

The Bi-Band Software PARIS Interferometric Receiver

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MOTIVATION

To implement a new instrument that provides GNSS-R observables at L1 and L5 simultaneously.

INSTRUMENT DESCRIPTION

HERITAGE

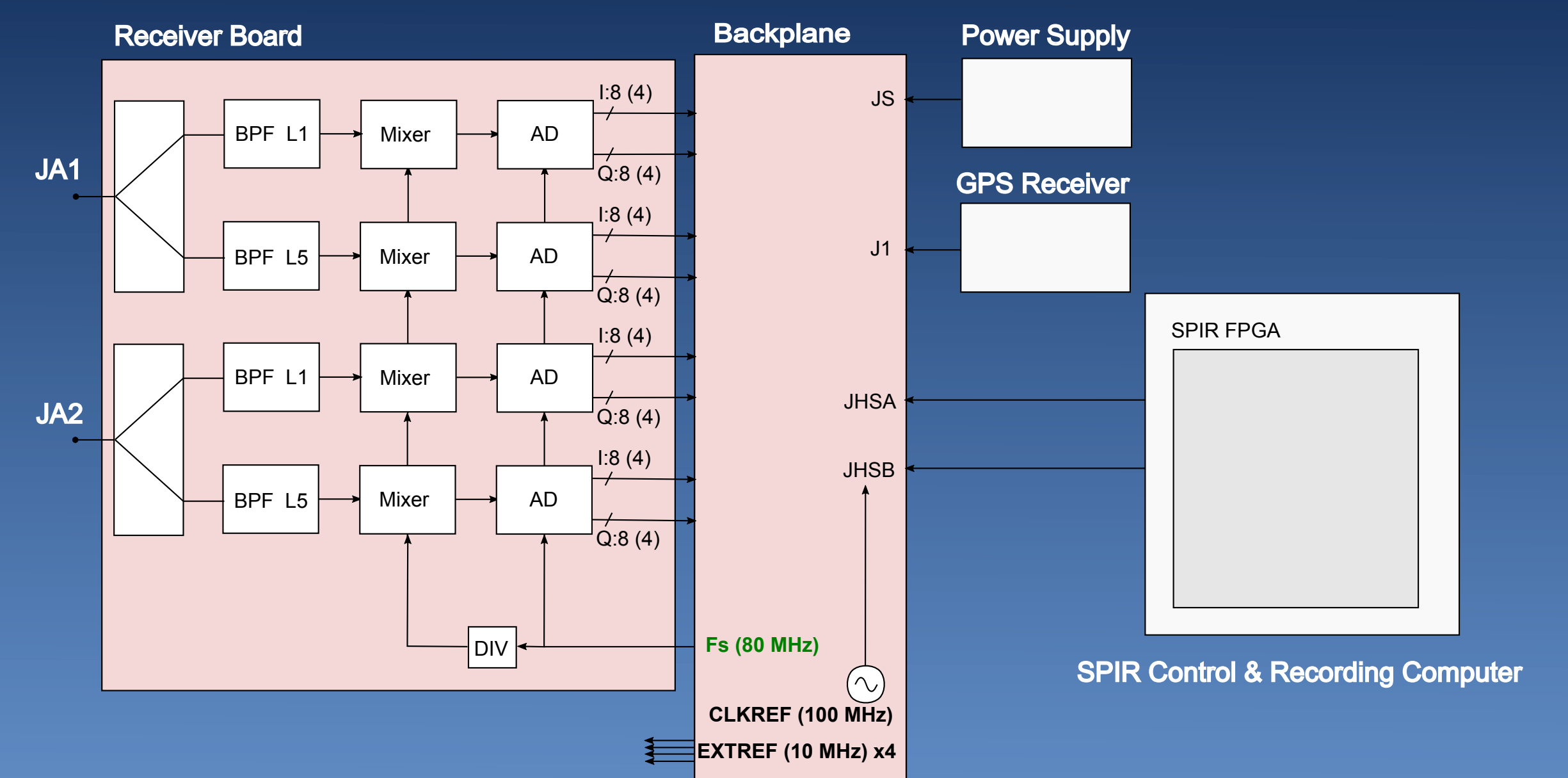
The BI-Band Software PARIS Interferometric Receiver (**BIBA-SPIR**) is based on the control and recorder back-end of SPIR [1].

A new dual-band (L1 & L5) front end has been implemented and the SPIR back-end adapted to the new front end.

