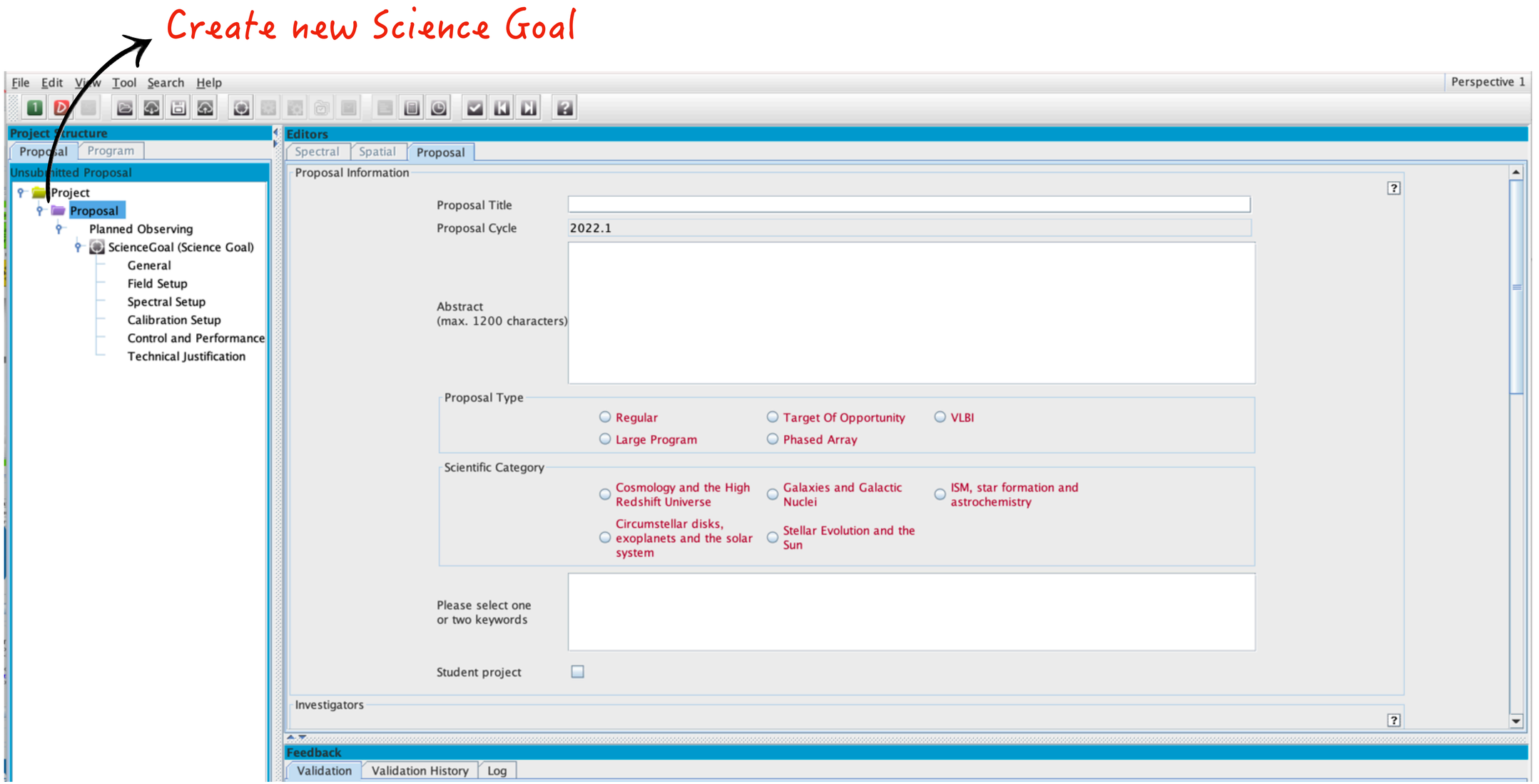
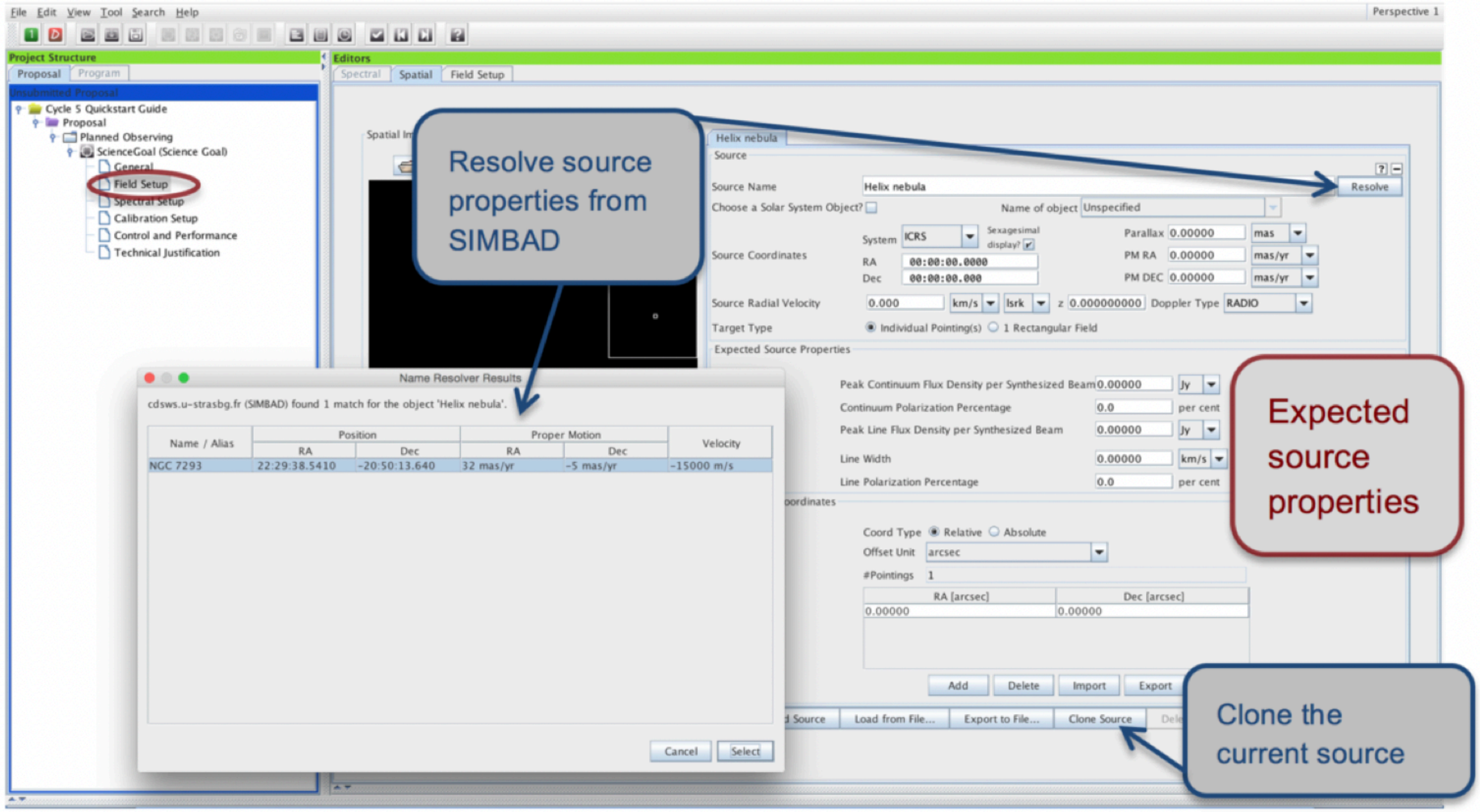


