Automatizing a Fourier transform spectrometer to measure millimeter and far-IR wavelength radiation

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Astronomical Instrumentation Lab for mm-λ

Astrophysics Dept. – INAOE

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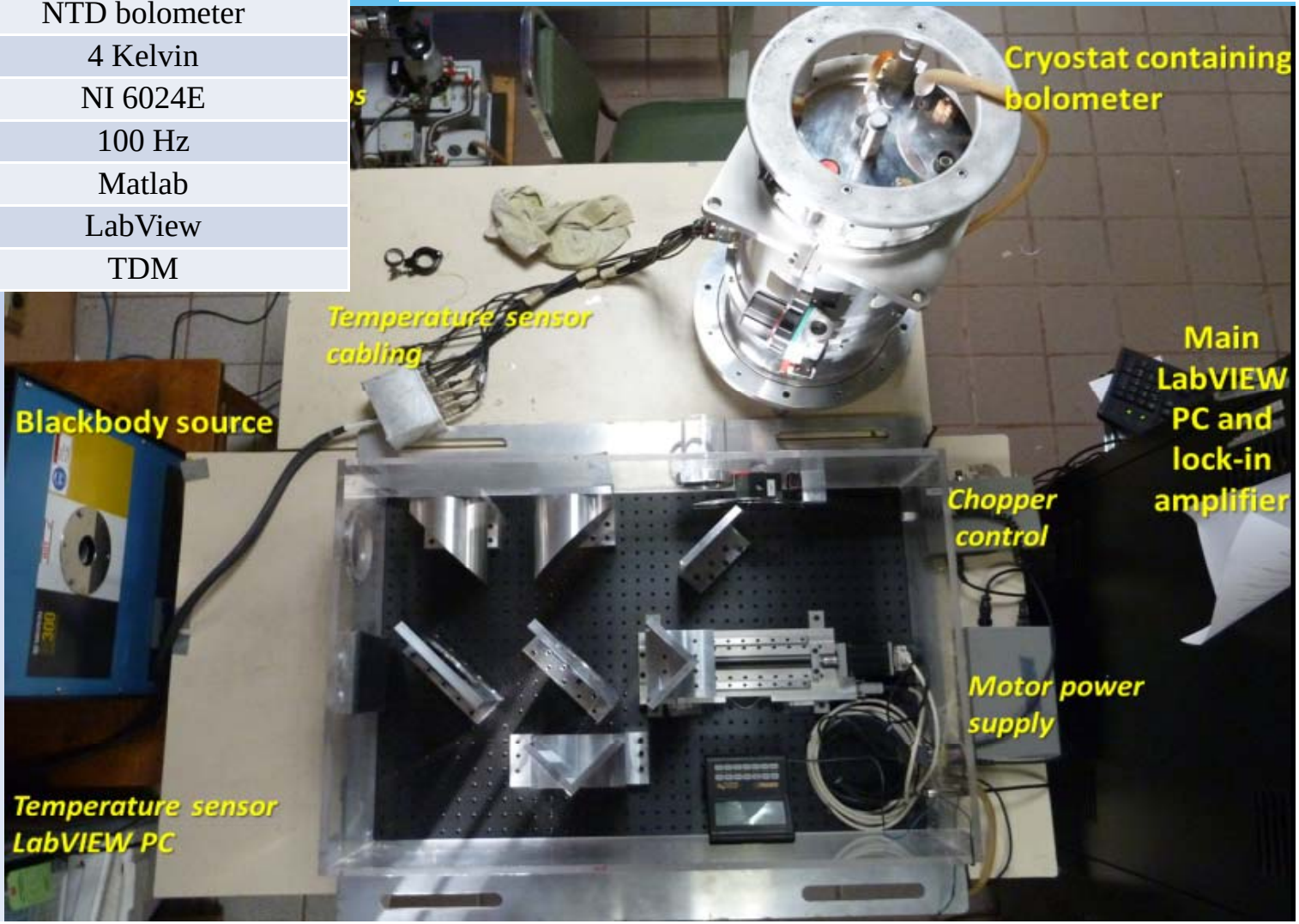
INAOE FTS

