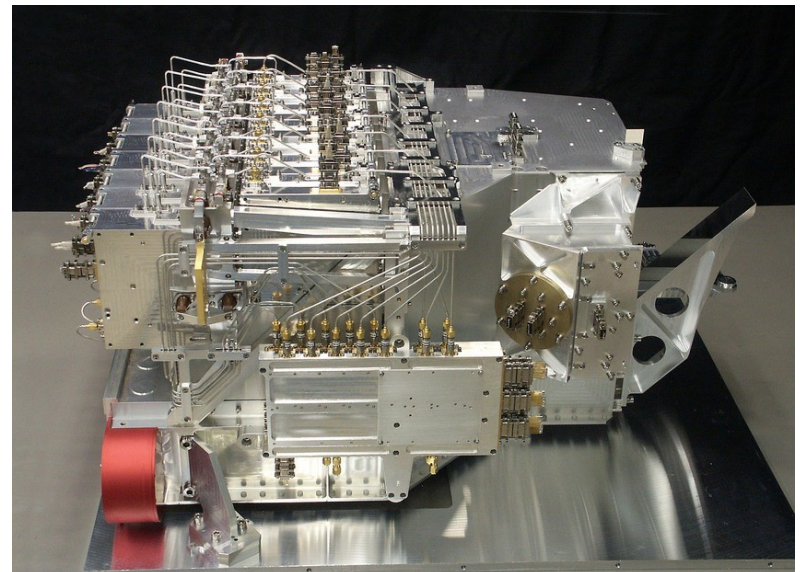
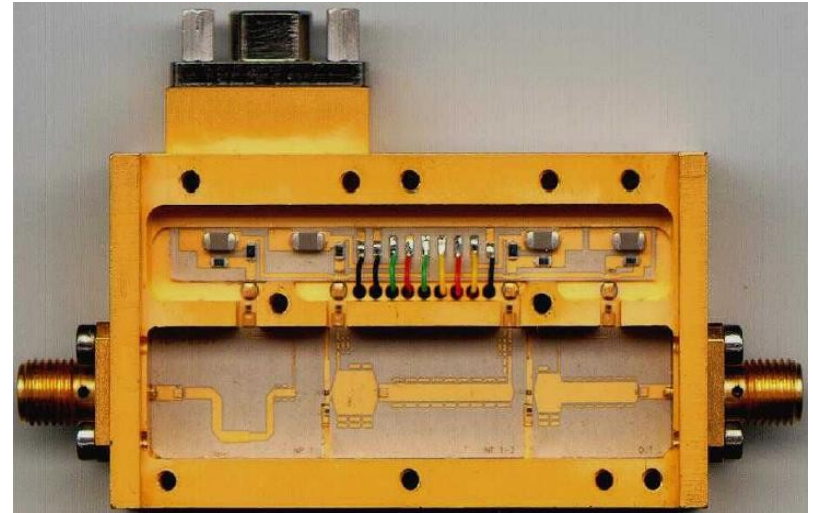