MAIN CHARACTERISTICS

- Dual band: **simultaneous L1 and L5**.
- One UP channel and one DW channel.
- IQ sampling at **80 MHz** rate.
- **Four bits per sample** quantization.
- High-speed **recording** of the four channels (UP, DW)x(L1, L5) at **2.56 Gbps**
- Software-defined **offline processing** using the **wavpy** library [2].
- Mass and power envelope compatible with CryoWing MK II UAV.

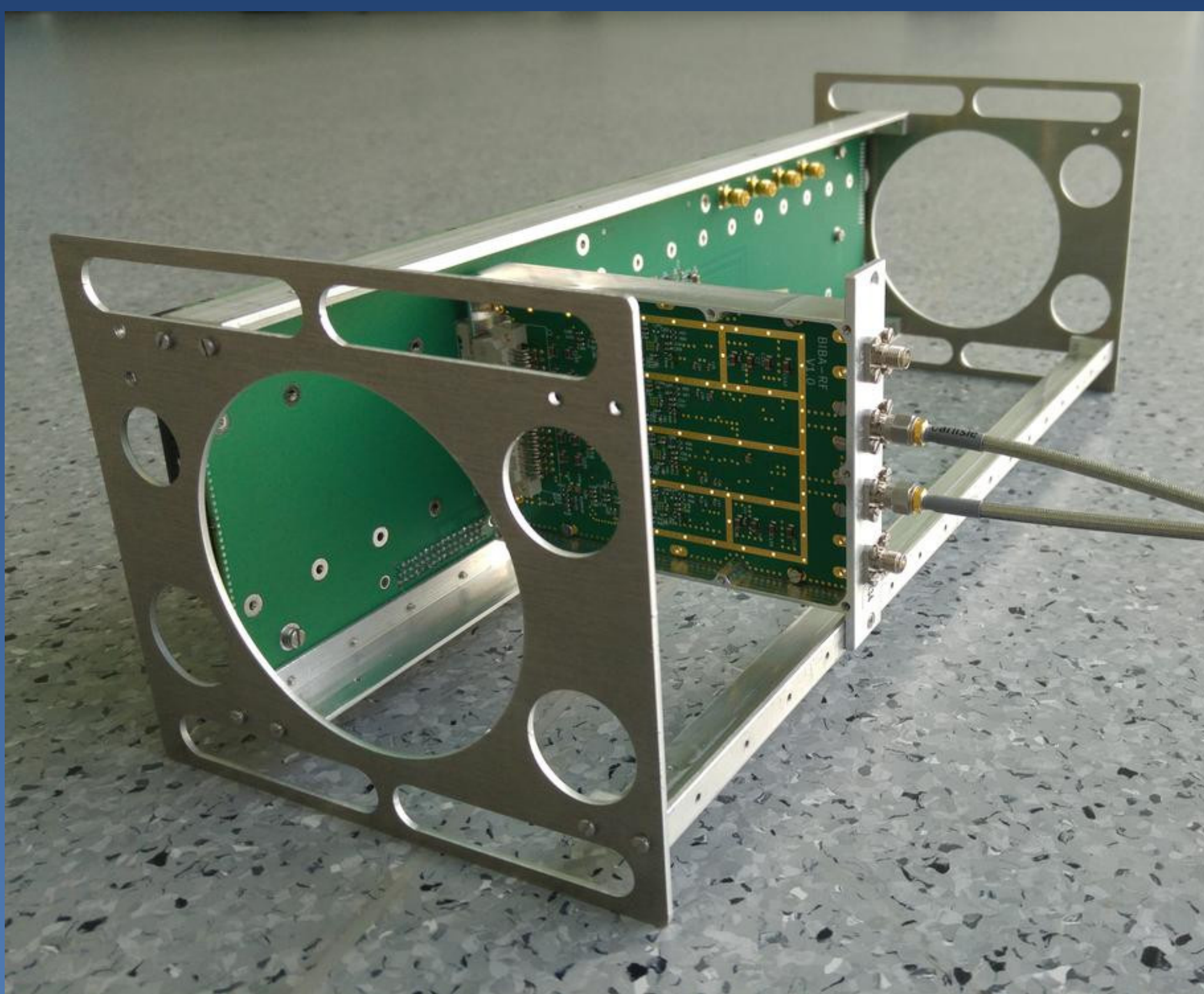
BLOCK DIAGRAM



BIBA-SPIR HARDWARE AND PRELIMINARY RESULTS

BIBA-SPIR

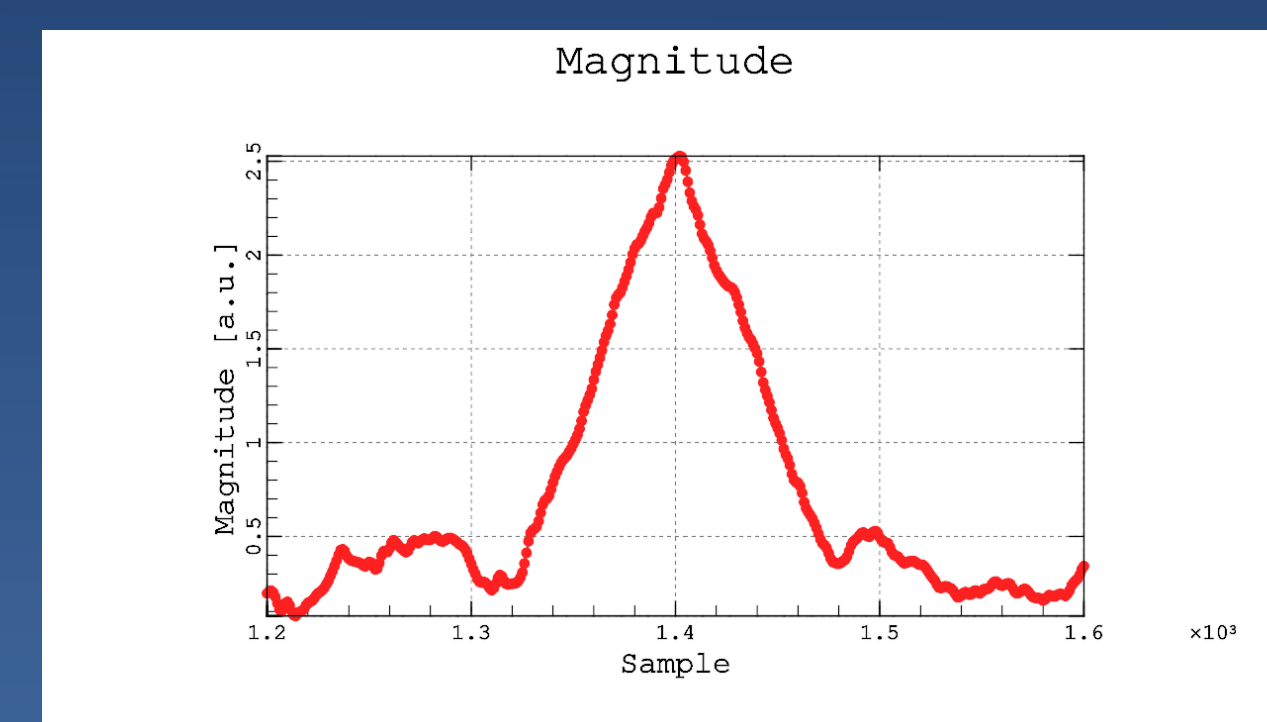
The BIBA-SPIR front-end has been designed to be fitted into the original SPIR mini rack, which is compatible with the CryoWing MK II UAV.



