

Peter Anderson

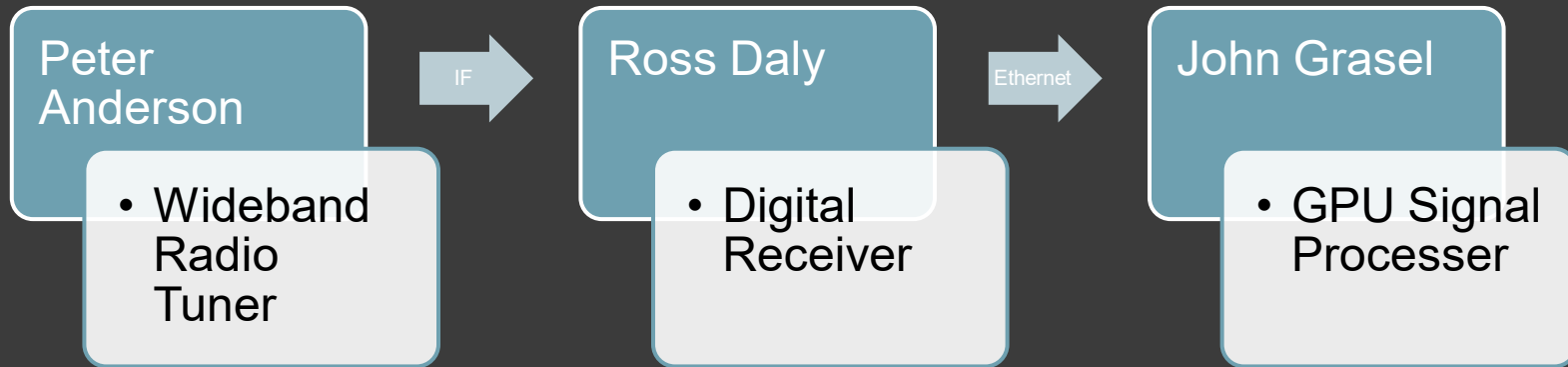
SUNY Oneonta

MIT Haystack Observatory

August 5th, 2010

WIDEBAND RADIO TUNER FOR GEOSPACE SCIENCE APPLICATIONS

Design Motivation

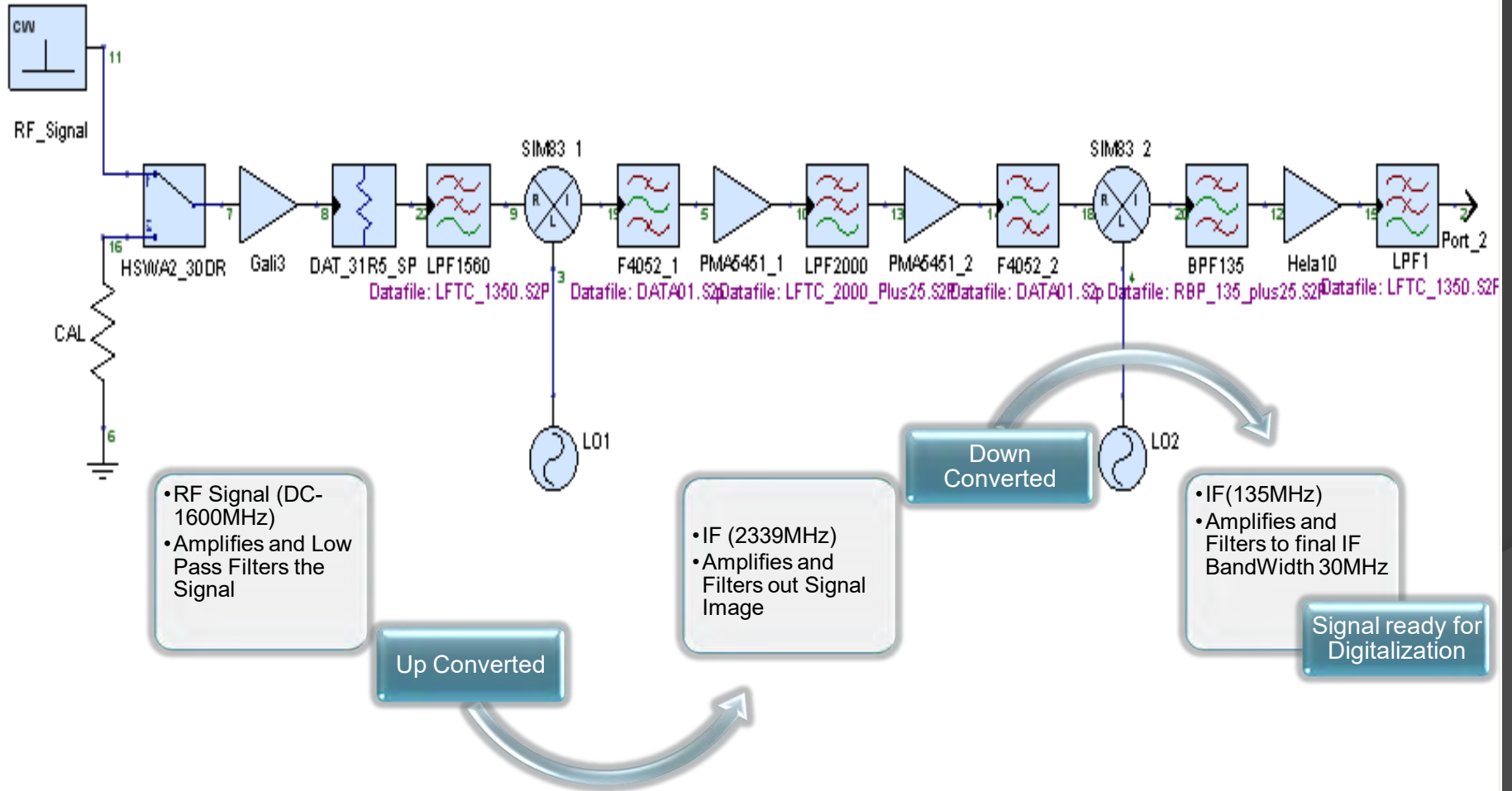


- A modular approach to Geospace Software Radio receiver design
- Prototype a low cost Wideband Radio Tuner