The contribution of the Observatorio Astronómico Nacional (OAN) to HIFI



The OAN contribution to HIFI

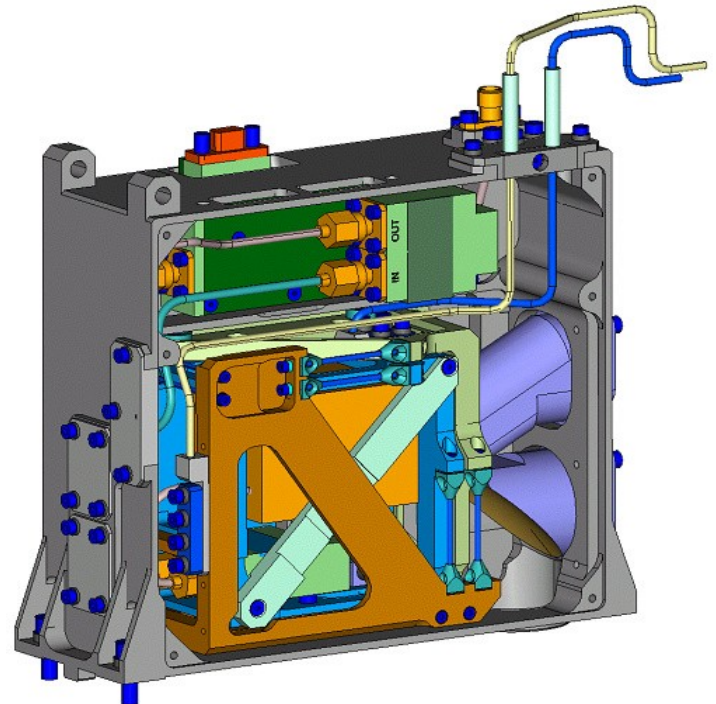
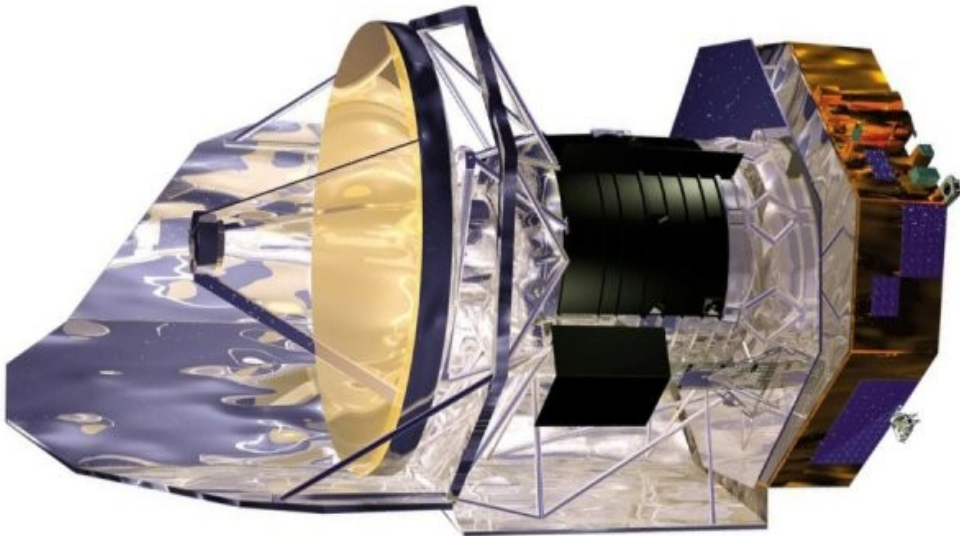
This is the first contribution of OAN to a space telescope.

The first transfer of state-of-the-art technology developed at OAN to the Spanish industry.

The natural extension to the submm range of research in Astrophysics done mainly at mm wavelengths by OAN astronomers.

