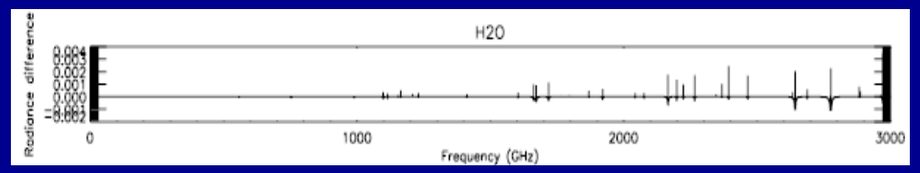
A novel wideband high-resolution spectrometer for next-generation passive terahertz sensors

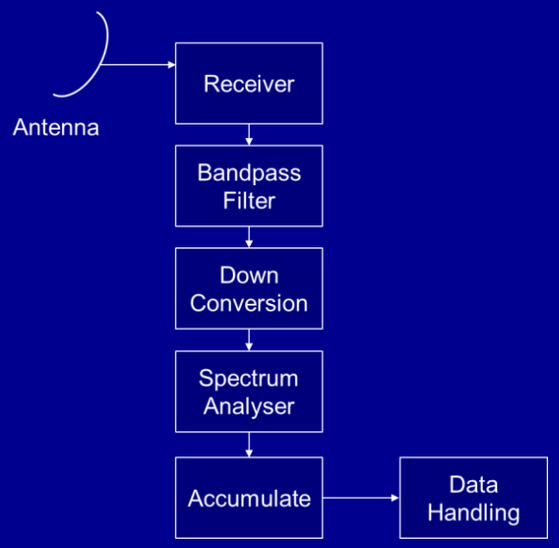
CEOI Seed Corn Study 2011/12

Measuring Atmospheric Constituents

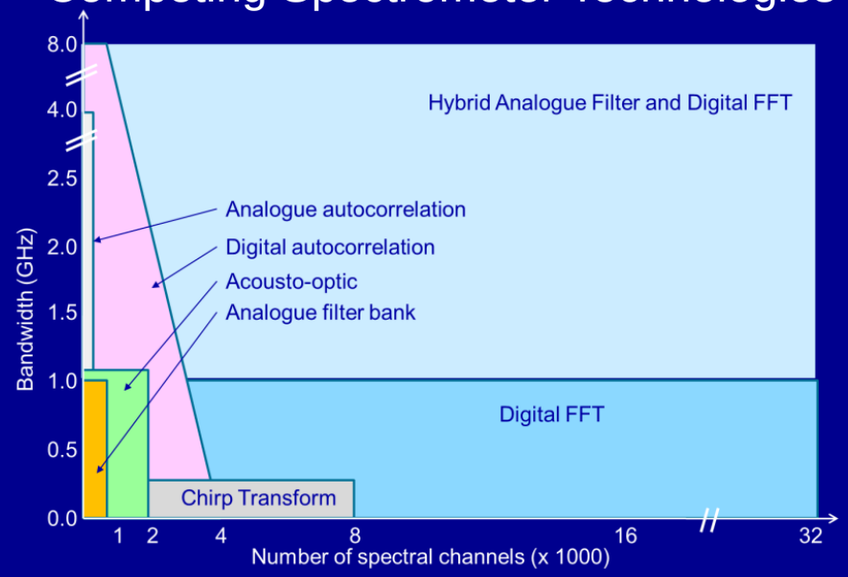
- Spacecraft points receiver at limb
- Receives microwave radiation from atmosphere
- Containing the spectral lines from various atmospheric species
- Spectral lines are completely submerged in noise
- Need to measure the spectrum and average
- To extract the wanted signal from noise



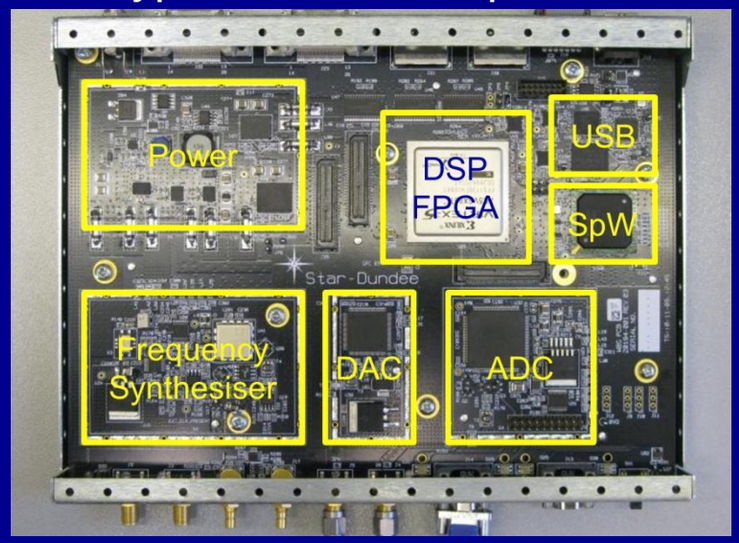
System Block Diagram



Competing Spectrometer Technologies



Prototype Wide Band Spectrometer



Prototype WBS Under Test With Receiver

Project Achievements

- Detailed test and characterisation of WBS ✔
  - WBS connected to Terahertz front-end ✔
  - Test results operating WBS with Terahertz front-end ✔
  - Analysis of test results ✔
- Provide test software ✔
  - Test software complete for characterisation tests ✔
  - All essential facilities required for running tests ✔
- Study increased spectrometer bandwidth ✔
  - Potential bandwidth that could be achieved ✔
  - Along with mass and power estimates ✔
- Technical roadmap for future exploitation ✔
  - Route to a flight system defined ✔