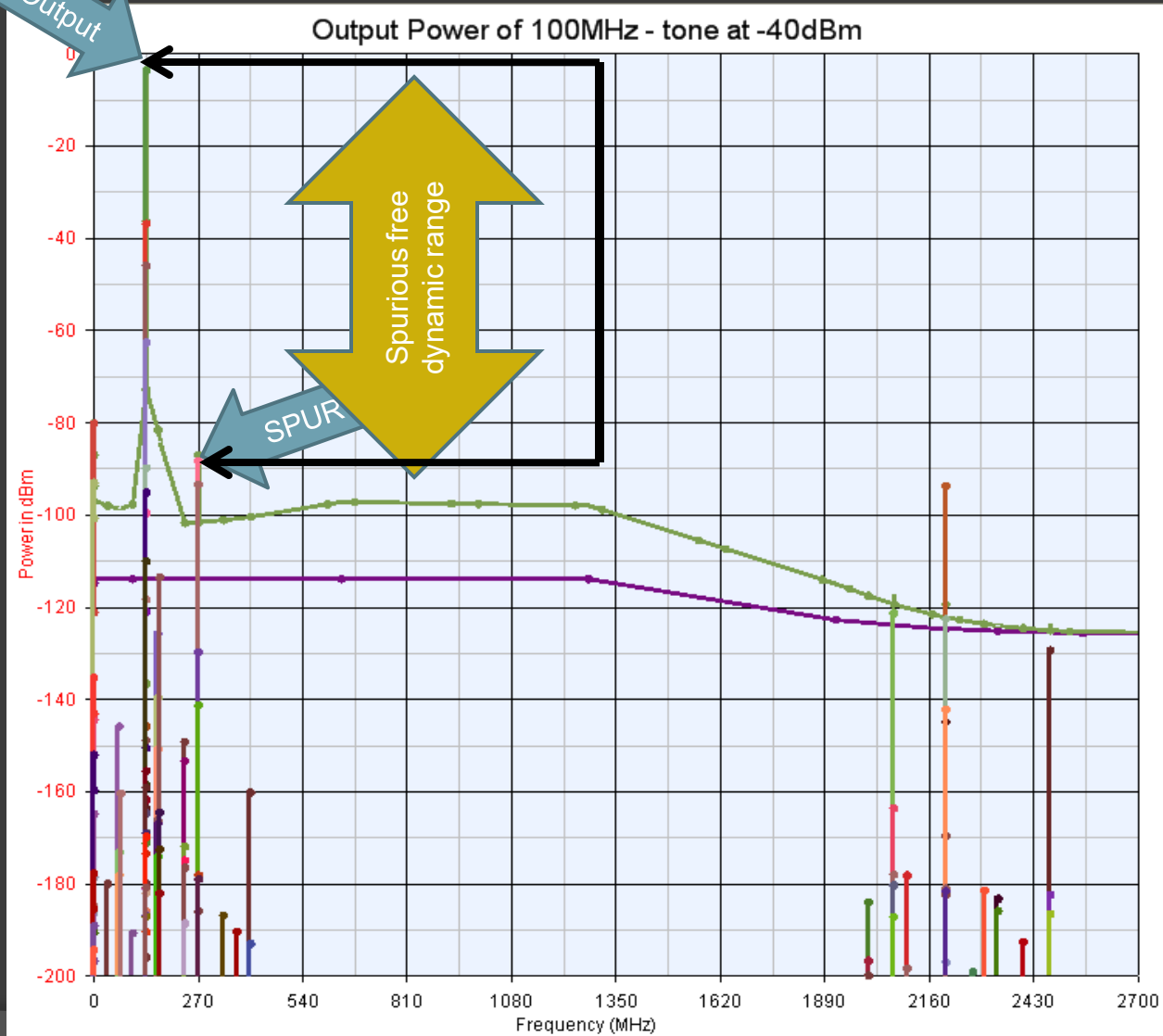
Wideband Radio Tuner

- ① Tunes Radio Frequencies(RF) to a common Intermediate Frequency(IF)
- ① Covers DC-1600MHz
 - Up-Down Converter Design
 - Eliminates Expensive Filters
- ① Low Cost
 - Use Commodity Parts
- ① Prototype using Development Kits