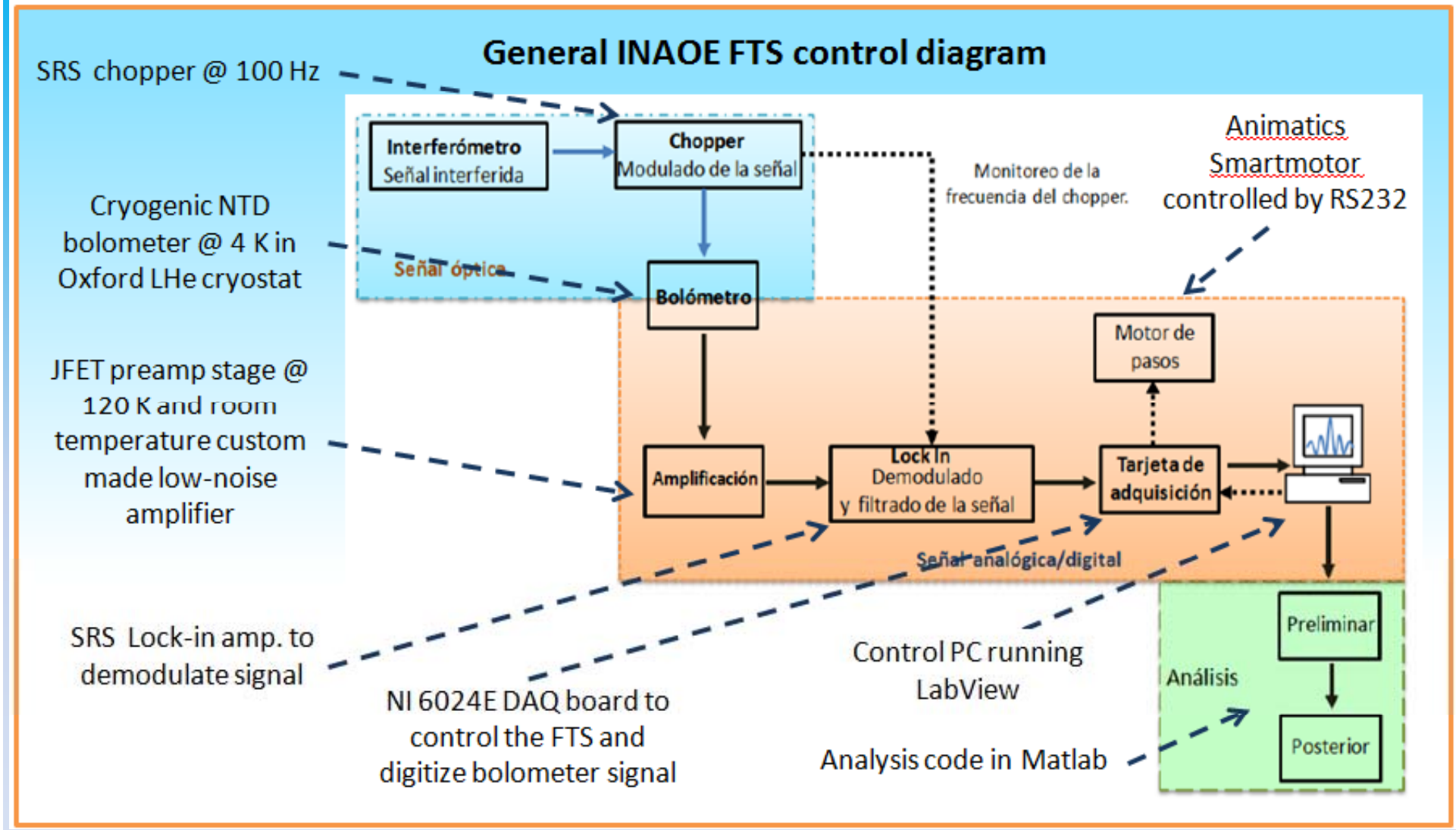
General characteristics

Item	Value/Description
FTS type	Martin-Puplett
Freq. range	100 – 1000 GHz
Max. Resolut.	0.5 GHz
Detector	NTD bolometer
T_{bolom}	4 Kelvin
DAQ	NI 6024E
Chopper Freq	100 Hz
Analysis Software	Matlab
Control Software	LabView
File system	TDM

Linear stage characteristics

Item	Value/Description
Moving linear stage distance	Lmax = 0.275 m
Step size	Lmin = 0.635um
1 revolution	1.27mm, 2000 steps
Linear stage / Motor	Servosystems /Animatics

