



Active Antenna Development at the Naval Research Lab



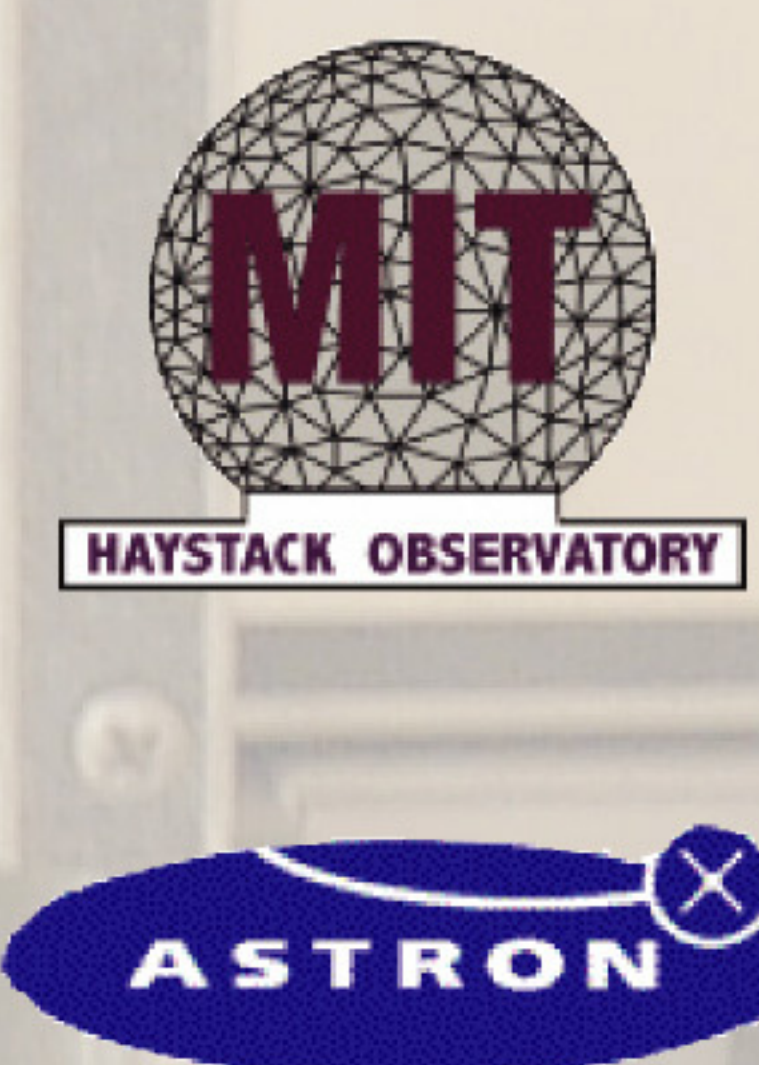
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Background

The Remote Sensing Division (RSD) of the Naval Research Laboratory (NRL) is engaged in a program to develop active antenna technology. We are presently collaborating with Bill Erickson (BIRS), Brian Corey and Eric Kratzenberg (Haystack Observatory), and engineers at ASTRON in this endeavor. Our specific focus at NRL/RSD is the development of low-frequency antennas for the Low Frequency Array (LOFAR) radio telescope.

