

# QUBIC: Q and U interferometer for cosmology

Status of the project and prospects for 2023

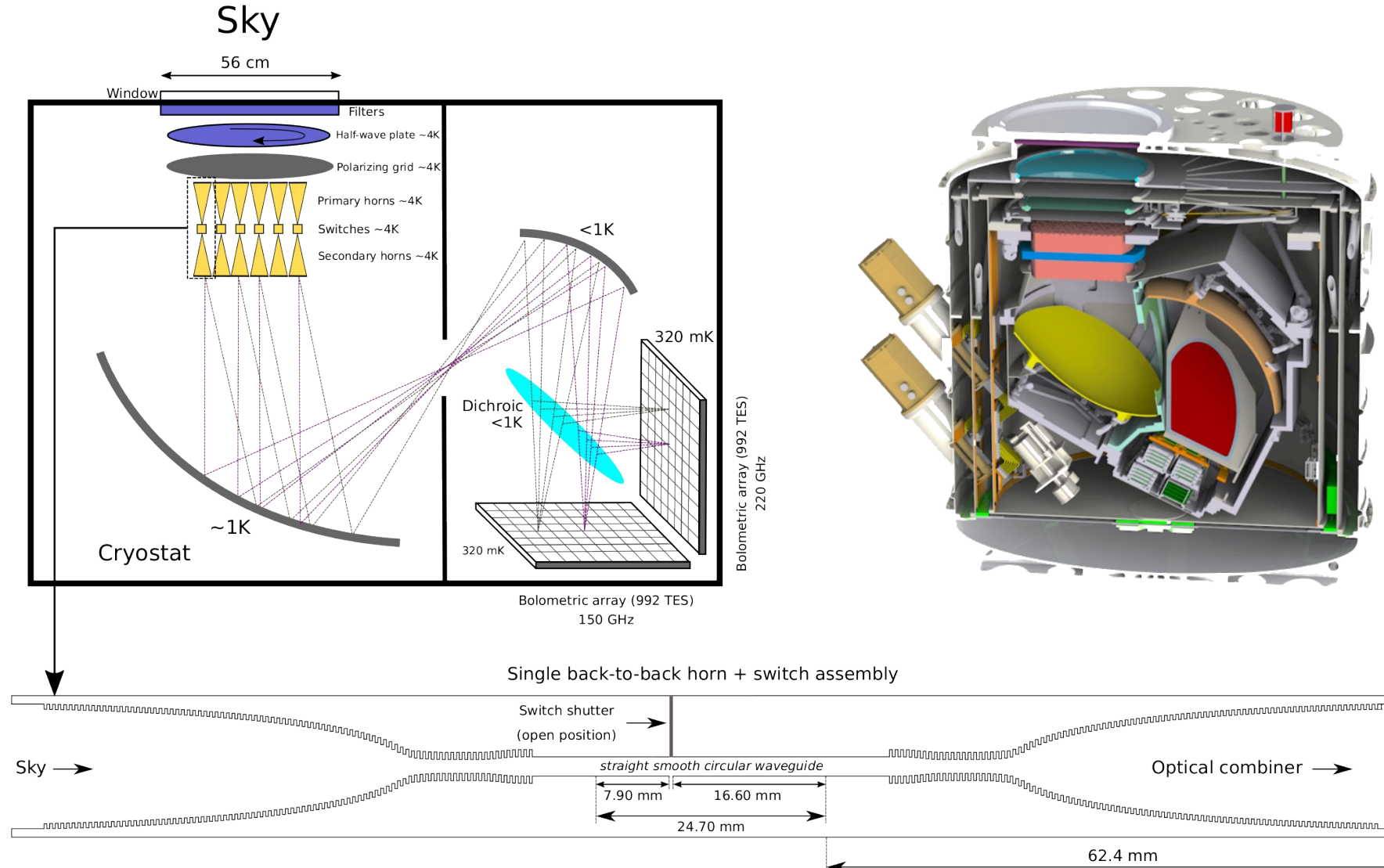