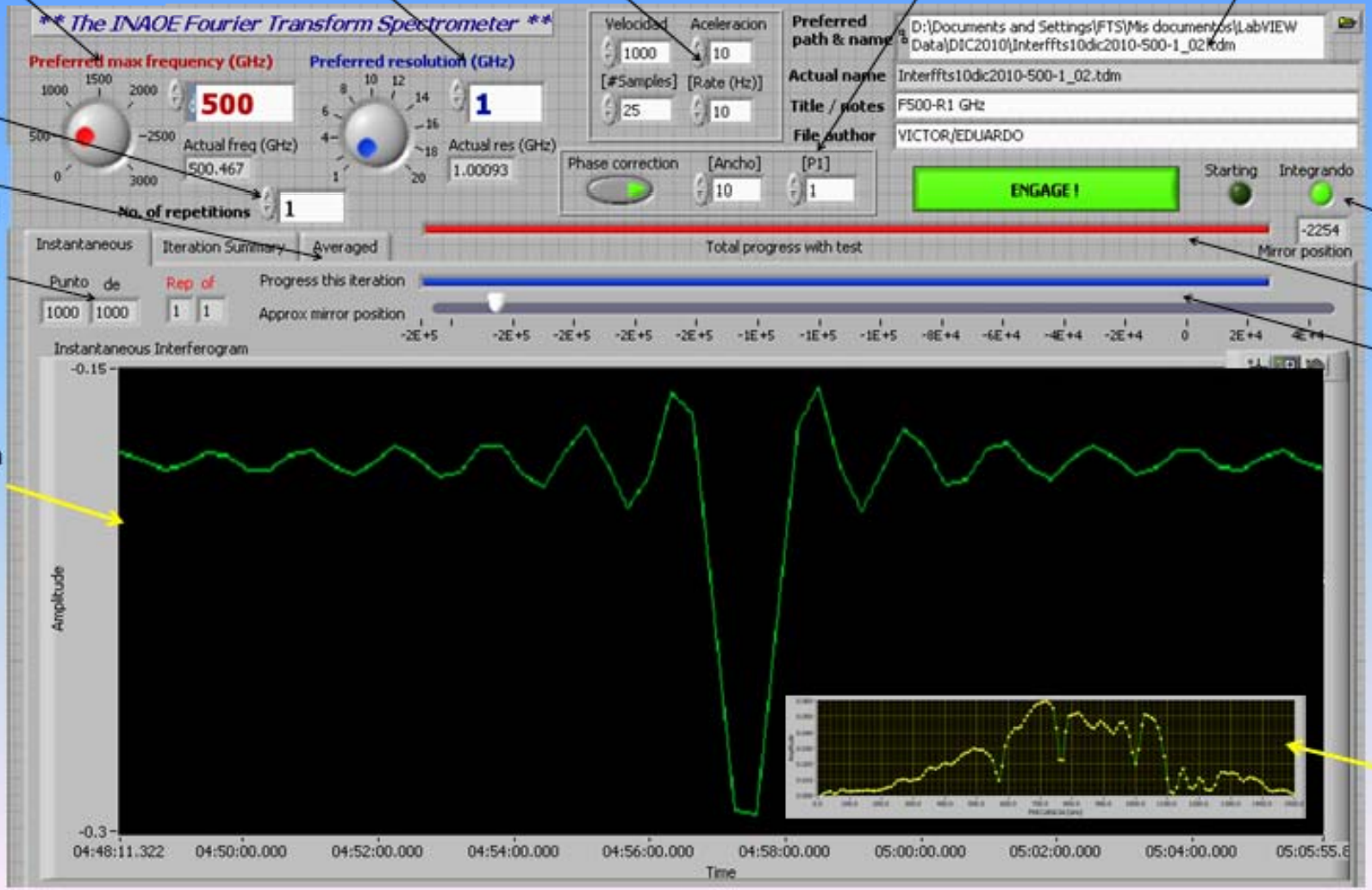




Interferogram apodization and phase correction

All mathematical programming in Matlab and embedded in LabView.