Simulate using Agilent Genesys



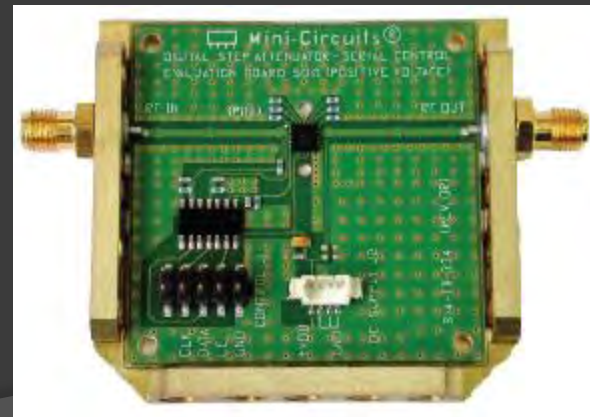
Example Simulation Output



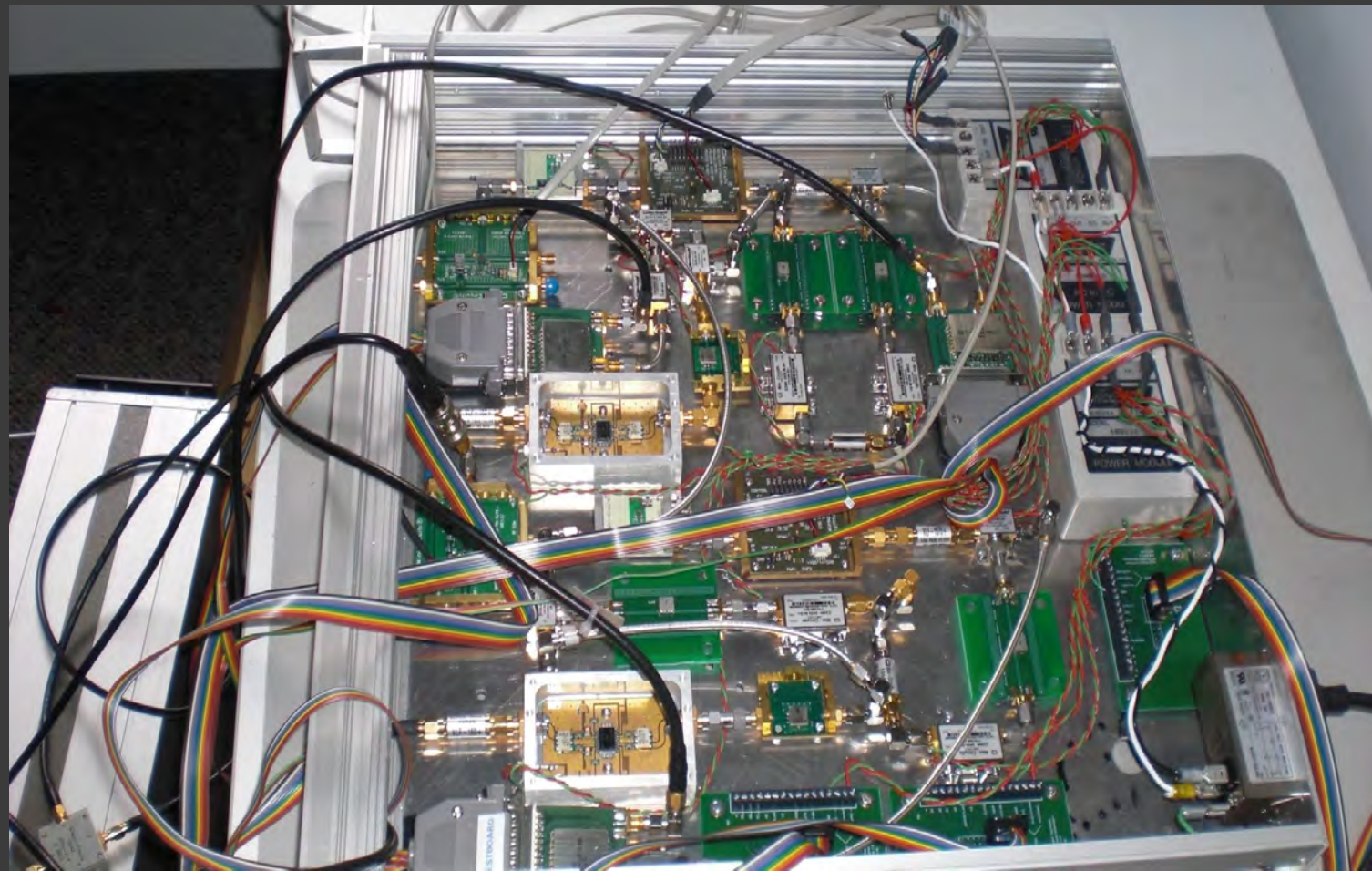
SPURs are the result of nonlinear processes. Extra signals that can create noise and interference.