Aniello Mennella

University of Milan, Dept. of Physics

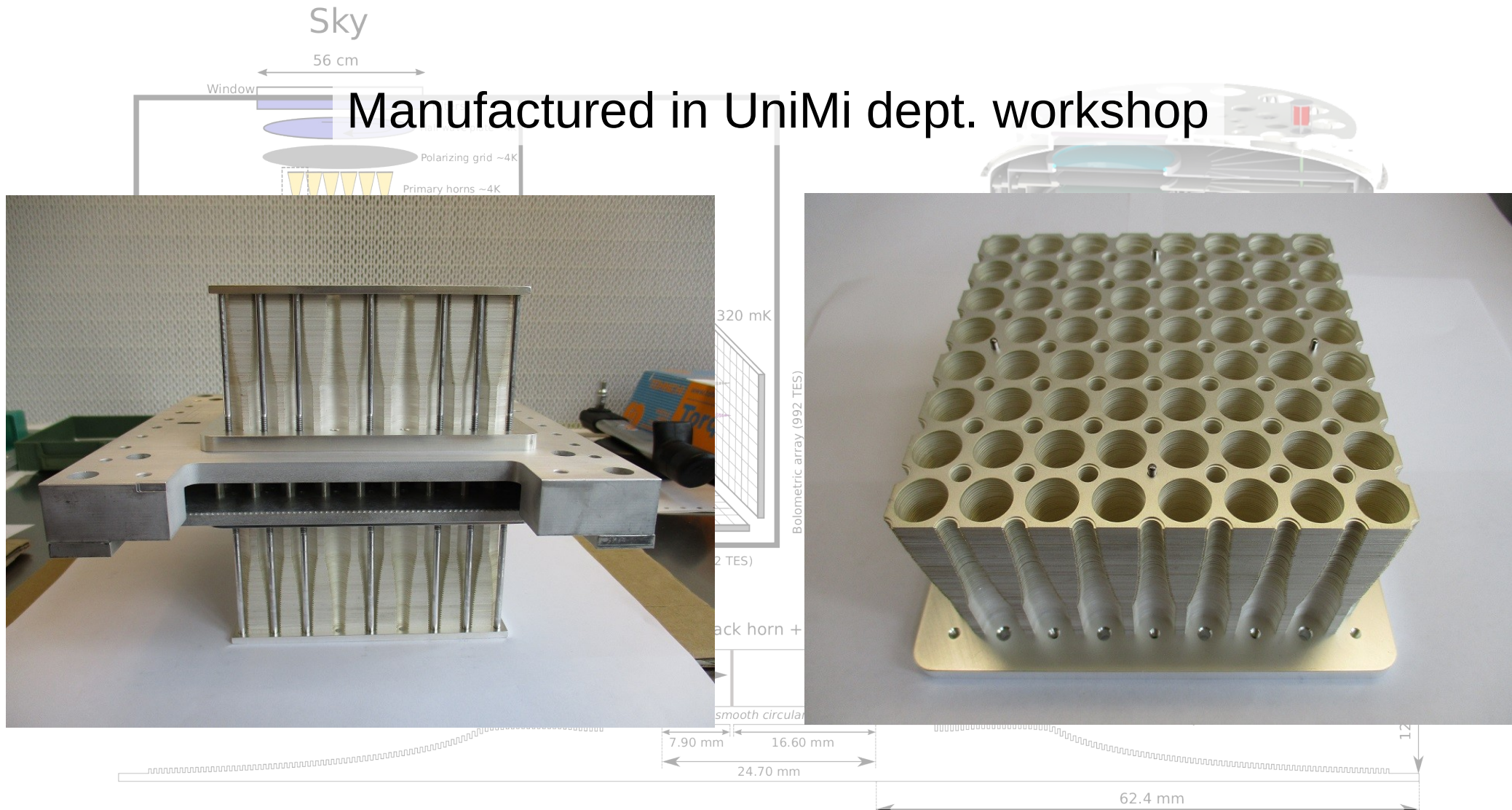
INFN-Milan



