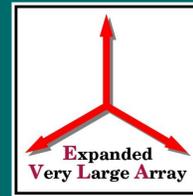




# EVLA: Current Status and Early Science Opportunities



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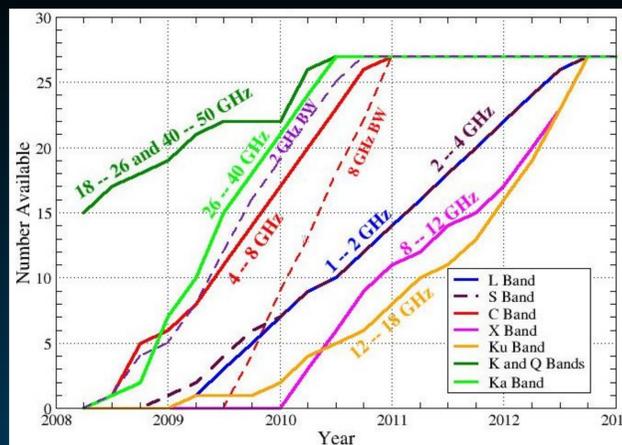
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## Abstract

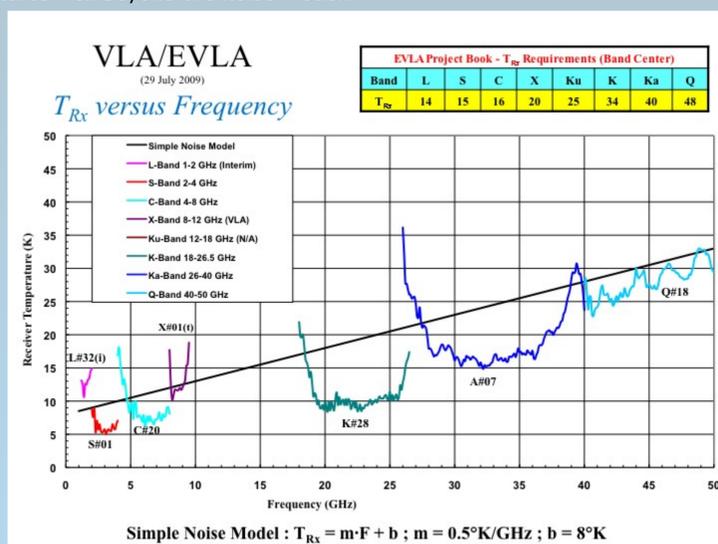
Scheduled for completion by the end of 2012, the Expanded Very Large Array (EVLA) will produce early science in 2010. The continuum sensitivity of the EVLA will be a factor of 3-20 better than the VLA (depending on the observing frequency band). The Canadian-built WIDAR correlator, currently being installed, will process up to 8 GHz/polarization, with up to 4.2 million channels and spectral resolution from 2MHz to 0.19 Hz. The EVLA will also provide continuous frequency coverage in the 1-50 GHz range without any gaps. Here we present an overview of the project, its current status, and first light observations. The extreme flexibility of WIDAR combined with the newly available sensitivity will allow astronomers to develop entirely new experiments that will revolutionize our understanding of the radio universe. A number of EVLA early science opportunities are offered such as the Open Shared Risk Observing (OSRO) for the general community and the Resident Shared Risk Observing (RSRO) program for those who are able to visit Socorro to help with EVLA commissioning.



**Left:** Availability schedule of EVLA capabilities. Plotted are the number of antennas with new features versus time. The high frequency receivers will be finalized first. The 20cm L-band system will be a combination of interim and final EVLA receivers through mid 2012 when the full EVLA system becomes available. Note that the full 8 GHz capability will be somewhat later than depicted.

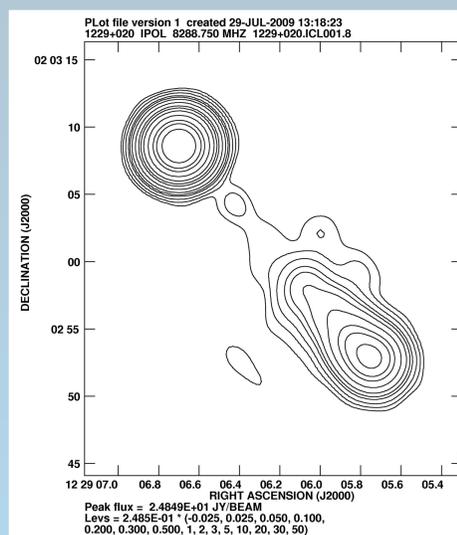
## Receiver Performance

The EVLA will have continuous frequency coverage in the 1-50 GHz range. All wideband receivers have been prototyped and tested. The plot below shows the receiver temperatures for most of the systems (courtesy of Bob Hayward). Typically, the performance of the receivers exceed the EVLA original specifications. Note that the L-band receiver at 1.4 GHz is an interim system and the final one is expected to exhibit receiver temperatures well beyond the noise model.



## The New Correlator: WIDAR

A centerpiece of the EVLA is its new correlator, WIDAR. WIDAR will exceed the capabilities of the current VLA correlator dramatically. Together with the new wideband receivers, the EVLA will eventually be capable to observe with bandwidths up to 8GHz for up to 4 polarization products. The minimum number of channels that WIDAR will deliver is 16,384. In other words, the resolution will be a minimum of 2 MHz. For every 2 GHz baseband, up to 16 sub-bands will be available with 'zoomed' bandwidths between 31 kHz and 128 MHz. The maximum number of channels will reach up to 4 million with resolutions in the Hz range. All sub-bands will be individually selectable and tunable within the baseband. To the right, we show a recent test observation of 3C283 in X-band with a preliminary version of WIDAR.



## Open Shared Risk Observing (OSRO)

Regular observers will perform their observations under the OSRO scheme. The OSRO mode will be a more reliable environment than RSRO observations but have restricted capabilities. Initially, OSRO observations will be simultaneously with 2 IFs and each for each IF a bandwidth can be chosen in the 0.03 to 128 MHz range. For full polarization, each polarization product will have 64 channels independent of bandwidth. For dual polarization, there will be 256 channels available per product. OSRO will thus allow observations with up to 38,400/n(GHz) km s<sup>-1</sup> bandwidth, and, in the other extreme, a spectral resolution of 0.037/n(GHz) km s<sup>-1</sup>. With progress in commissioning, new correlator modes will become available with time. The first call for proposals will be on October 1, 2009 for D configuration. Future configurations will be C, B, and A, in that order.

## Resident Shared Risk Observing (RSRO)

RSRO observers will have the full capability of the EVLA available to them, significantly exceeding OSRO specifications. To become a RSRO observer, we invite experienced radio astronomers to come to Socorro, NM for a period of at least three months during which they will be responsible for specific commissioning tasks. Examples are listed on our webpage, but we encourage RSRO participants to define their own goals, tailored to their science interests and aligned to EVLA commissioning needs. In return, RSRO observers will receive telescope time and we expect that 1200h per year will be available specifically dedicated for the RSRO program until the end of 2011. Please see our webpages for the details:

[www.aoc.nrao.edu/evla/astro](http://www.aoc.nrao.edu/evla/astro)