Field setup…

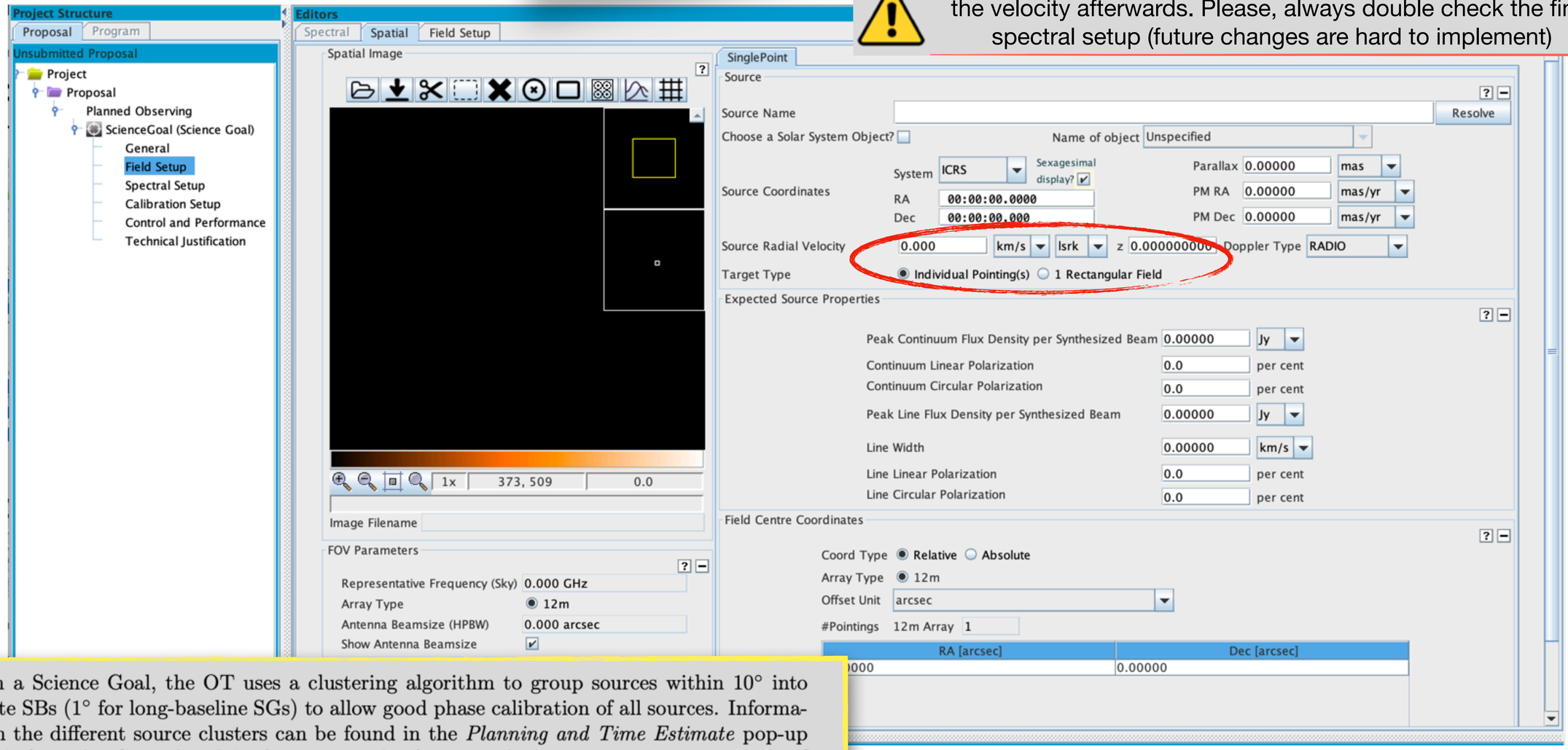

Resolve source properties from SIMBAD
Expected source properties
Clone the current source
Name Resolver Results
cdsws.u-strasbg.fr (SIMBAD) found 1 match for the object 'Helix nebula'.
NGC 7293 22:29:38.5410 -20:50:13.640 32 mas/yr -5 mas/yr -15000 m/s
Cancel
Select
Helix nebula
Resolve
Add
Delete
Import
Export
Load from File...
Export to File...
Clone Source

Field setup…

NEW

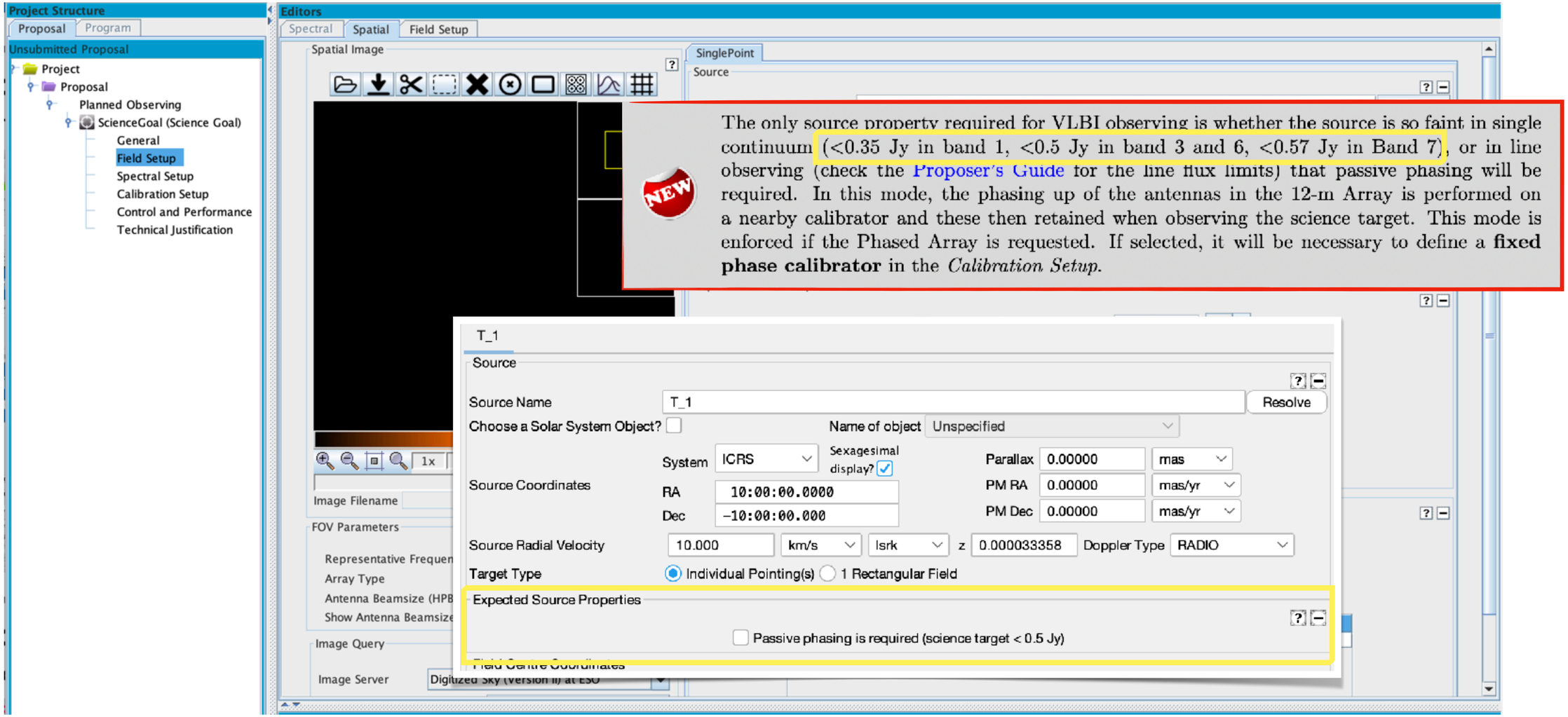
A warning will be given if a velocity has not been entered for all sources. This is to encourage users to give source velocity information, mainly for use in the ALMA Science Archive. Solar-system objects are exempt.

The frequencies in the spectral setup might change if you modify the velocity afterwards. Please, always double check the final spectral setup (future changes are hard to implement)