The OAN contributions to HIFI

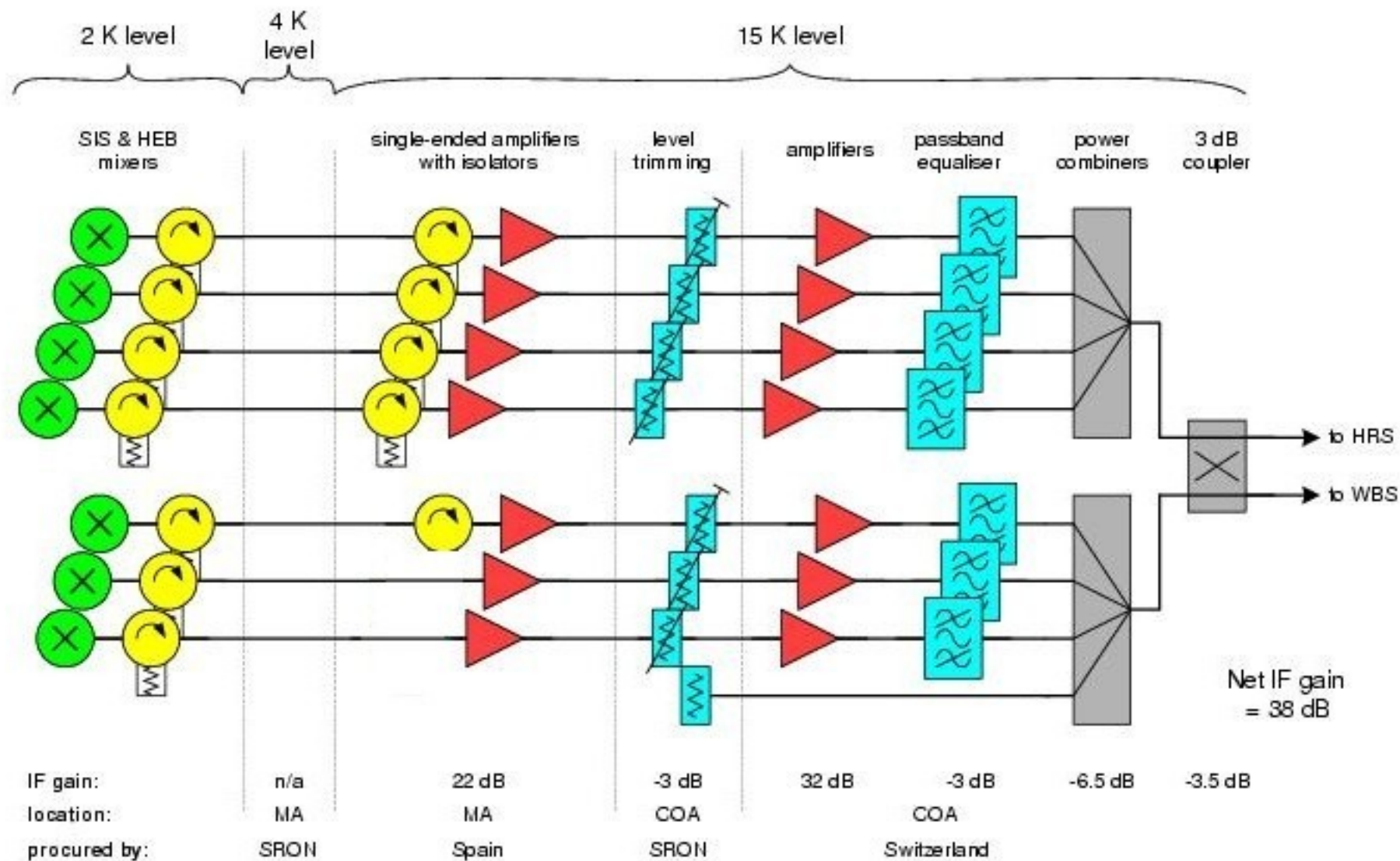
- The Herschel project
- Hardware: First stage of IF amplification
- Science: Key Programs
- ICC: software & SIP (up to 2001)