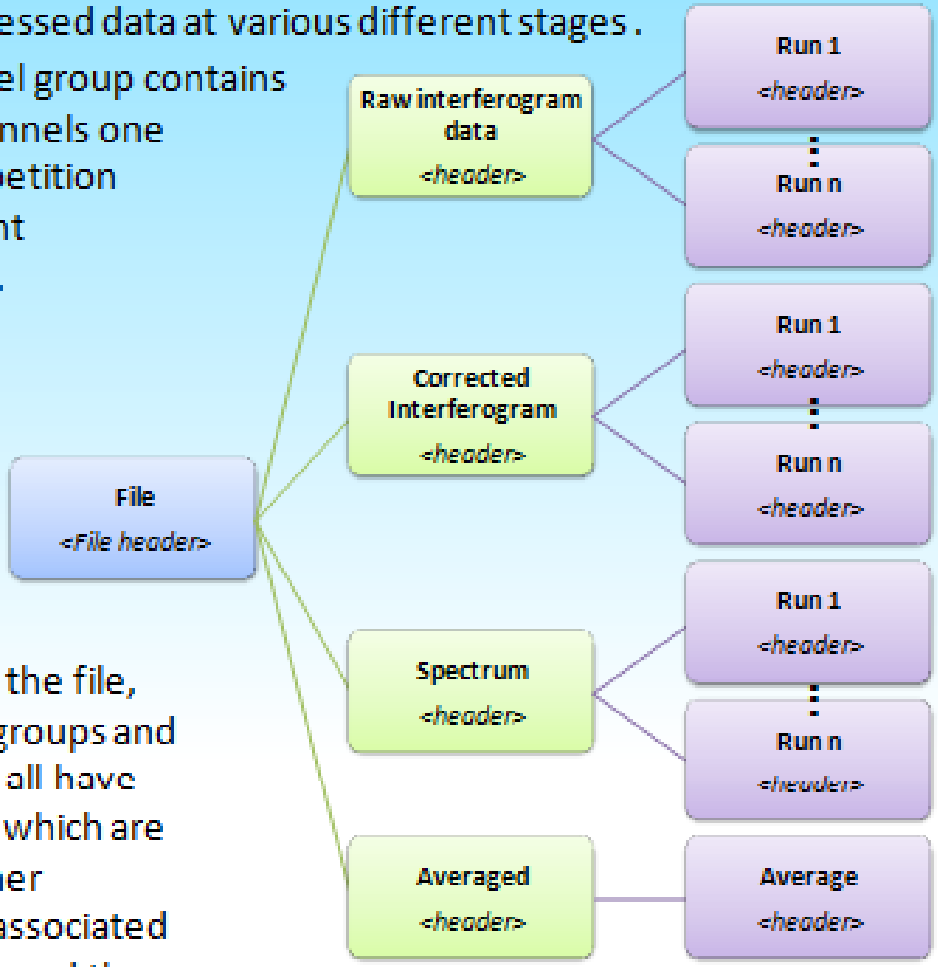
INAOE FTS main control GUI



File and data handling system

•NI technology data management (TDM) storage system
•TDM output file contains channel groups for the raw data and the processed data at various different stages .

•Each channel group contains multiple channels one for each repetition of the current experiment.



•Additionally the file, the channel groups and the channels all have headers into which are recorded other parameters associated with the data and the experimental setup.

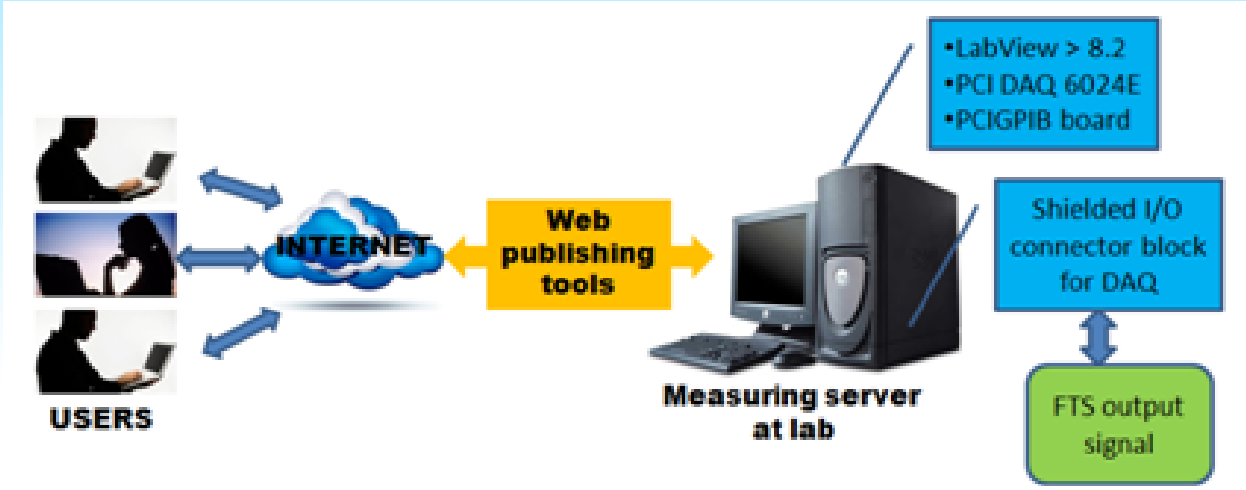
•TDM files can be converted to several different formats for broad compatibility.

Remote control operation

•Use of the integrated LabView Web Publishing tool.