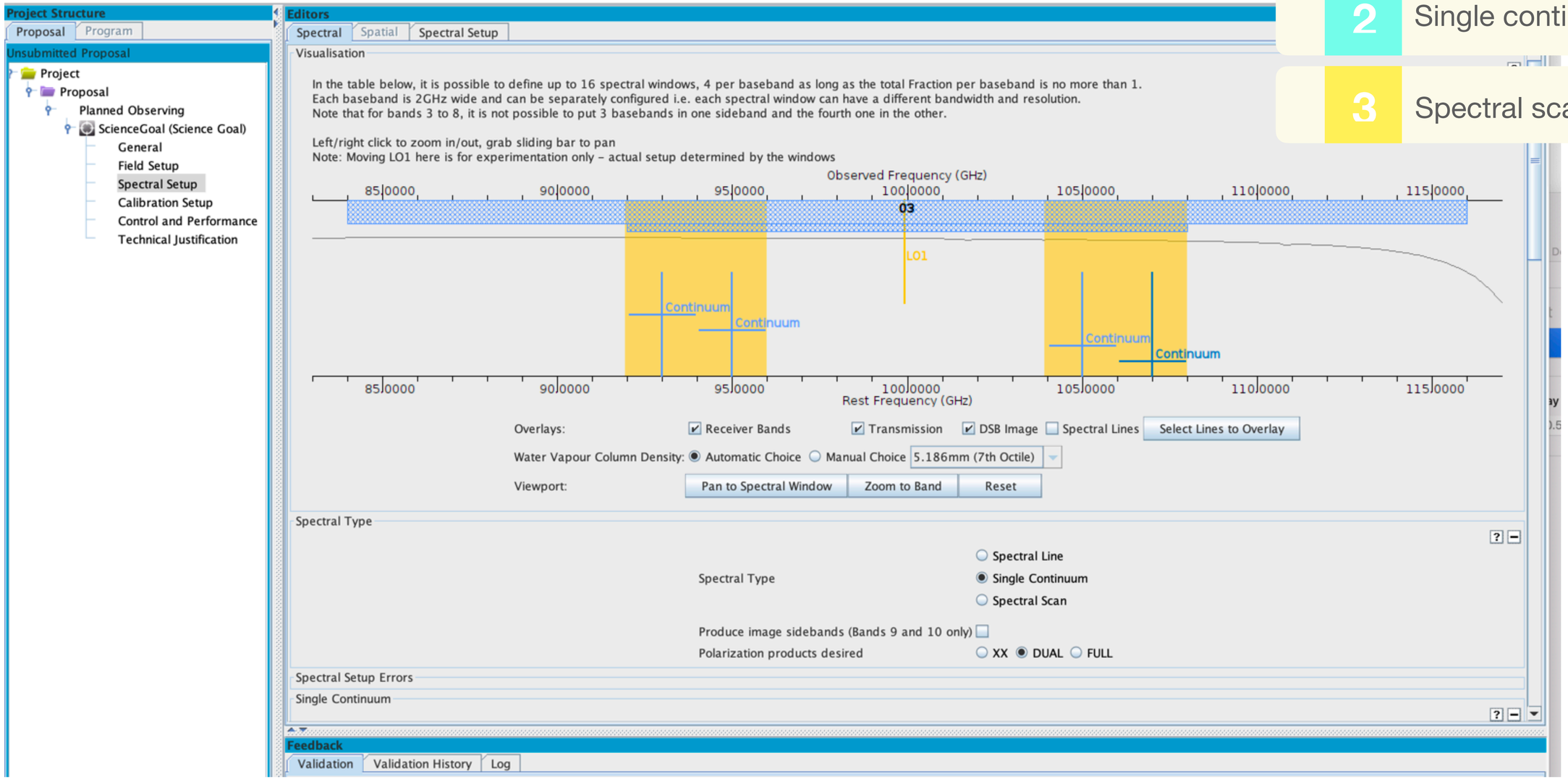
Within a Science Goal, the OT uses a clustering algorithm to group sources within 10° into separate SBs (1° for long-baseline SGs) to allow good phase calibration of all sources. Information on the different source clusters can be found in the *Planning and Time Estimate* pop-up available from the *Control and Performance* node. A source cluster can contain a maximum of 150 pointings.

Field setup (VLBI)...



Spectral setup…

1. Spectral Line
2. Single continuum
3. Spectral scan



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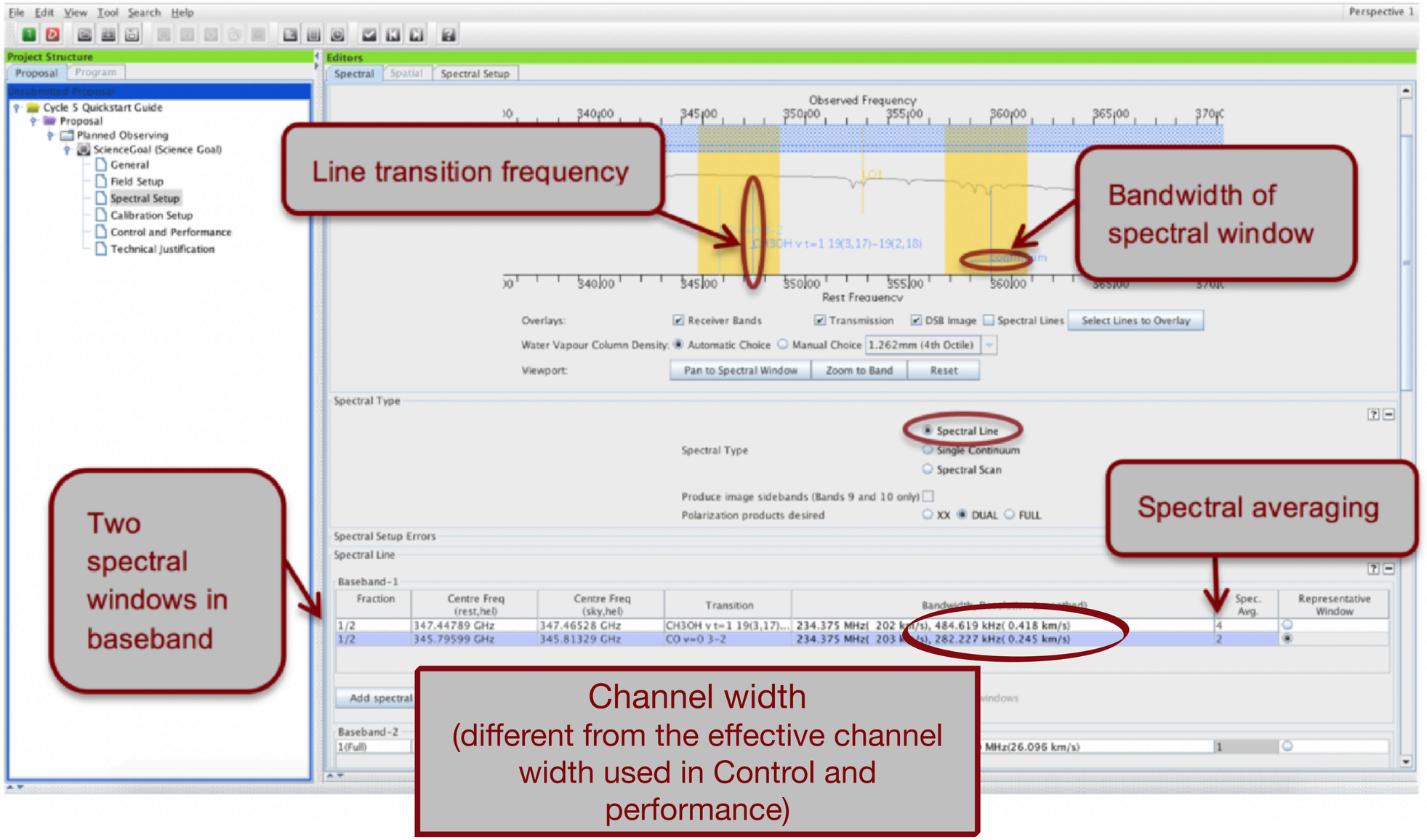

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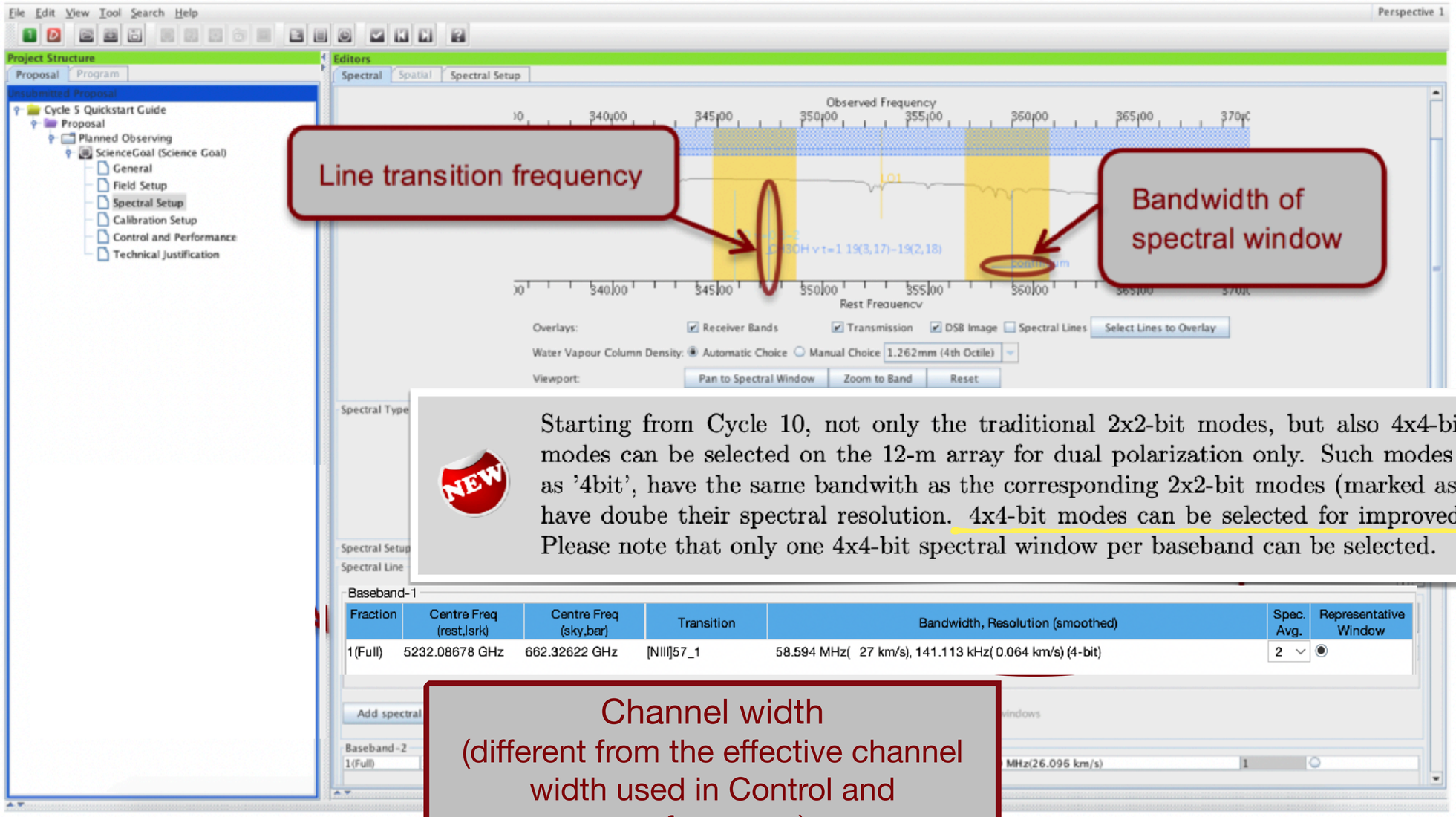