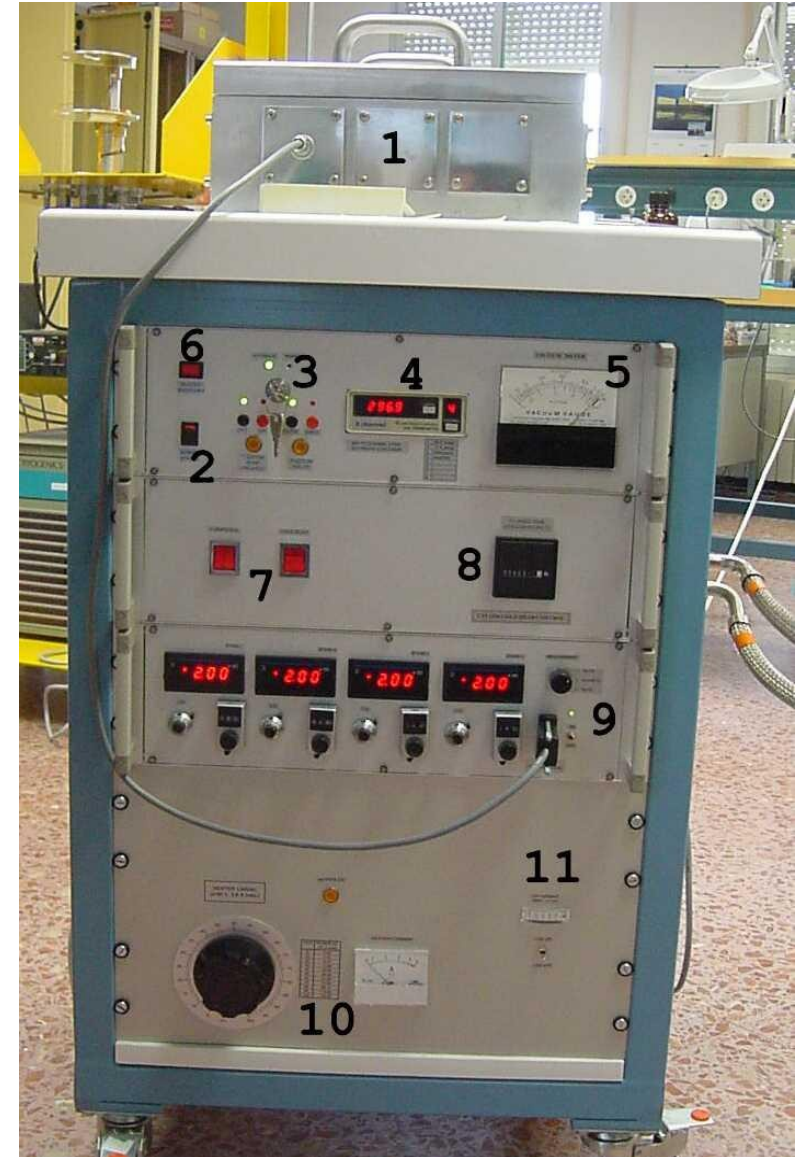
Hardware contribution: the goals

To design and build low noise (<5 K),
wide band (4 GHz),
low power dissipation (<5 mW)
IF amplifiers for all 7x2 bands.

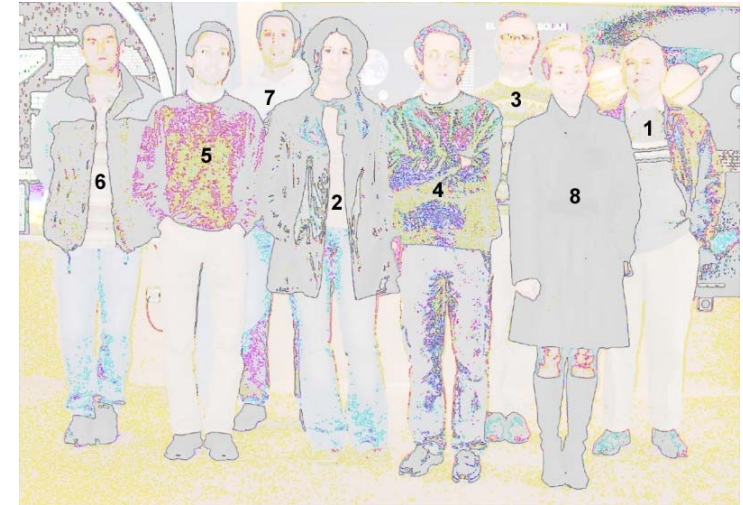
To characterize the isolators.



Hardware contribution: the labs



Hardware contribution: the team (2003)



1. Pere Planesas, Principal Investigator
2. Carmen Diez, Project Manager
3. Alberto Barcia, Hardware Manager
4. Juan Daniel Gallego, Co-Investigator
5. Isaac Lopez, Design Engineer
6. Rafael Garcia, Microelectronics Technician
7. Jose Antonio Abad, Machining Technician
8. Mari Fe Barriopedro, Administration