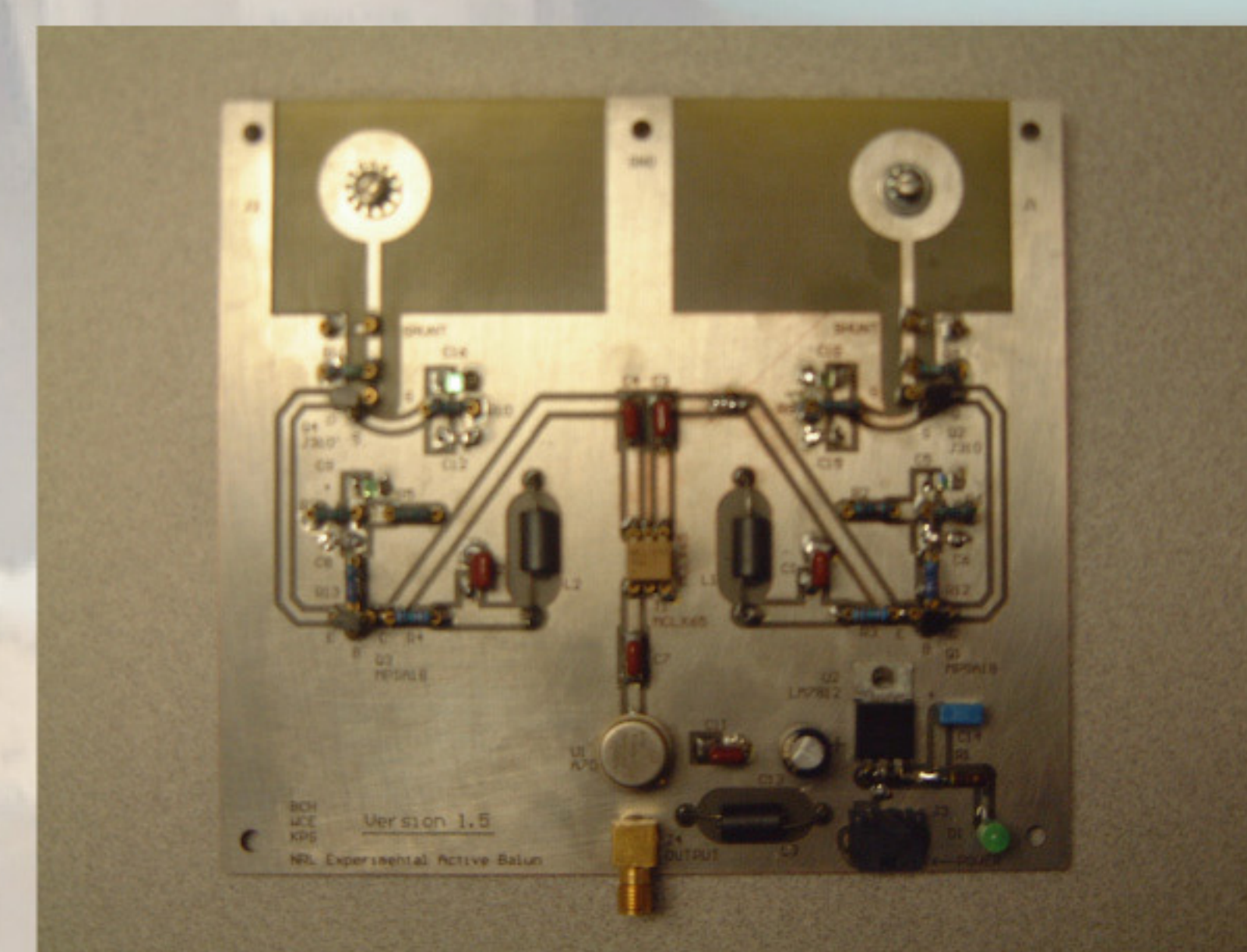
Approach

Our approach involves the assessment of many candidate antenna systems through simulation, prototyping, and testing. We are presently considering a variety of antenna topologies, including folded dipoles, 'fat' dipoles, and log-periodic antennas. To achieve the sensitivity and wideband performance required for LOFAR, we are investigating the use of active baluns. These devices are matching and gain networks intended to mitigate the widely varying reactive impedance of some antennas at low frequencies by presenting them with a high input-impedance.