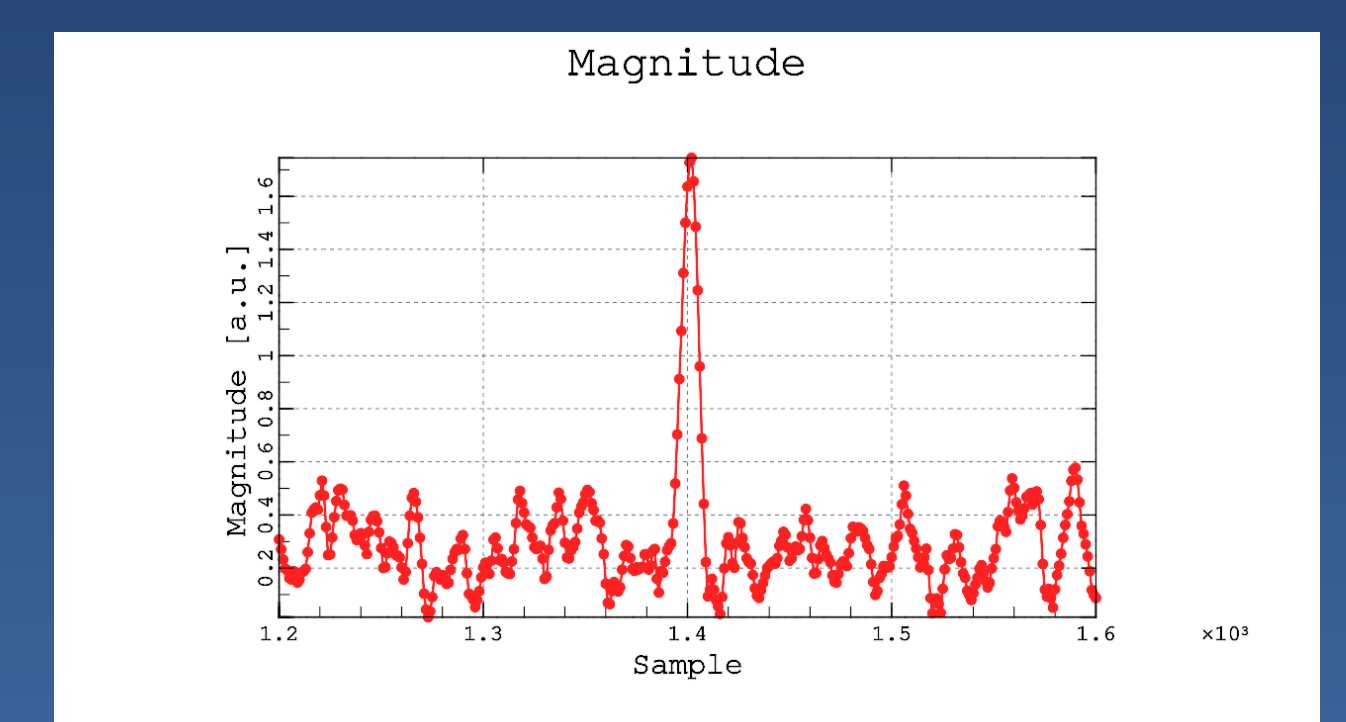
BIBA-SPIR front end

PRELIMINARY DATA

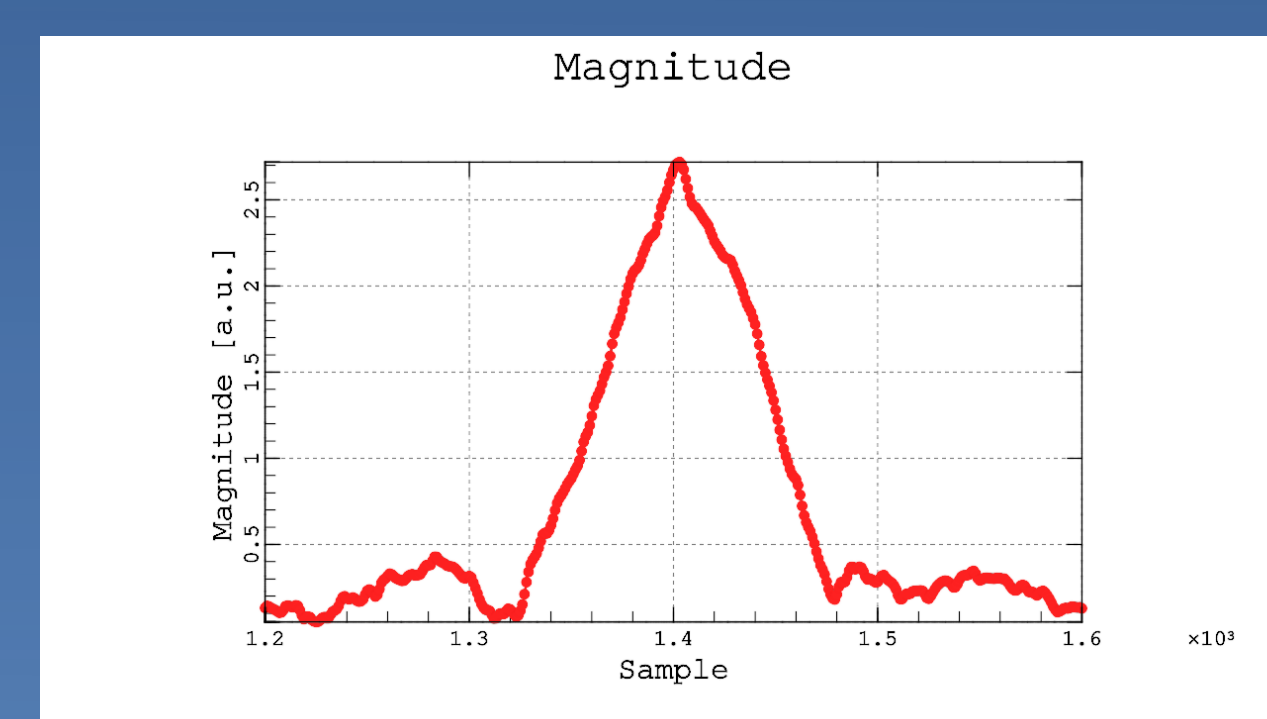
Preliminary laboratory tests were carried out. The performance of BIBA-SPIR is being tested using a GNSS antenna pointing to Zenith connected to its input ports. Successful results have been obtained so far.