NEW

Starting from Cycle 10, not only the traditional 2x2-bit modes, but also 4x4-bit correlator modes can be selected on the 12-m array for dual polarization only. Such modes are marked as '4bit', have the same bandwith as the corresponding 2x2-bit modes (marked as '2bit'), but have doube their spectral resolution. 4x4-bit modes can be selected for improved sensitivity. Please note that only one 4x4-bit spectral window per baseband can be selected.

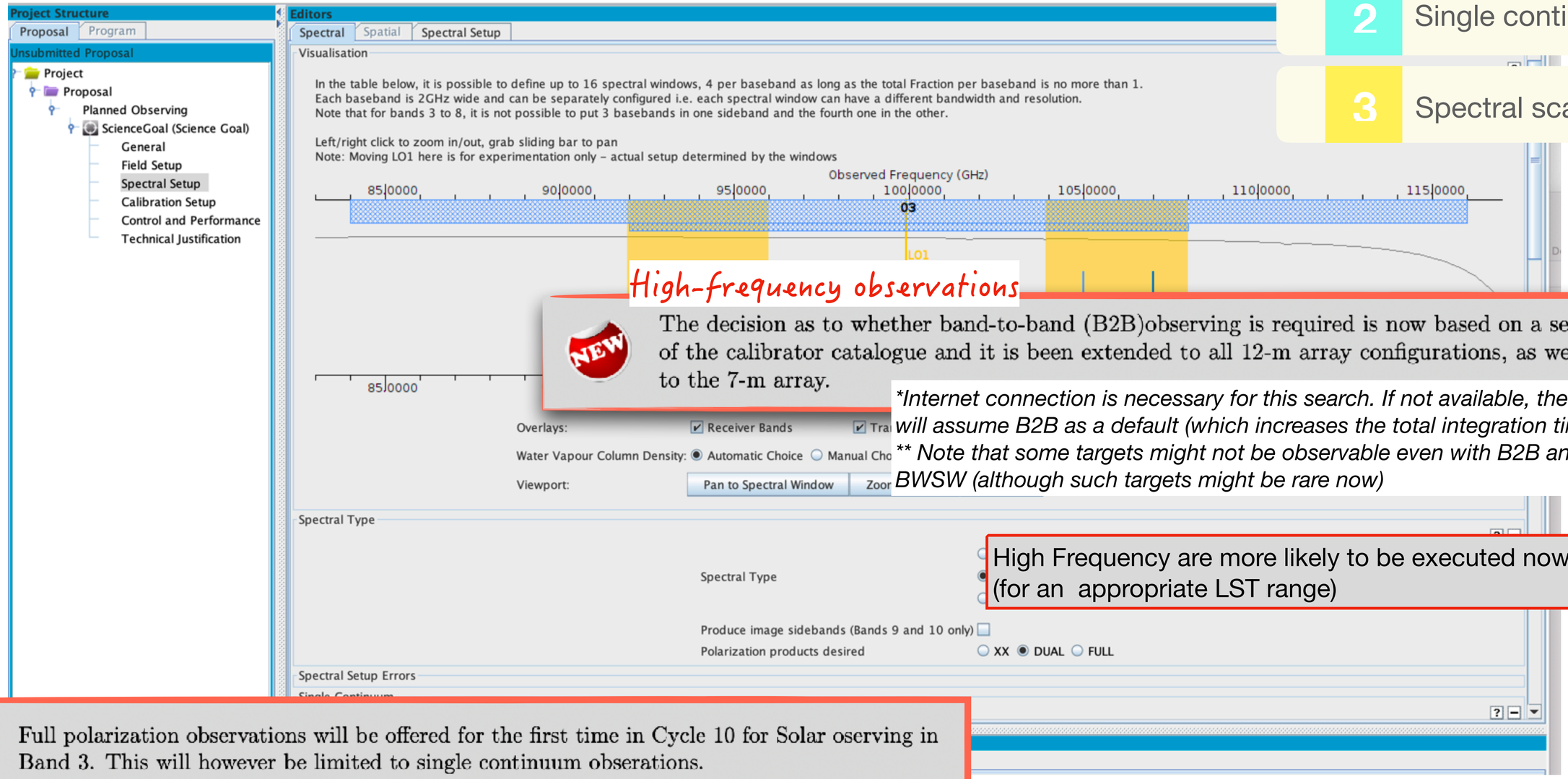
Channel width
(different from the effective channel width used in Control and performance)

Spectral setup…

1 Spectral Line

2 Single continuum

3 Spectral scan



High-frequency observations

NEW

The decision as to whether band-to-band (B2B)observing is required is now based on a search of the calibrator catalogue and it is been extended to all 12-m array configurations, as well as to the 7-m array.

*Internet connection is necessary for this search. If not available, the OT will assume B2B as a default (which increases the total integration time).
** Note that some targets might not be observable even with B2B and/or BWSW (although such targets might be rare now)

High Frequency are more likely to be executed now!
(for an appropriate LST range)

NEW

Full polarization observations will be offered for the first time in Cycle 10 for Solar oserving in Band 3. This will however be limited to single continuum obserations.