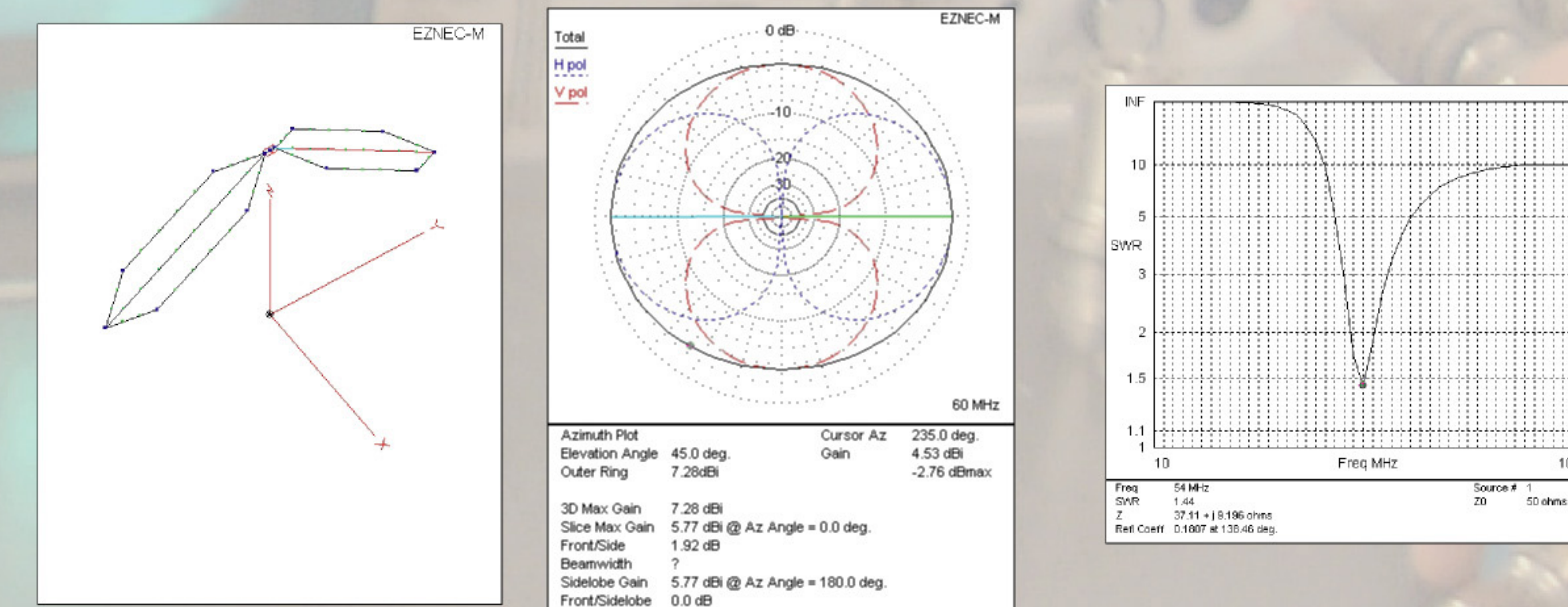


Progress

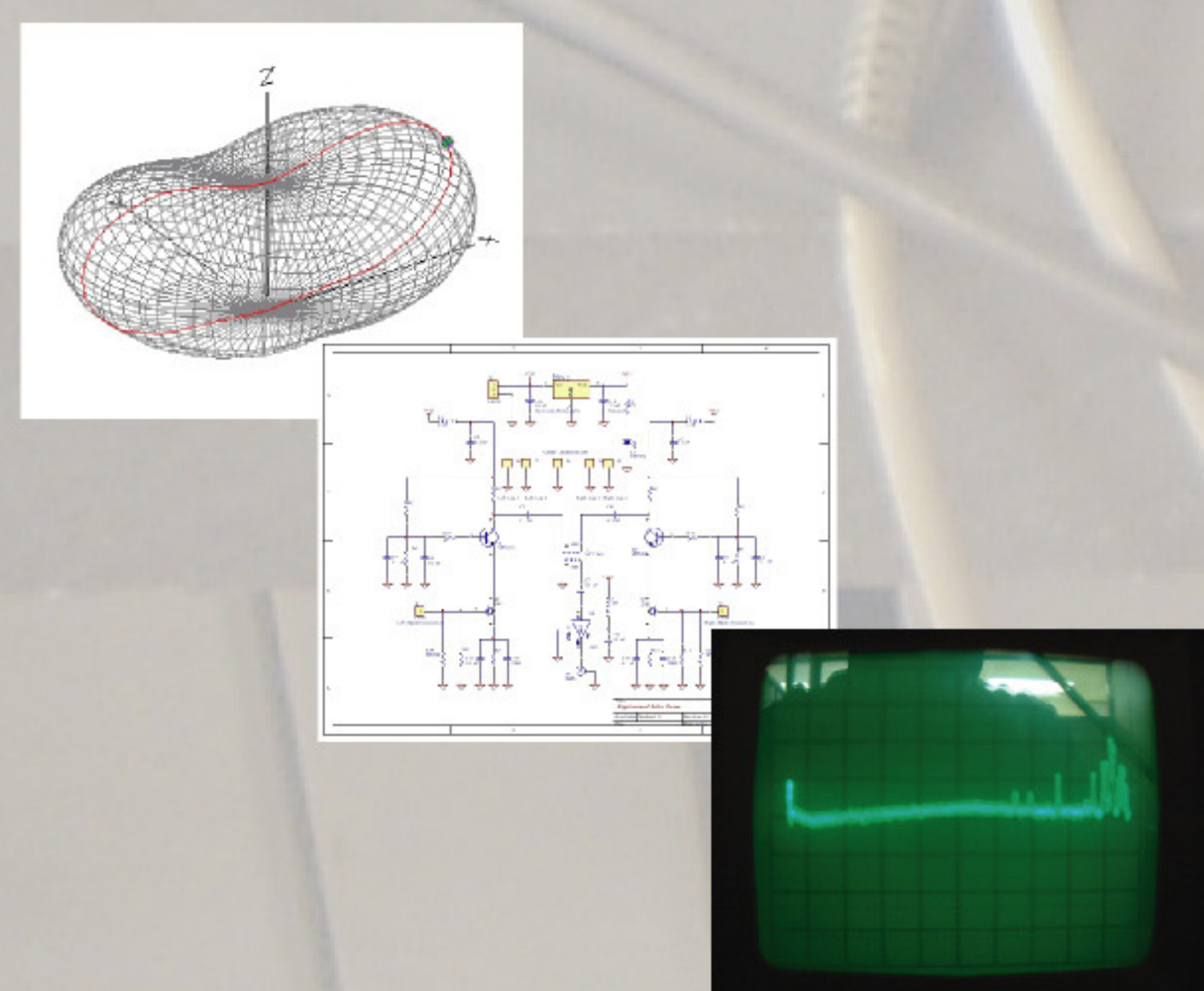
We have designed and prototyped several active baluns, and are presently characterizing their performance with folded and 'fat' dipole antennas. By assessing the performance of the active baluns with established antenna topologies, we are able to iteratively refine the device. These antenna systems are currently being tested at the Bruny Island Radio Spectrometer (BIRS) facility by Bill Erickson, which allows for performance comparisons with an established instrument in a common environment.



Active Balun Prototype



Simulation and Analysis of Candidate Designs



In-House Development and Testing of Antenna Systems at N.R.L.

Future Efforts

After conducting an exhaustive survey of economically feasible systems, we will turn our attention to optimizing the design for low cost and high reliability. Because of the large number of antennas required for LOFAR, and the need for them to operate with minimal maintenance, this phase of our effort will be critical.