Hardware contribution: the funding

Programa Nacional del Espacio (MEC): 4 M€ + OAN

1FD1997-1442

ESP-99/1291/E

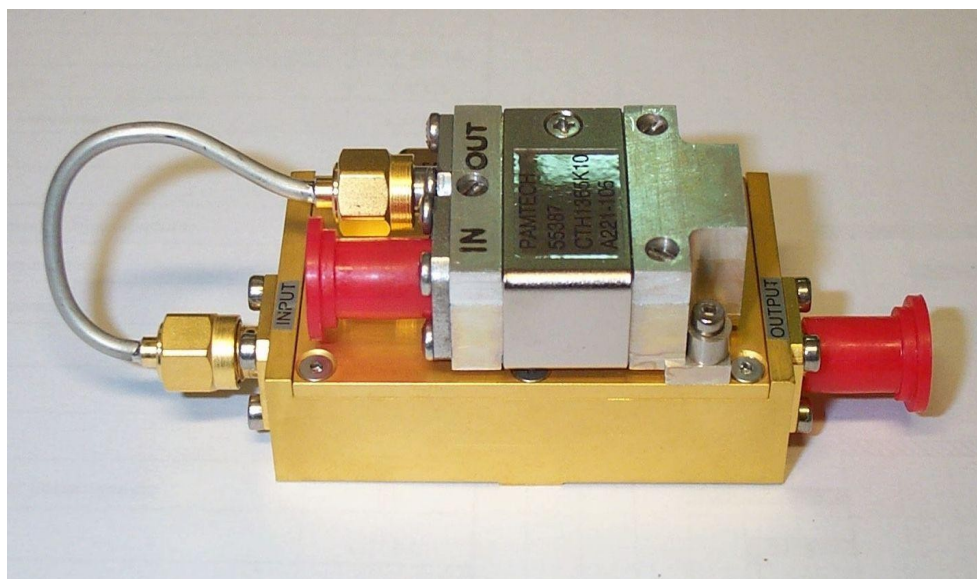
ESP 2001-4519-PE

ESP 2002-01693

ESP 2003-04957

Hardware contribution: the method

- To design 4-8 GHz cryogenically cooled LNAs (GaAs, InP) under the HIFI specifications.
- To build DMs for all the HIFI mixer groups (DEMIRM, KOSMA, SRON, JPL, Chalmers).
- To build or upgrade cryostats.
- To test the isolators and the amplifier-cable-isolator assembly.



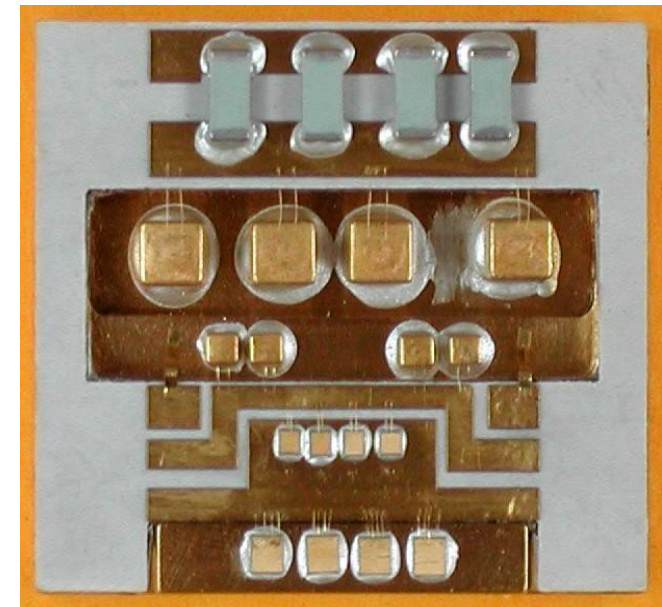
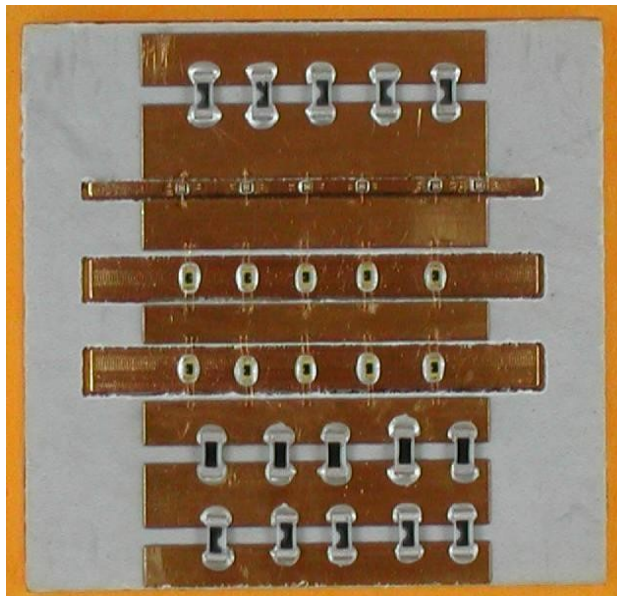
Hardware contribution: technology transfer

- To transfer to space industry our *know-how* on LNA, cryogenics and bonding.