Spectral setup…

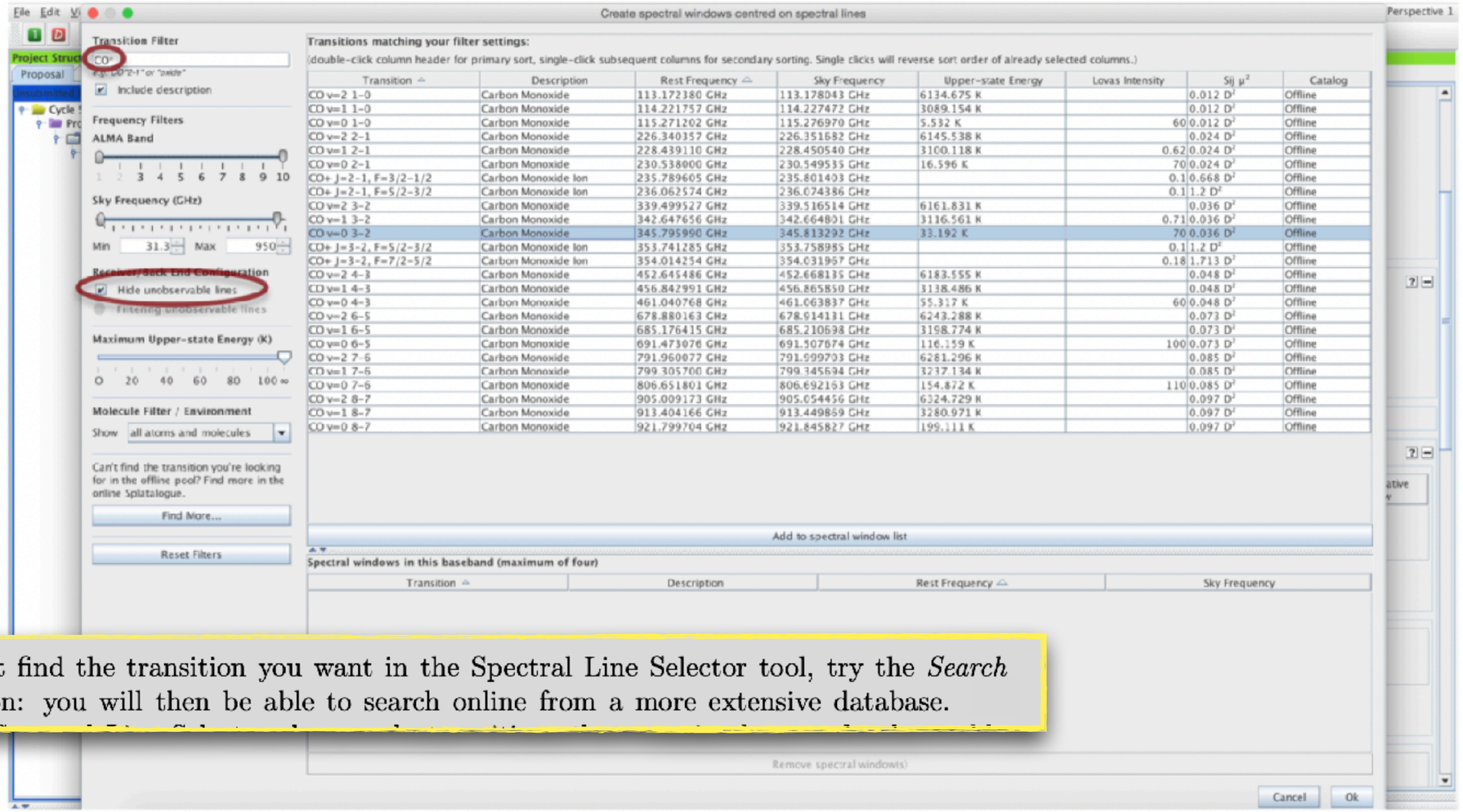
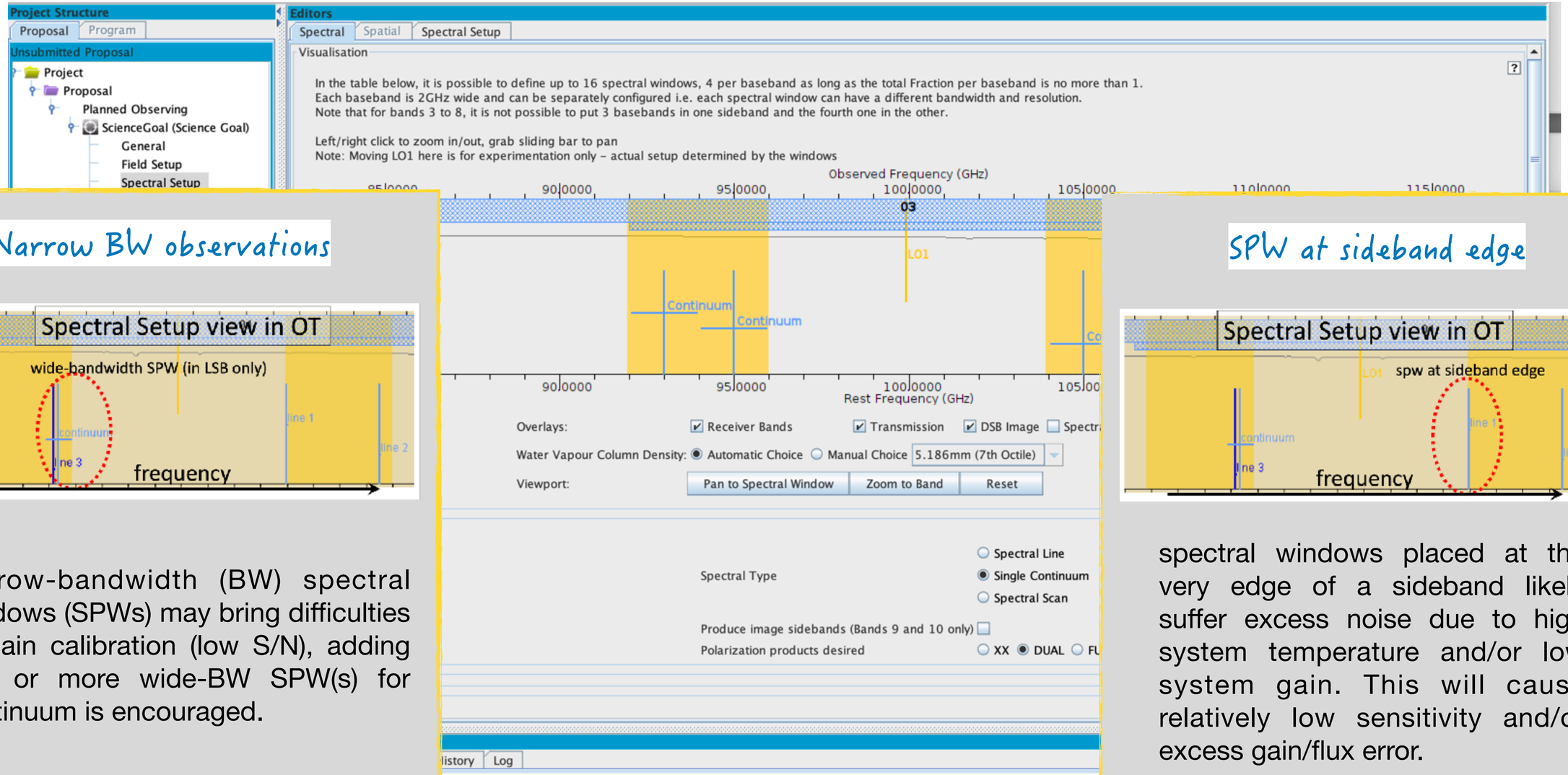


Figure 4: The Spectral Line Selector tool.

Spectral setup…



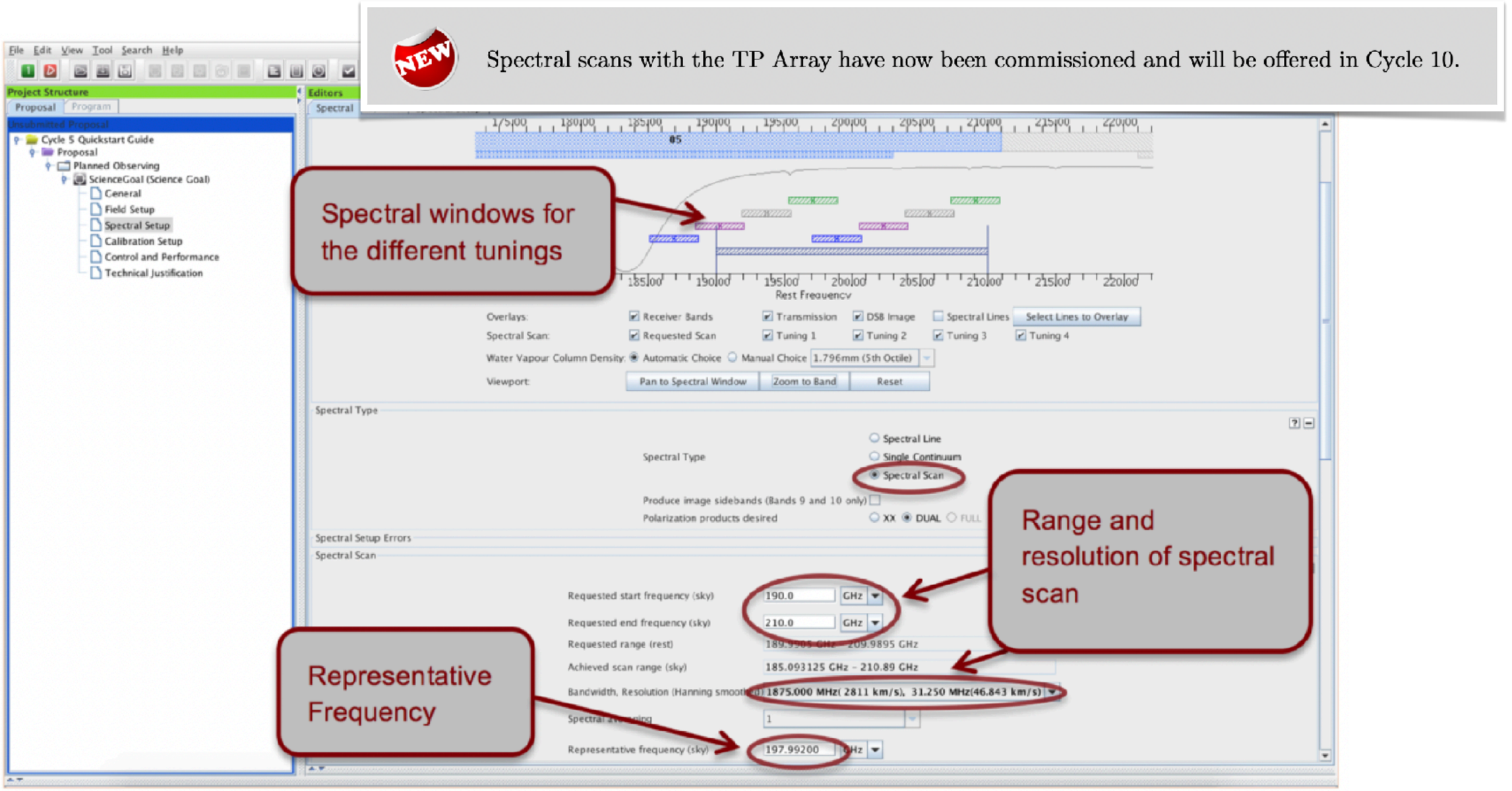
Narrow BW observations

Narrow-bandwidth (BW) spectral windows (SPWs) may bring difficulties at gain calibration (low S/N), adding one or more wide-BW SPW(s) for continuum is encouraged.