# QUBIC in a nutshell - the instrument

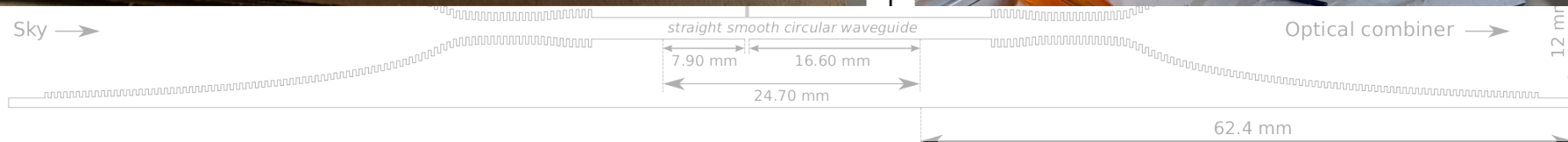
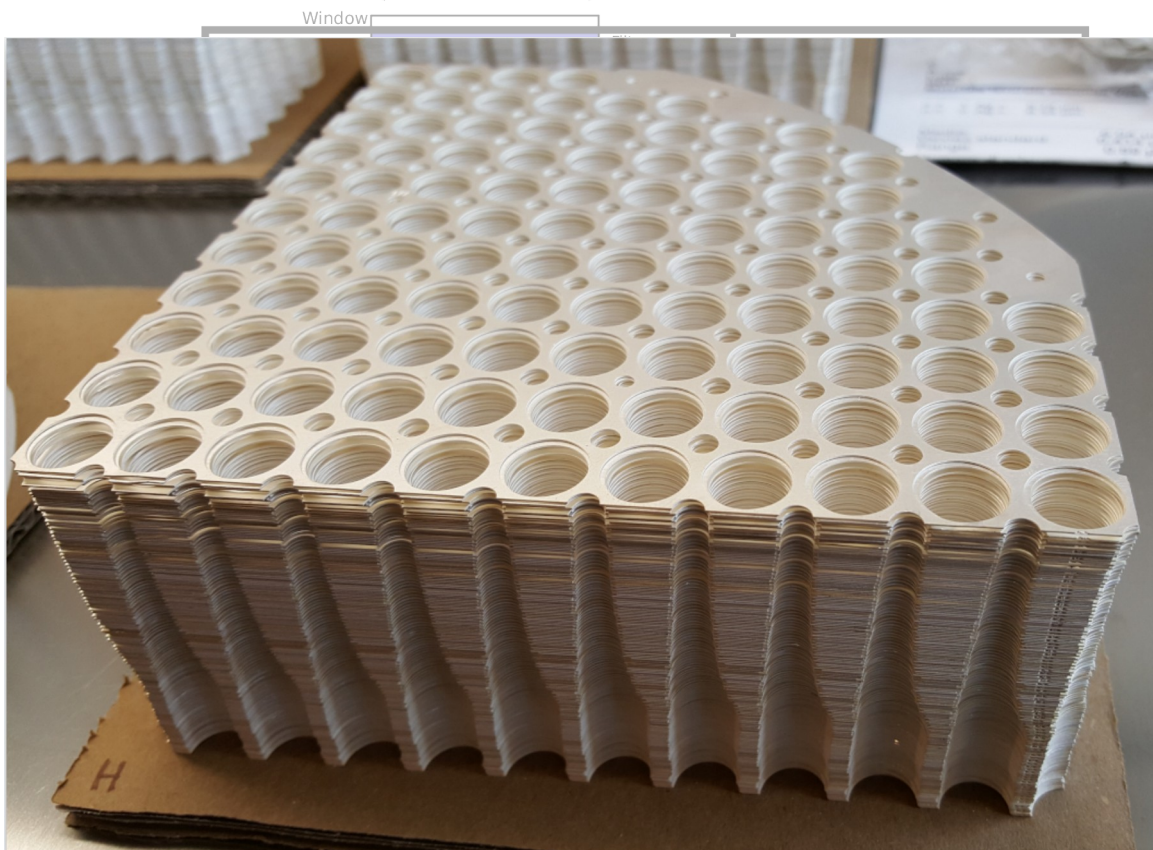