Prototyping

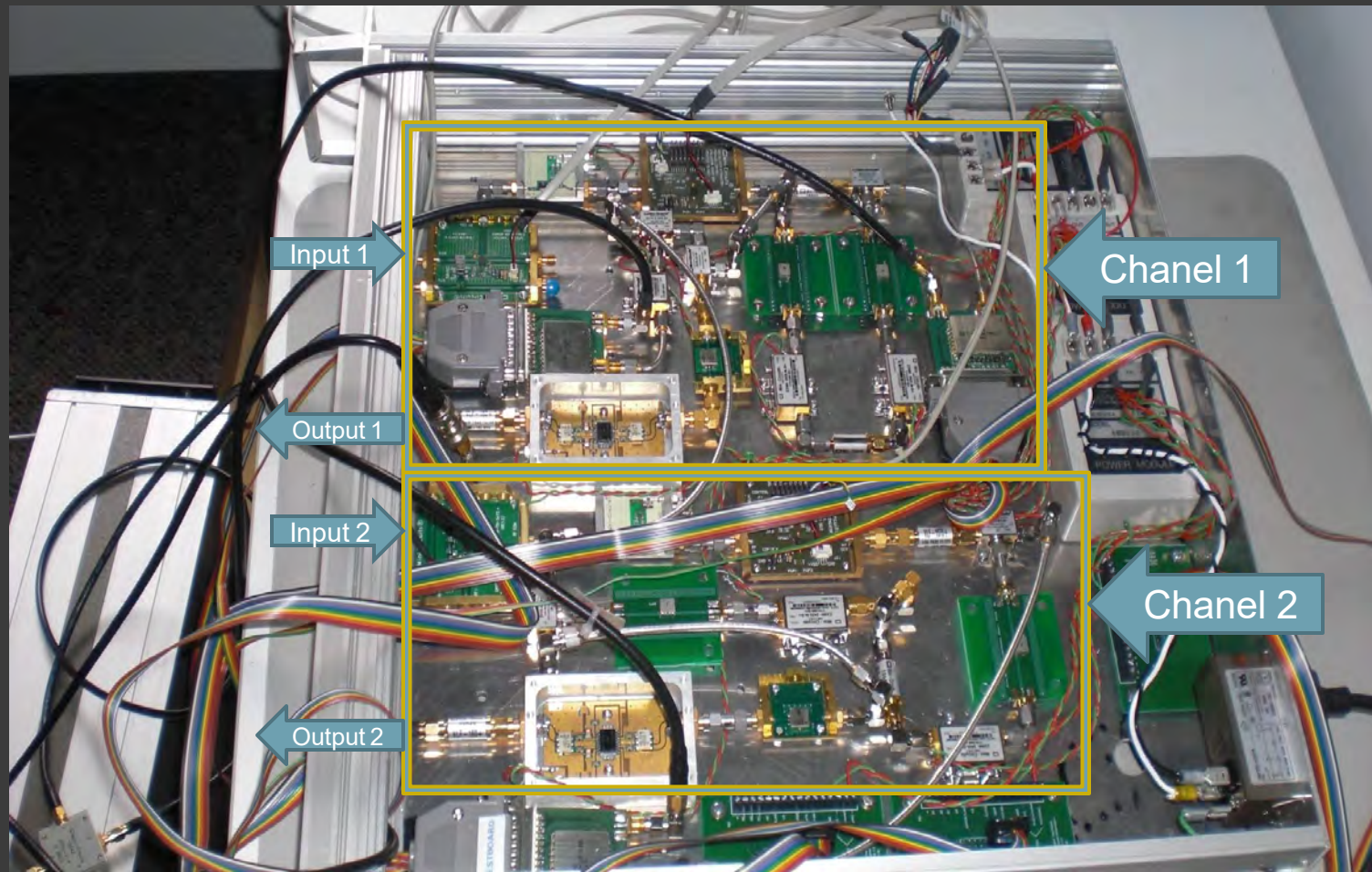
- Took Goldbox/Testboard approach instead of using doing a Printed Circuit Board
- Speed up Development time
- Allow for easier troubleshooting and testing