SPW at sideband edge

spectral windows placed at the very edge of a sideband likely suffer excess noise due to high system temperature and/or low system gain. This will cause relatively low sensitivity and/or excess gain/flux error.

Spectral setup (spectral scans)…



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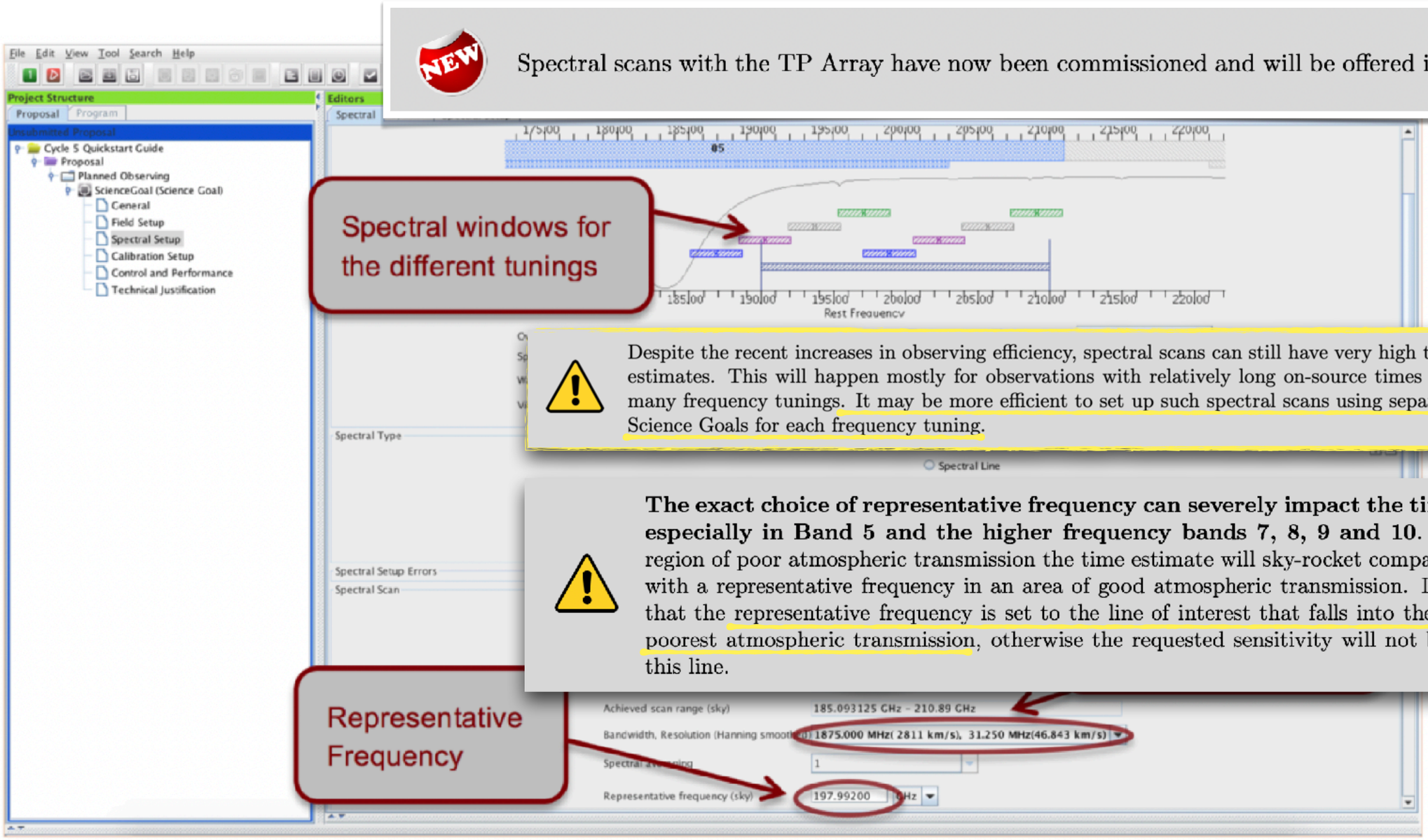


NEW

Spectral scans with the TP Array have now been commissioned and will be offered in Cycle 10.

Spectral windows for the different tunings

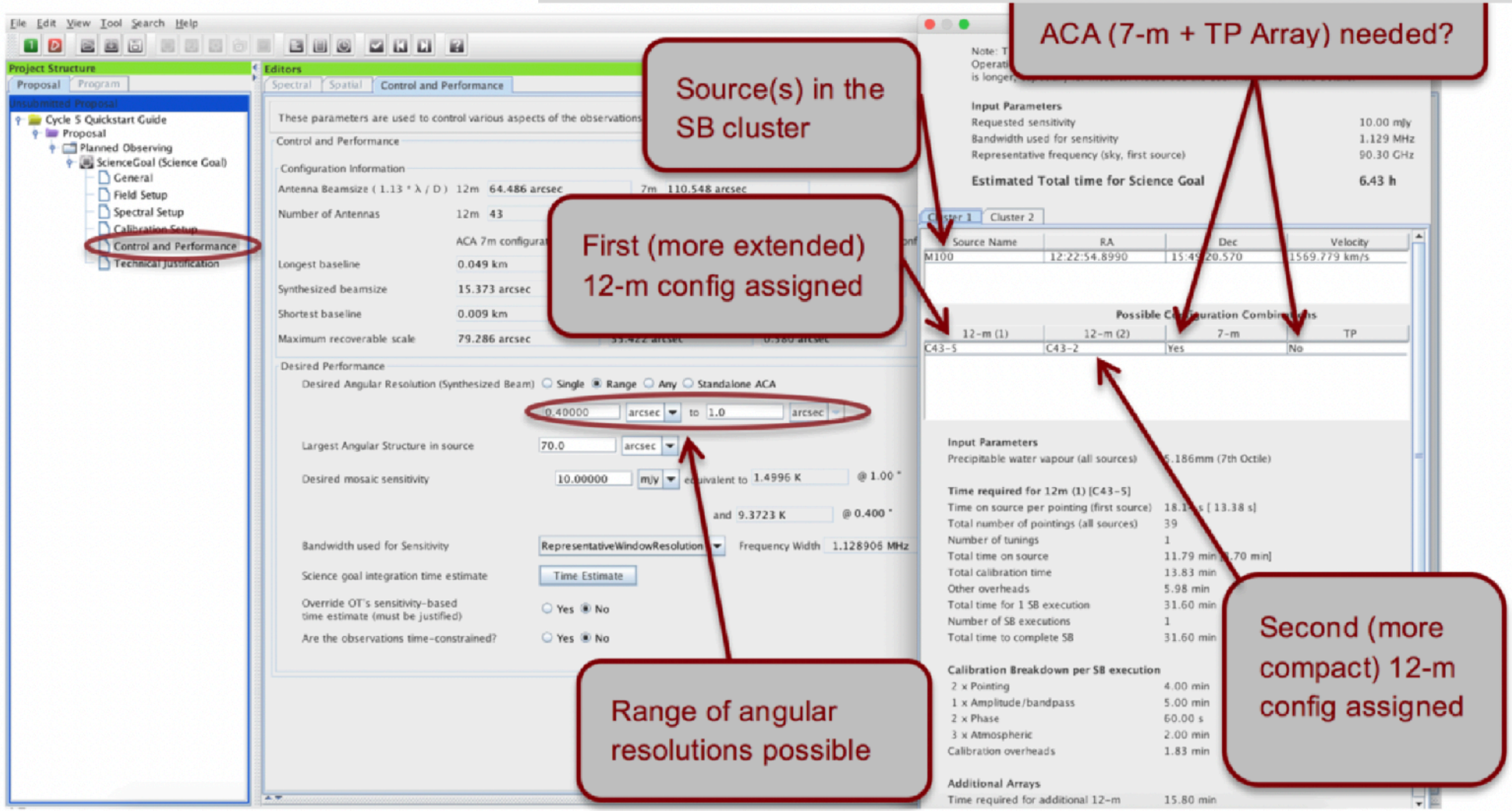
Despite the recent increases in observing efficiency, spectral scans can still have very high time estimates. This will happen mostly for observations with relatively long on-source times and many frequency tunings. It may be more efficient to set up such spectral scans using separate Science Goals for each frequency tuning.