# QUBIC in a nutshell - Tech. dem. antennas



# QUBIC in a nutshell - Final instrument antennas

Manufactured in UniMi dept. workshop



# Recent activities

## Contribution to TD tests in Salta

- E. Manzan spent 3 weeks in June in Salta participating to the test campaign
- Instrument preparation for new cooldown
- Instrument preparation for first sky observation (Moon, currently being observed)

## Component separation

- Investigate how the increased spectral resolution provided by Bolometric Interferometry (BI) can resolve Galactic foreground complexity and provide robustness to foreground mitigation for primordial B-mode search

# Recent activities

## Laboratory test data analysis

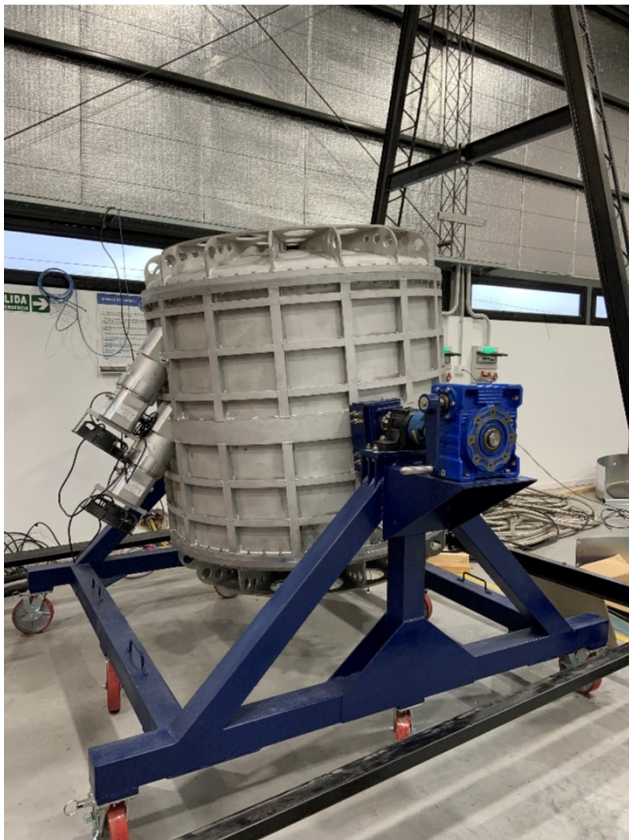
- Characterization of spectral response [E. Manzan]
- Characterization of detector response sign (positive/negative) [A. Mennella]
- Preparation of linearity test procedure (to be performed in July) [A. Mennella]

## Preparations for integration at the site

- Started preparatory telecons [A. Mennella, F. Cavaliere]

# Technological demonstrator in Salta lab

- Positioning of the QUBIC-TD in front of the lab gate for the first sky observation (atmosphere and Moon observations)