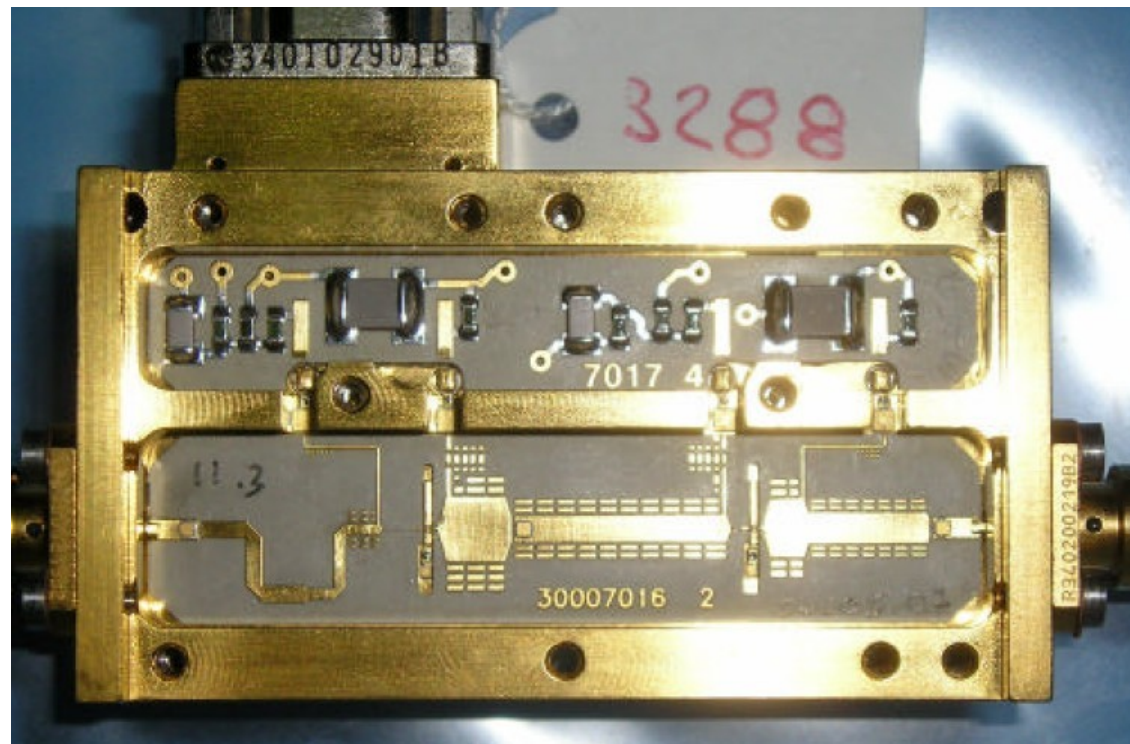
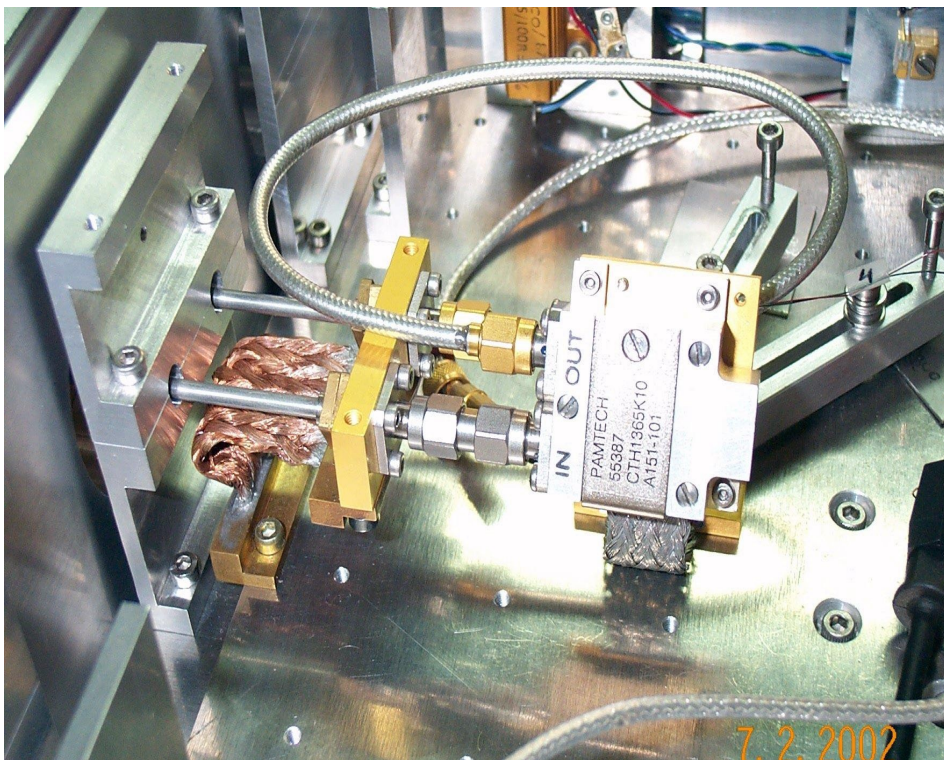
Hardware contribution: technology transfer