The exact choice of representative frequency can severely impact the time estimate, especially in Band 5 and the higher frequency bands 7, 8, 9 and 10. If it falls in a region of poor atmospheric transmission the time estimate will sky-rocket compared to a setup with a representative frequency in an area of good atmospheric transmission. It is important that the representative frequency is set to the line of interest that falls into the region of the poorest atmospheric transmission, otherwise the requested sensitivity will not be reached for this line.

Representative Frequency

Control and performance…

Users do not directly select whether ACA 7-m and/or Total Power observations should be added to their 12-m observations or not. Instead, the ACA is imposed by the OT if required to achieve the LAS requested. Whether or not ACA observations will be scheduled can be easily seen in the *Planning and Time Estimate* pop-up (see Fig. 11) or the Proposal Time Summary dialogue ("clock" icon on the menu bar).



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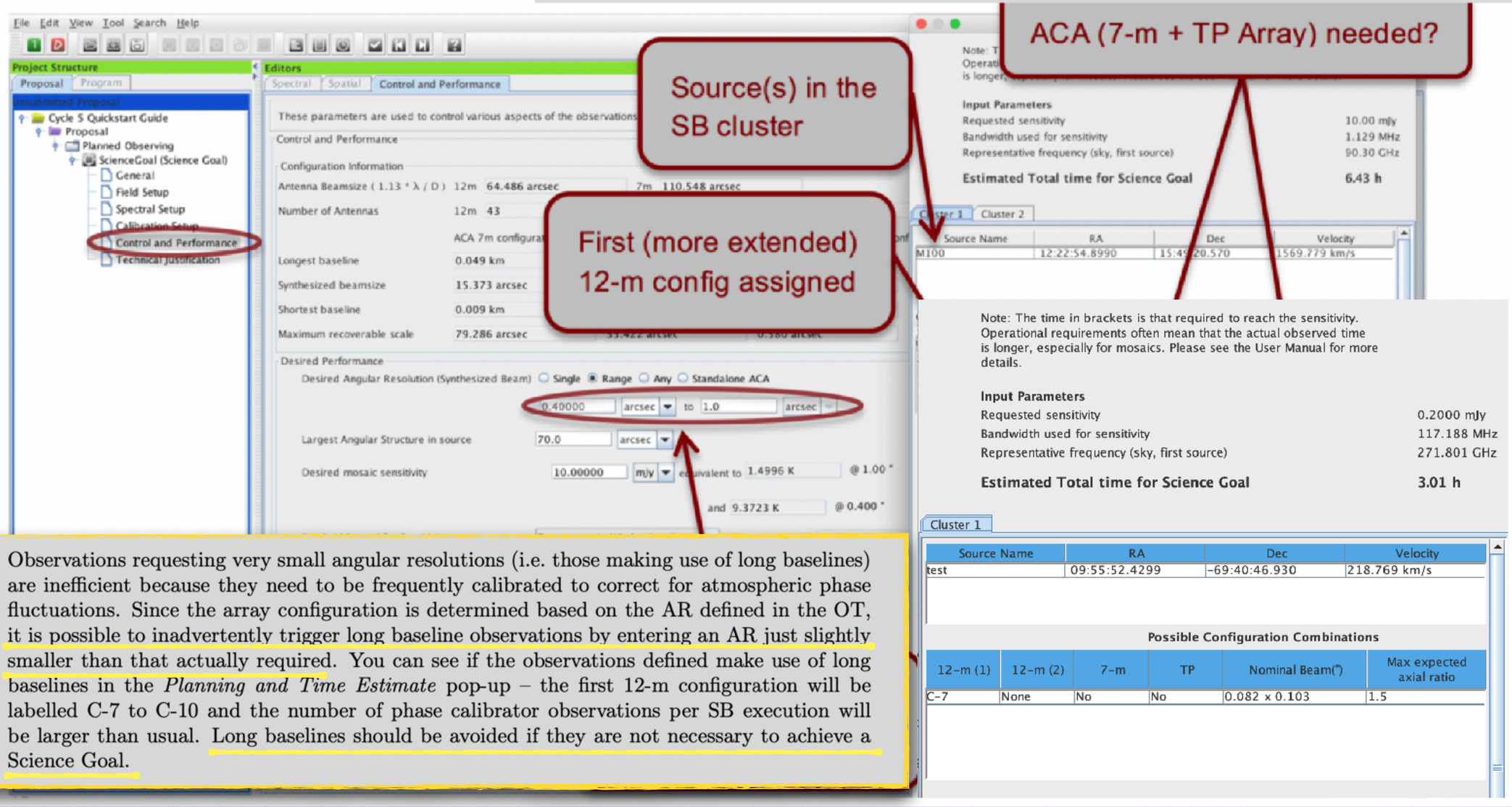


Observations requesting very small angular resolutions (i.e. those making use of long baselines) are inefficient because they need to be frequently calibrated to correct for atmospheric phase fluctuations. Since the array configuration is determined based on the AR defined in the OT, it is possible to inadvertently trigger long baseline observations by entering an AR just slightly smaller than that actually required. You can see if the observations defined make use of long baselines in the *Planning and Time Estimate* pop-up – the first 12-m configuration will be labelled C-7 to C-10 and the number of phase calibrator observations per SB execution will be larger than usual. Long baselines should be avoided if they are not necessary to achieve a Science Goal.

Control and performance (minimum Bandwidth Used for Sensitivity)…

Resolution ≠ Effective channel width

Spectral Setup

Spectral Line

Baseband-1

Fraction	Centre Freq (rest,lsrk)	Centre Freq (sky,bar)	Transition	Bandwidth, Resolution (smoothed)	Spec. Avg.	Representative Window
1(Full)	5232.08678 GHz	662.32622 GHz	[NIII]57_1	58.594 MHz(27 km/s), 141.113 kHz(0.064 km/s) (4-bit)	2	

Control and performance

Bandwidth used for Sensitivity: RepWindowEffectiveChannelWidth Frequency Width: 0.195313 MHz

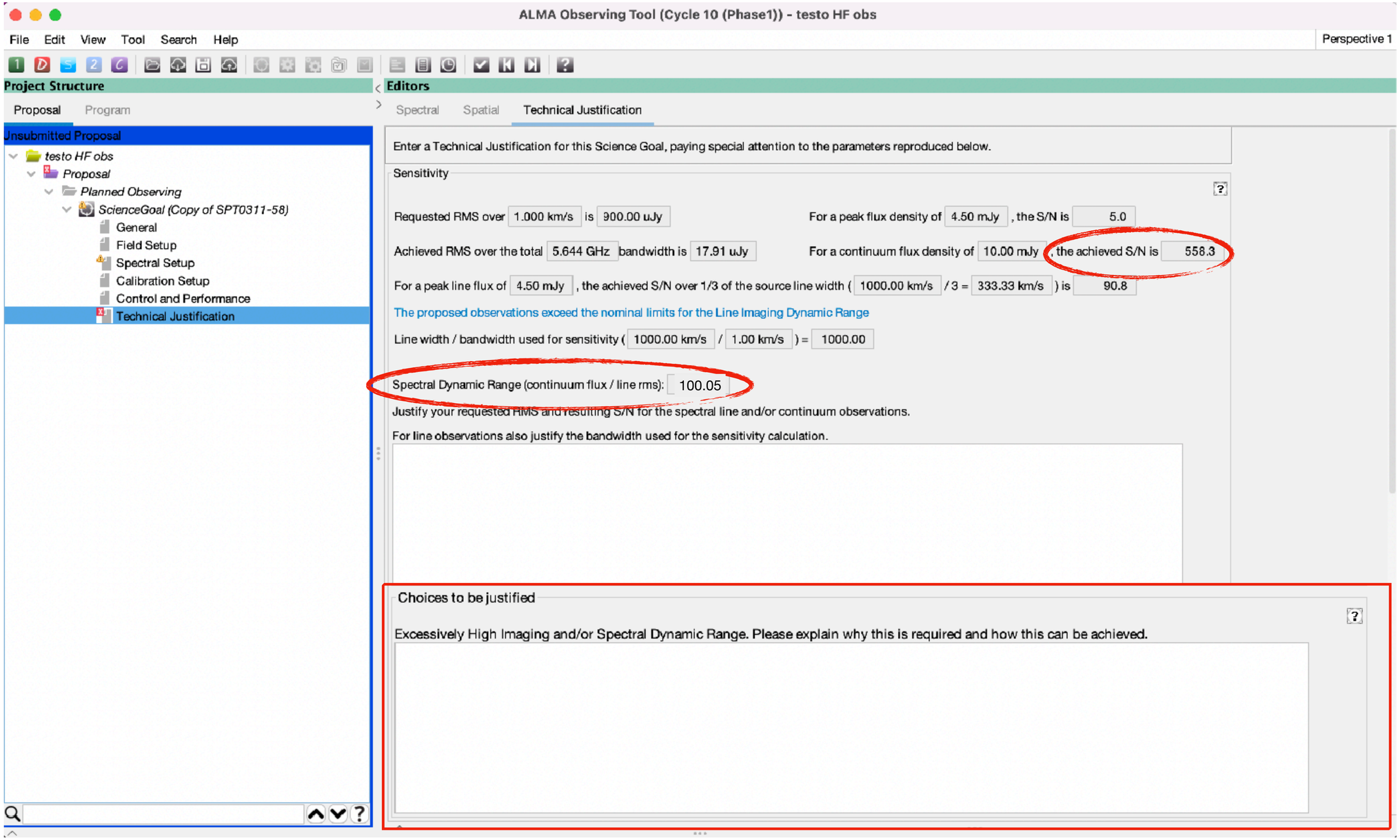
Technical justification

Line width / bandwidth used for sensitivity (1000.00 km/s / 88.41 m/s) = 11311.53