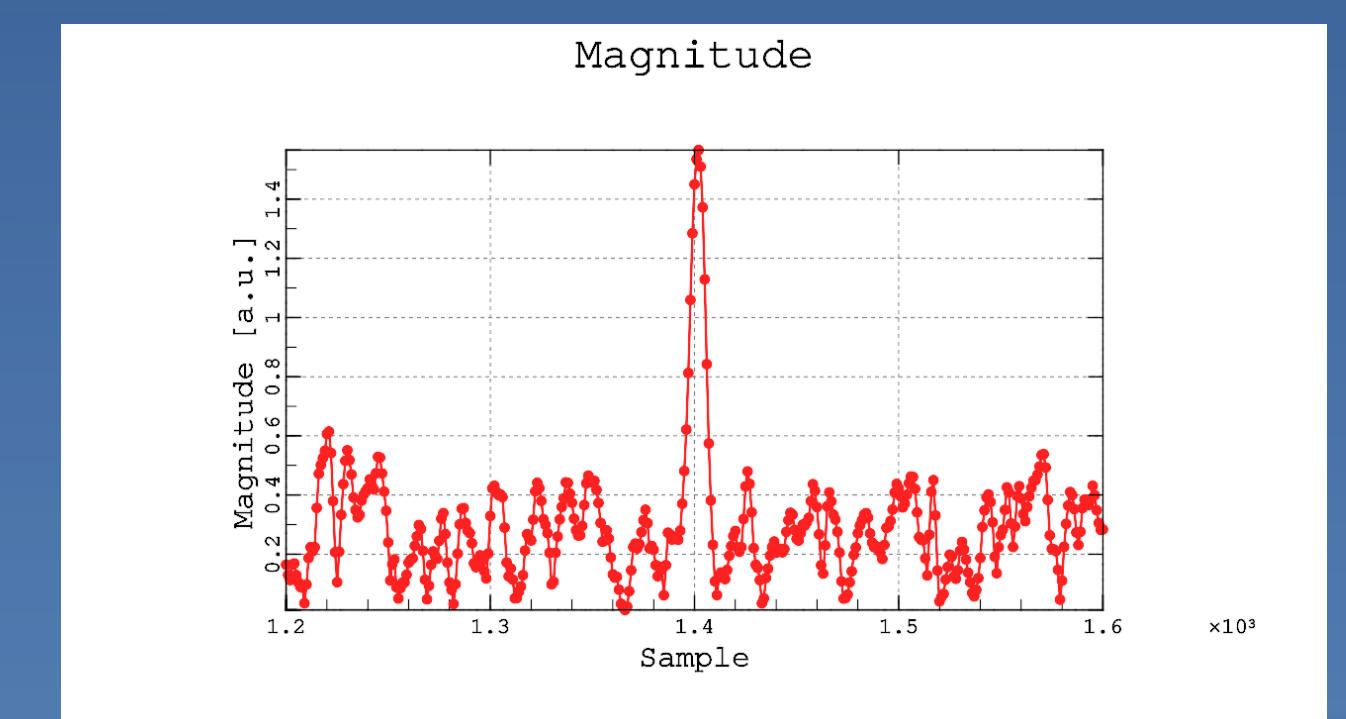
L1 UP channel



L5 UP channel



L1 DW channel



L5 DW channel

CONCLUSIONS

- Ongoing validation of BIBA-SPIR instrument with promising results.
- A dual-band (L1 and L5) instrument will provide GNSS-R observations for enhanced remote sensing applications (altimetry, roughness,...).
- Preparation of future ground based and airborne campaigns.

REFERENCES

- [1] Ribó, Serni, Juan Carlos Arco-Fernández, Estel Cardellach, Fran Fabra, Weiqiang Li, Oleguer Nogués-Correig, Antonio Rius, and Manuel Martín-Neira. "A Software-Defined GNSS Reflectometry Recording Receiver with Wide-Bandwidth, Multi-Band Capability and Digital Beam-Forming." Remote Sensing 9, no. 5 (2017): 450.
- [2] Fabra, Fran, Estel Cardellach, Weiqiang Li, and Antonio Rius: "WAVPY: An Open Source Tool for the GNSS+R Community". GNSS+R 2017 Workshop. Specialist Meeting on Reflectometry using GNSS and other Signals of Opportunity. May 23-25, 2017. Ann Arbor, MI. USA.