- Space qualification of processes and materials.
- To monitor and support the construction and characterization of LNAs by space industry.



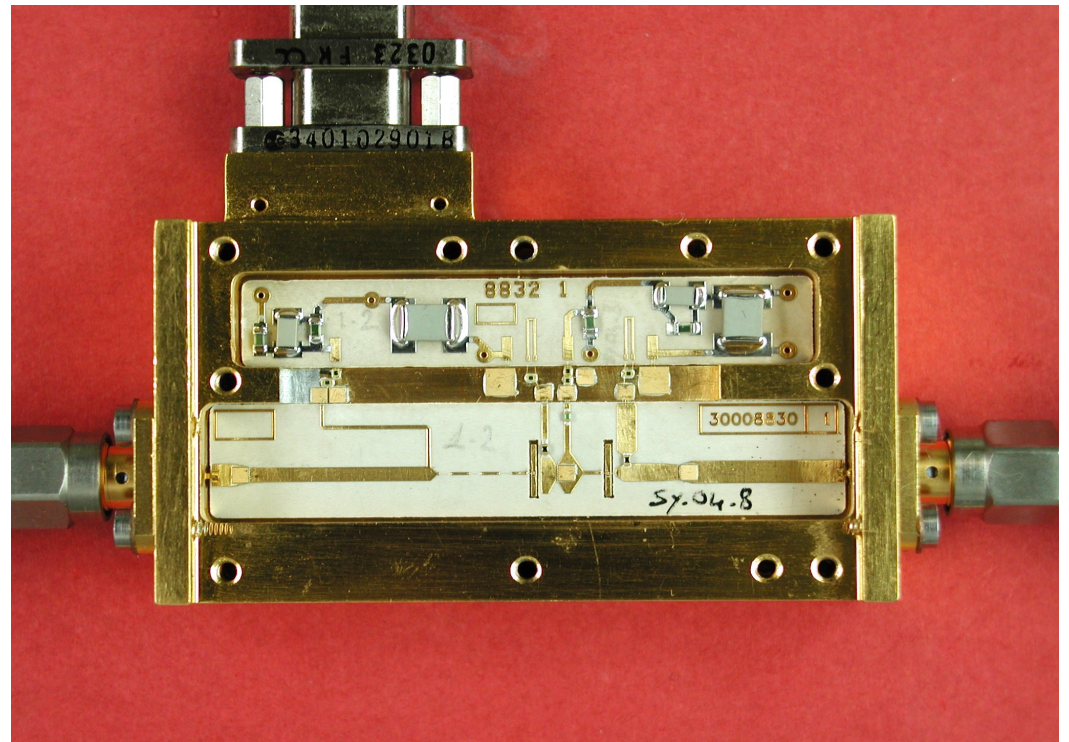
Hardware contribution

- To screen and characterize the isolators by industry.
- To deliver QMs, FMs and FSs LNAs to the HIFI consortium.



Hardware contribution: unexpected tasks

- To advise in the design of the IF2 amps (the second stage of amplification).
- Design (with SRON), prototyping (with ETH), transfer to industry and building IF1 LNAs (QM, FM, FS) in the 2.4-4.8 GHz range for HIFI bands 6 & 7.