The effective channel width takes into account the effect of Hanning Smoothing!
(This is now the minimum frequency that can be used for BUfS)

See the ALMA Technical Handbook and/or OT User Manual

Technical justification…



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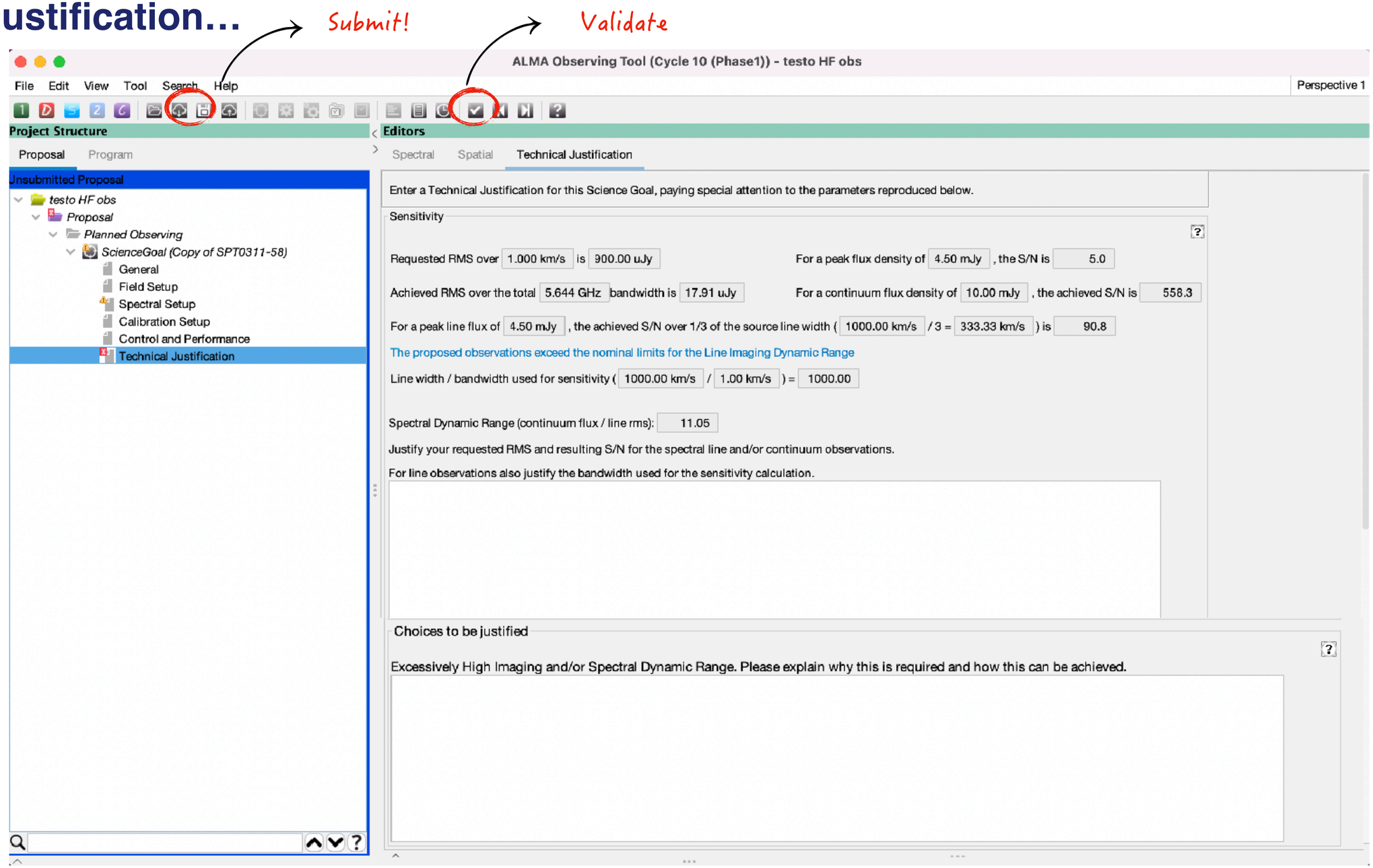

Documentation…

QUESTIONS? FEEDBACK?

About | Science | Proposing | Observing | Data | Processing | Tools | Documentation | Help

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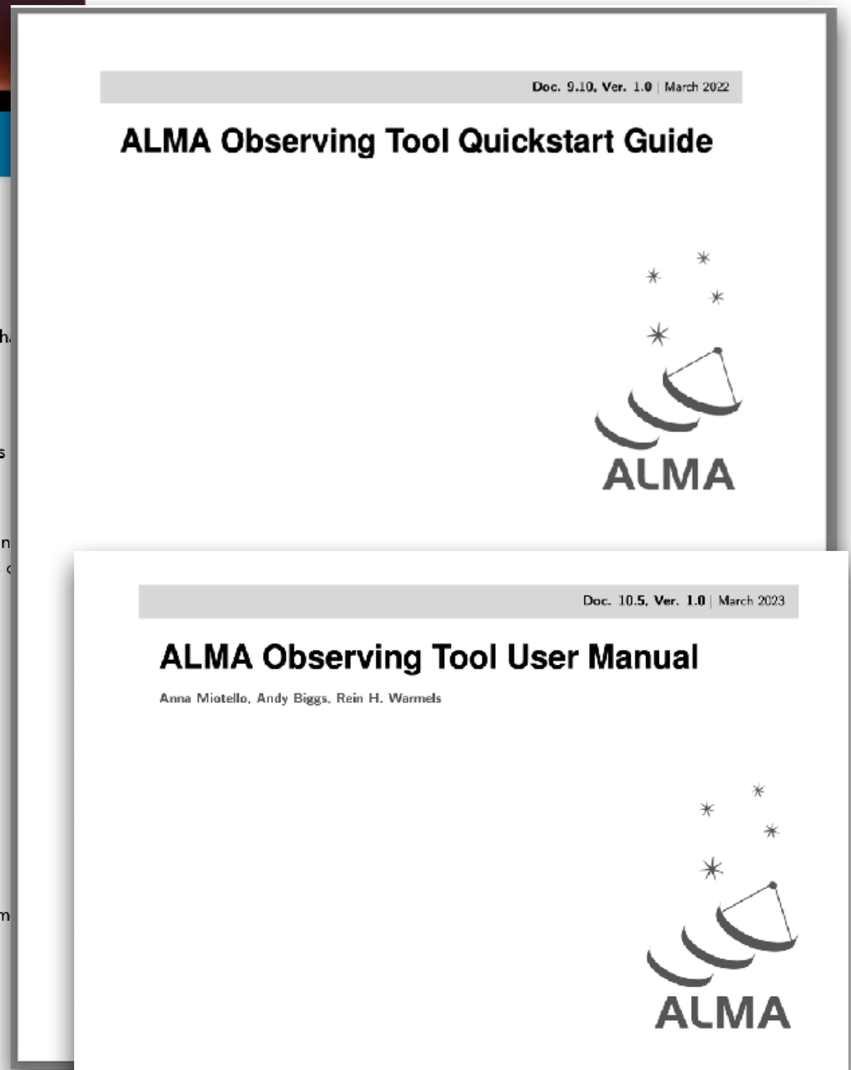
Doc. 9.10, Ver. 1.0 | March 2022

ALMA Observing Tool Quickstart Guide

ALMA

Doc. 10.5, Ver. 1.0 | March 2023

ALMA Observing Tool User Manual

Anna Miotello, Andy Biggs, Rein H. Warmels

ALMA