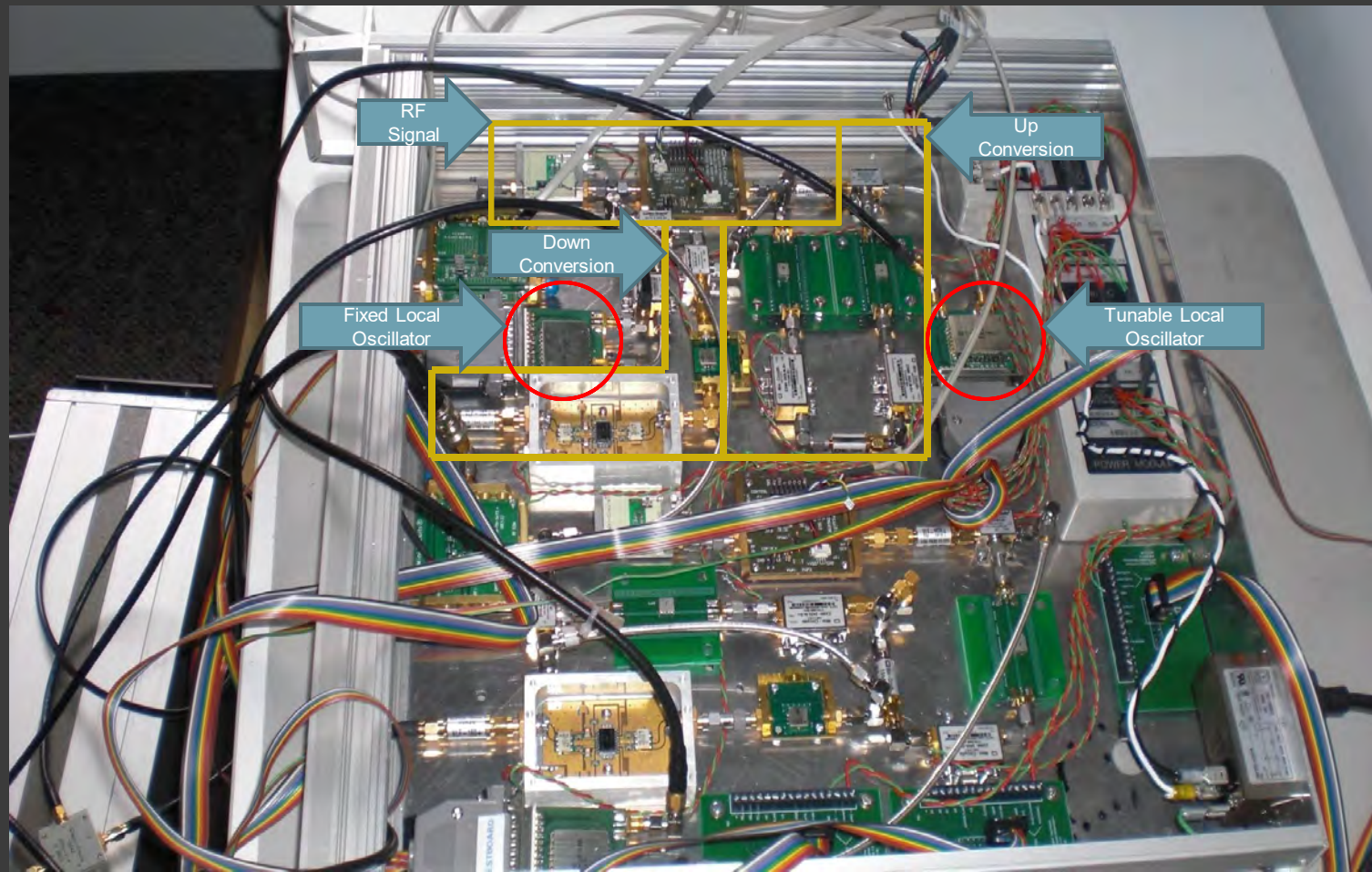
The Tuner Prototype



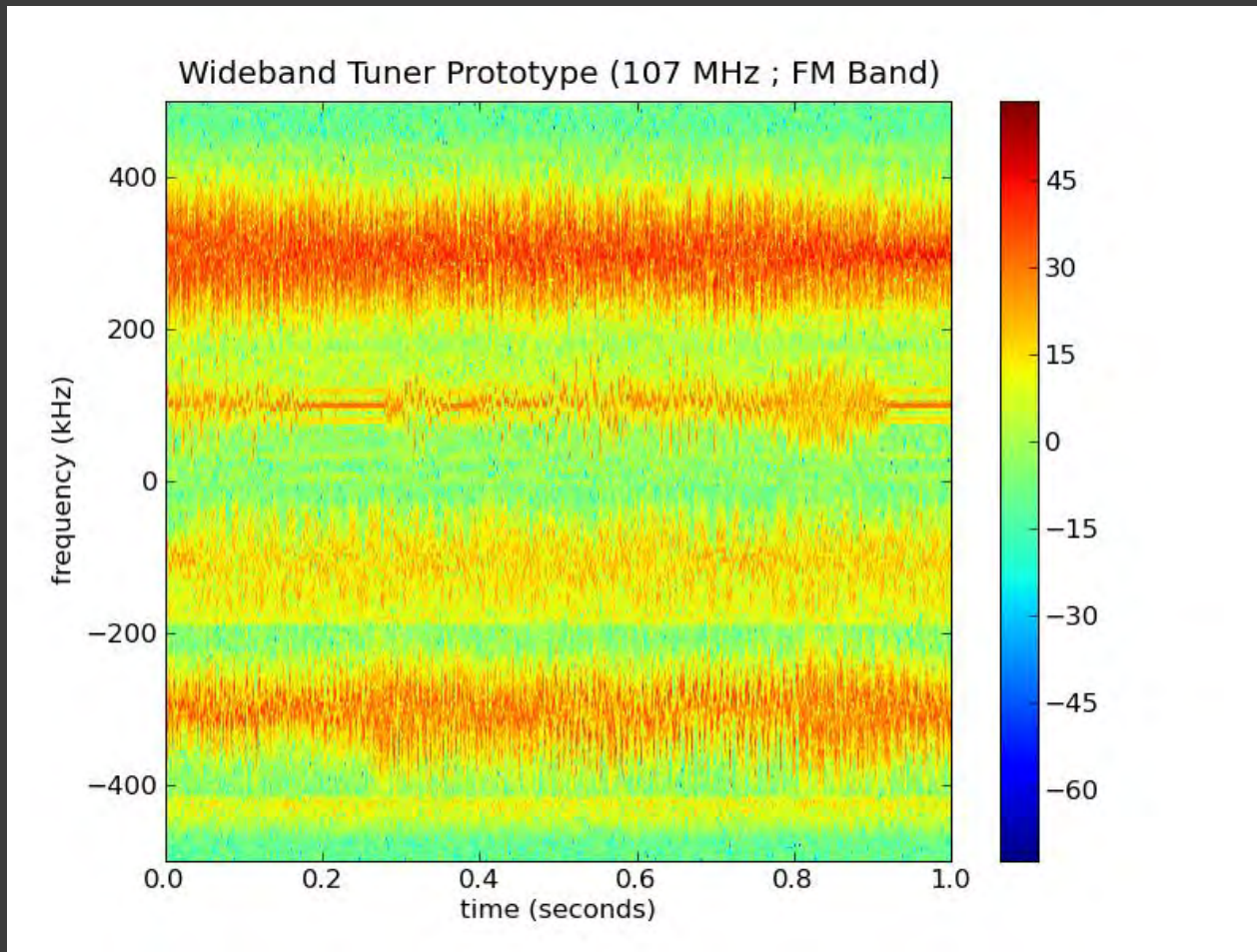
The Tuner Prototype



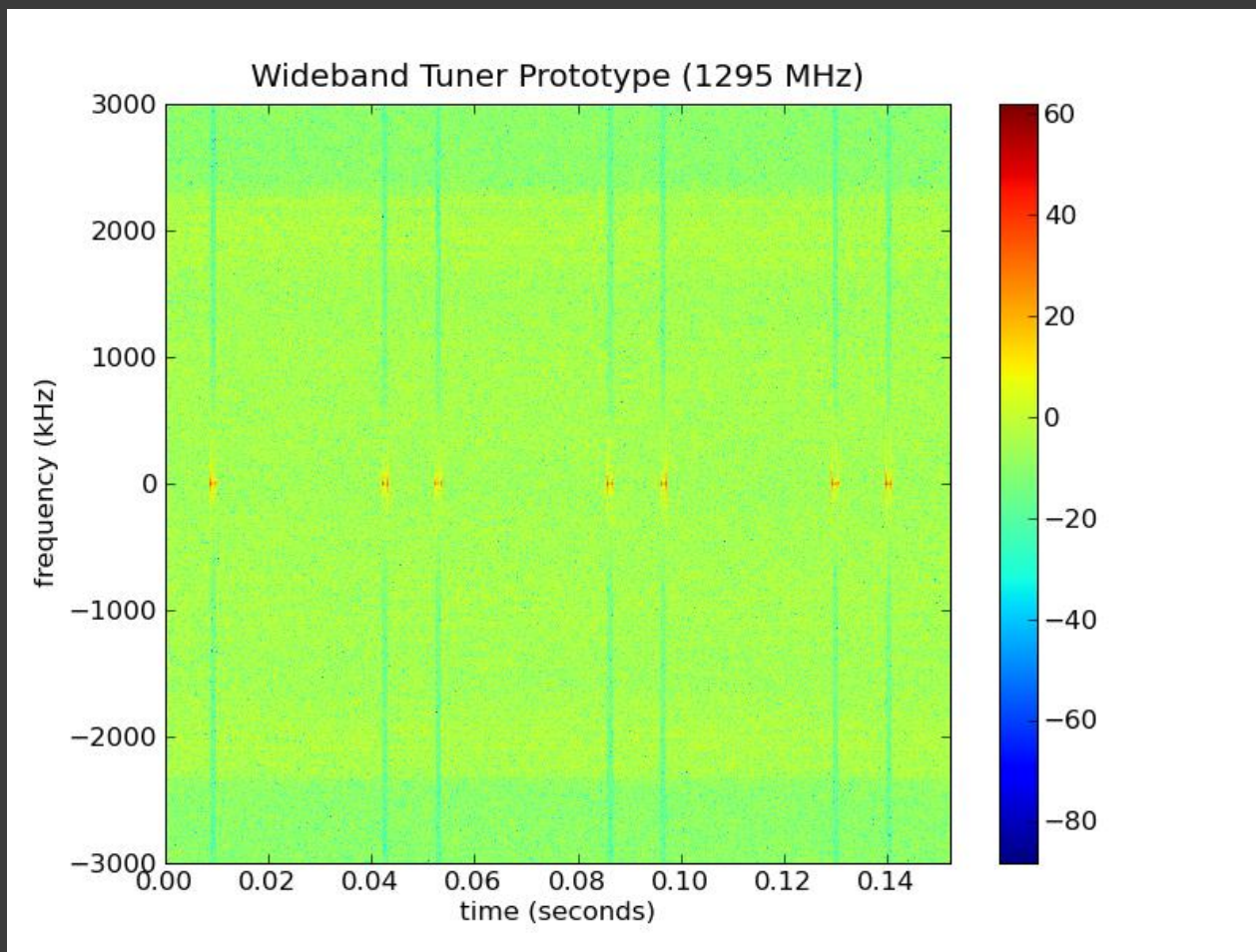
The Tuner Prototype