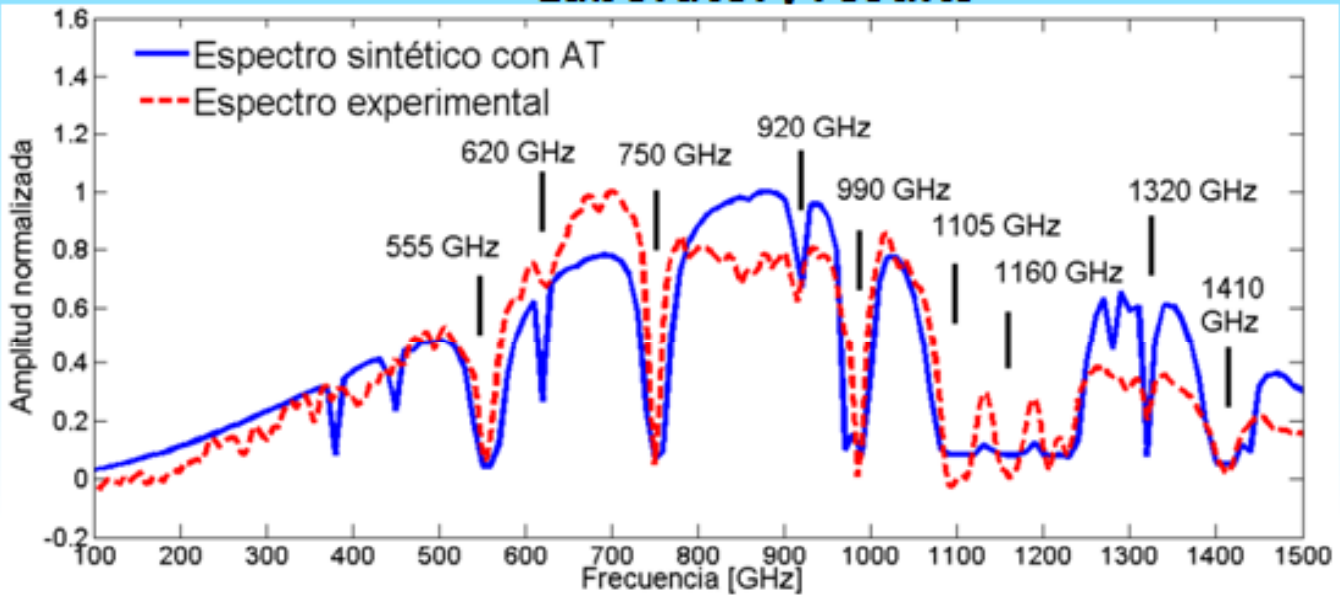
•Allows the client to view and control the front panel of a VI remotely or just show a snapshot that updates continuously through the use of a web browser.

•The acquisition occurs on the host computer but the remote user has total control .

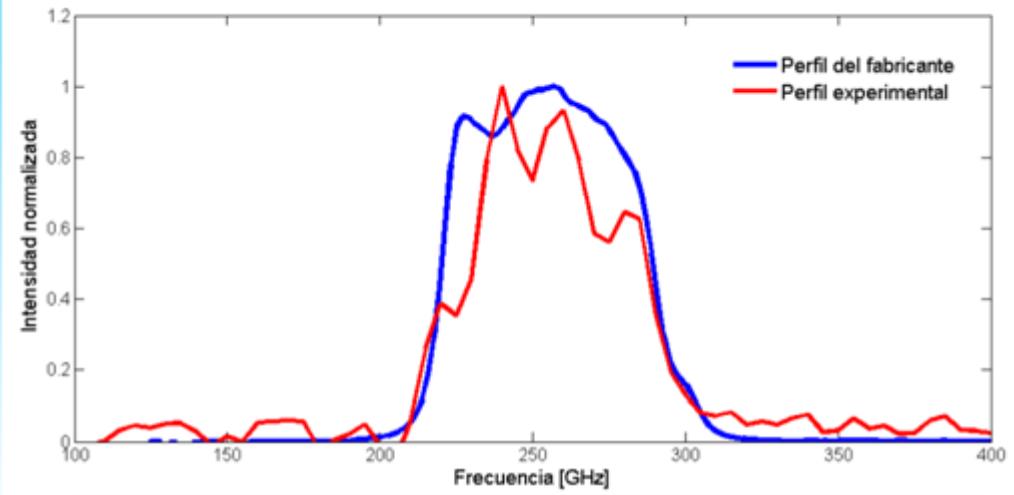


•At any time the operator of the host machine can assume control of the application back from the client currently in control.

Laboratory results



Atmospheric spectral profile of the atmosphere inside the FTS container measured in our laboratory which shows main water absorption lines and the range of operation of the instrument.



Millimeter (1.2mm) wavelength metal-mesh band-pass filter spectral profile measured in our lab.