# Technological demonstrator in Salta lab

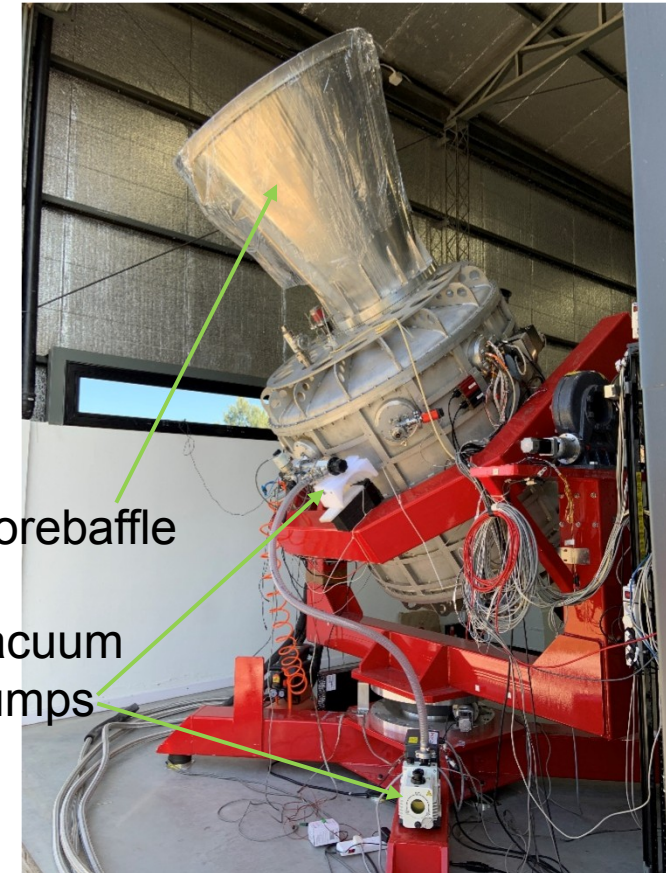
- Positioning of the QUBIC-TD in front of the lab gate for the first sky observation (atmosphere and Moon observations)
- Reconnection of the compressors, pulse tubes and electronic rack
- Integration of the forebaffle for the first time ever
- Vacuum pumping and cooling procedures

Pulse tubes



Forebaffle

Vacuum pumps





# Preparations for integration

First Cool down at Maintenance Mount (MM) level			
Id#	Activity	days	Observation
1	Download packing + Installing cryostat on MM+ download current electronic rack	1	Crane at site
2	Intallation of OM	3	Crane at site
3	Cryostat: Reinforcement Tool removal + back fridges installation	3	No Crane
4	train installation	3	No Crane
5	Criostat connection in MM	1	No Crane
6	Cool down at MM level	10	No Crane
7	A-T's	2	No Crane
8	Warm up	3	No Crane
9	Criostat installation on OM	1	Crane at site
10	Cool down a nivel Mont Obs	10	No Crane

Net working days (without cool down)	17
total working days (considering 2 days of resting every 5 working days)	24
Contingencies 30%	31
total days (including cool down process)	51

- Integration will start in October and will last about 50 days. Our support (Francesco Cavaliere will be on site) will be focused during the first three weeks, before the first cooldown
- Currently weekly telecons are held every Monday

# FTE Milano for 2023

Nome	Posizione INFN	Ruolo	Tempo
Marco Bersanelli	Associato INFN	Prof. Ordinario	20%
Cristian Franceschet	Associato INFN	Ricercatore	30%
Aniello Mennella	Associato INFN	Prof. Ordinario	50%
Maurizio Tomasi	Associato INFN	Ricercatore	30%
Loris Colombo	Associato INFN	Ricercatore	20%
Elenia Manzan	Associato INFN	Dottoranda	100%
Francesco Cavaliere	Associato INFN	Tecnico EP	30%

# Funding requests for Milano for 2023

Tipologia	Richiesta [k€]	Sub Judice [k€]	Descrizione
Missioni	32	14	<ul style="list-style-type: none"><li>• 2 working meetings (15 days each) in Paris for pipeline development and science simulations (13k)</li><li>• 2 collaboration meetings (2 people, two days each meeting, 3k, SJ)</li><li>• 1 collaboration meeting in Argentina (2 people, five days, 6k, SJ)</li><li>• 2 travels to Argentina for TD operations and FI installation and lab testing (1 person for 15 days for two times, 10.0k, of which 5k SJ)</li></ul>
Shipment	2	Shipment of final instrument antennas from Italy to France	Shipment of final instrument antennas from Italy to France (to be taken from 2022)
Totale	34		