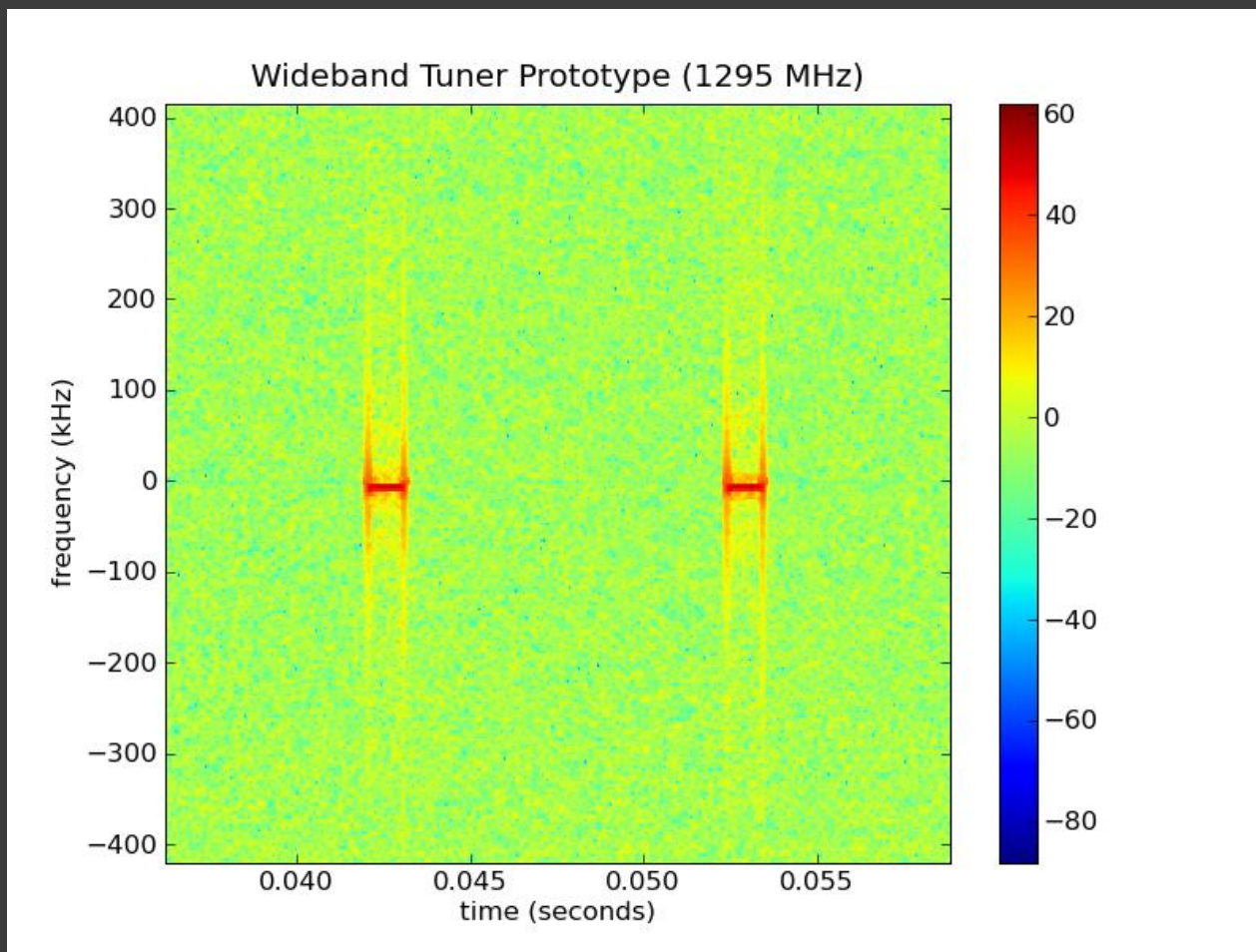
Signals from Discone Antenna



Signals from Discone Antenna



Signals from Discone Antenna



Conclusions

- The tuner downconvert's over a wide RF input range
- No Filter required prior to tuner input
- Systematic testing still needed
- The parts cost per channel is \$82
 - *(Excluding Local Oscillators and PCB in quantity 1)*

Acknowledgments

◎ My Mentors

- Frank Lind
- James Marchese

◎ Special Thanks

- Will Rogers
- KT Paul
- Ching Lue
- Anthea Coster
- Everyone else at Haystack for making this REU a great experience