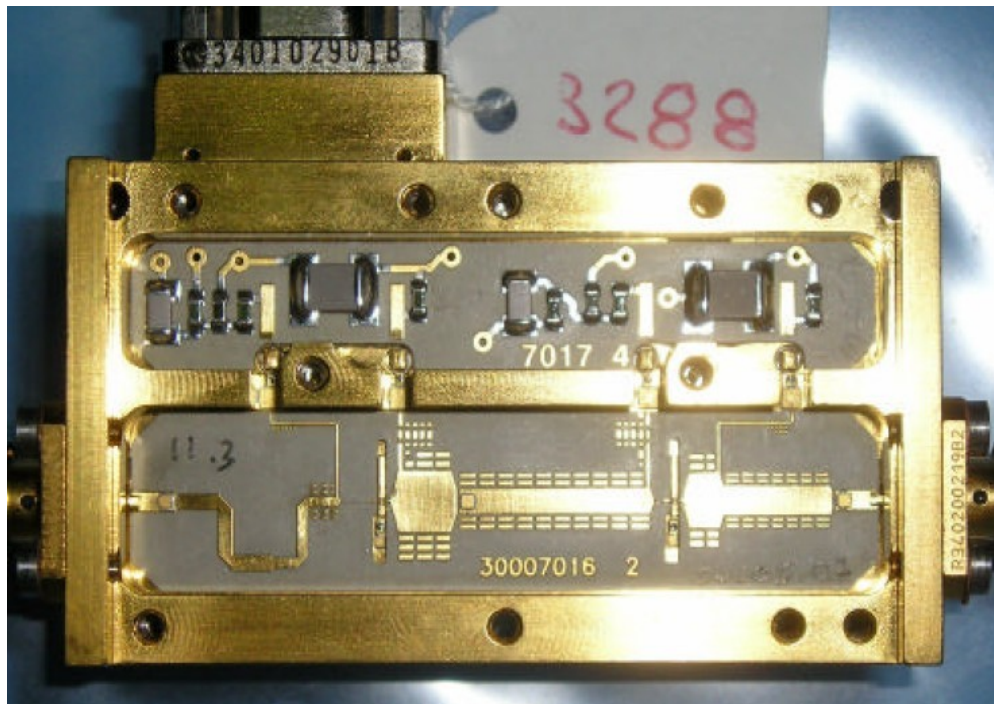


Hardware contribution: some problems along the way

- Funding delays, up to one year.
- Consortium delay in deciding the right qualified InP devices to be used.
- Need to design, prototype and transfer the IF1-low amps.
- Close, continuous control and advise of space industry work.
- Unjustified delays in industry.

Hardware contribution: current status

Last FS to be delivered to the consortium before
Christmas !



Contribution to the Instrument Control Center

The goal:

Up to 2001: To study the possibilities and to get the tools or knowledge to contribute to some Work Packages.

In 2002 this duty was transferred to DAMIR at CSIC, under the leadership of J. Martín-Pintado.

Science contribution

The goals:

To contribute to the definition of the HIFI scientific program.

To play a significant role in Guaranteed Time Key Programs.

To obtain scientific return from the participation in building the Herschel Space Observatory.

Science contribution: GT Key Programs

- Water and CO observations of AGB envelopes, PPNe and PNe: leaded by V. Bujarrabal (OAN).
- Water in star forming regions: R. Bachiller (col), M. Tafalla, A. Fuente (col).
- Spectral survey in star forming regions: A. Fuente (col), M. Tafalla.
- The dense and warm interstellar medium: A. Fuente (col), P. de Vicente, T. Alonso.
- Physical and chemical conditions of the ISM in galactic nuclei: S. Garcia-Burillo (col), P. Planesas (col), A. Usero, J. Graciá-Carpio.

Science contribution: GT KP

Water and CO observations of AGB envelopes, PPNe and PNe

The goal: to get a deeper insight in the thermodynamics, structure and dynamics of these objects. 215 h required.

The OAN team: V. Bujarrabal (coordinator), J. Alcolea (col), P. Planesas (col) + associates: F. Jiménez-Esteban, F. Colomer, J.F. Desmurs, G. Quintana-Lacaci, ...

The whole team: 19 co-Is, from The Netherlands, Spain, Sweden, Poland, USA, Germany, and ESA.

Near future

Contribution to the definition and preparatory work for Open Time Key Programs.

Participation in Open Time Normal Programs.

To enlarge the team with additional postdoc and graduate students.

Application for funding for the HSO operations period.

