06/June/2019

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KISS

A spectrum-imager dedicated to the study of the secondary anisotropies of the CMB

Outlines

The path

I. Science context and requirements
- Sunyaev Zel'dovich Effect

II. Observation strategy and instrument design
- Fourier Transform Spectrometry
- Fast detectors: Kinetic Inductance Detectors

III. Laboratory tests and characterization
- Detectors performances
- Geometrical characterization

IV. Installation and observations
- The Moon observations

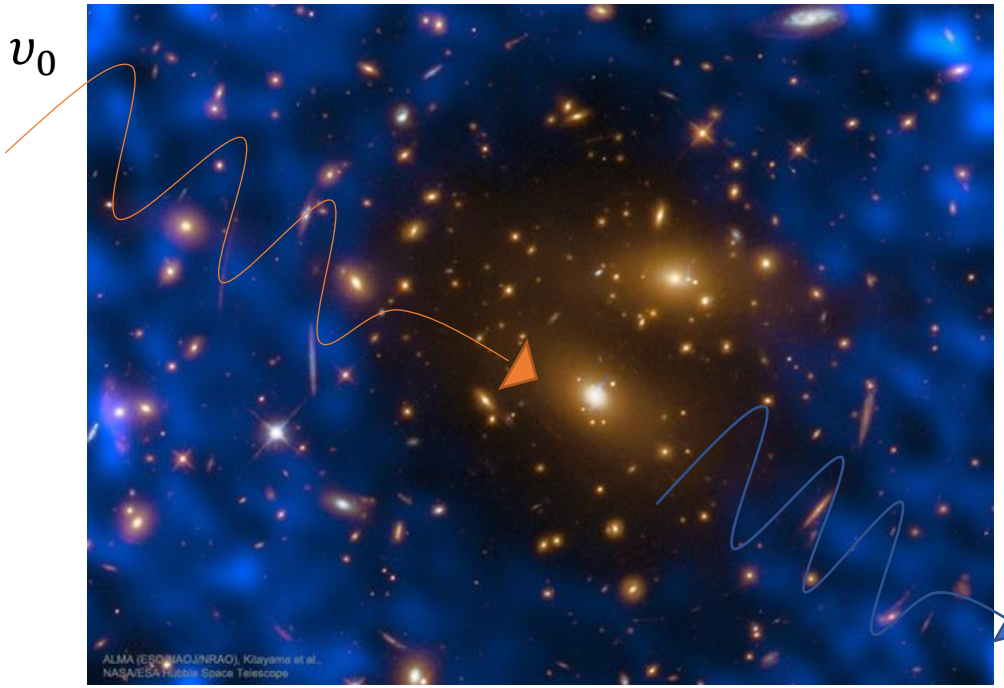
V. Conclusions and perspectives

Teide vulcano from Teide observatory

I. Science context and requirements

Inverse Compton scattering CMB-IntraClusterMedium

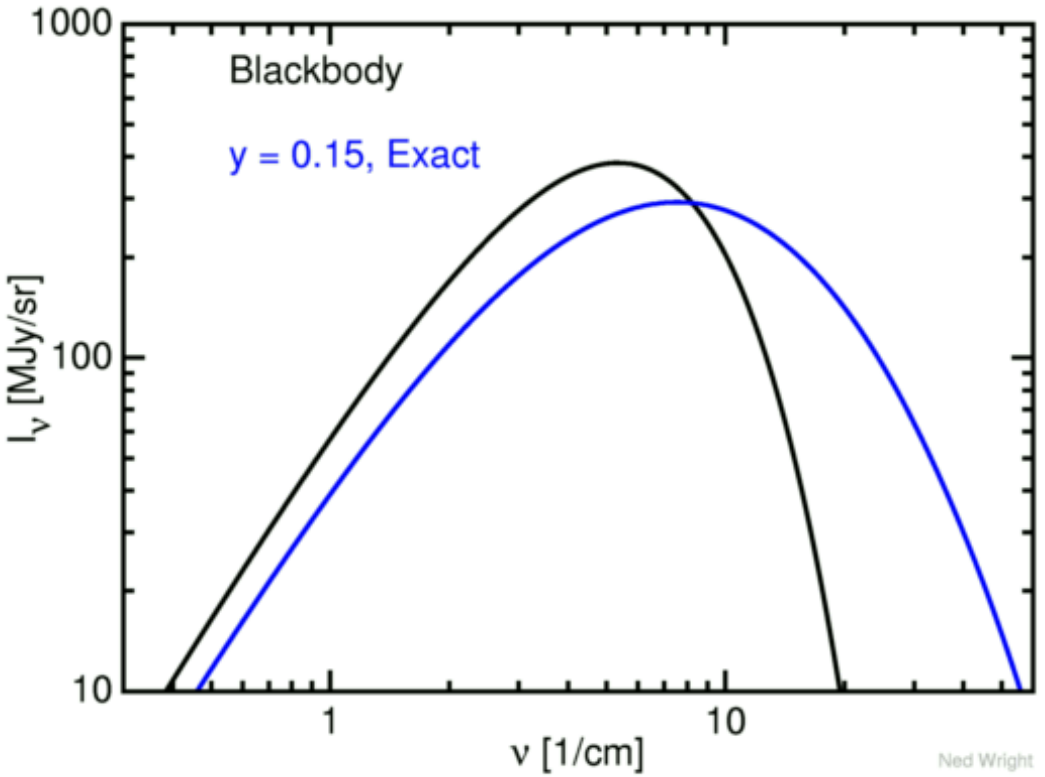
RXJ1347.5



[Kitayama, T. et al.: 2016]

ALREADY WIDELY DISCUSSED

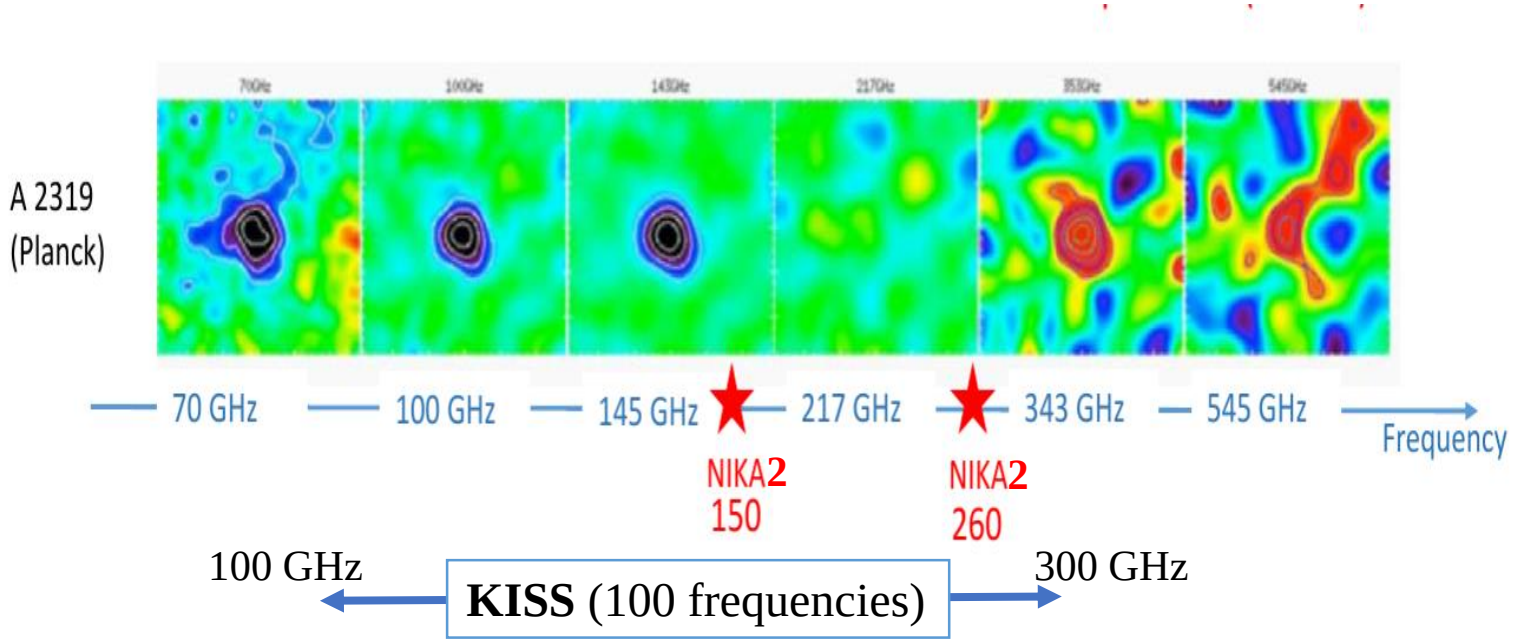
Main target of the experiment

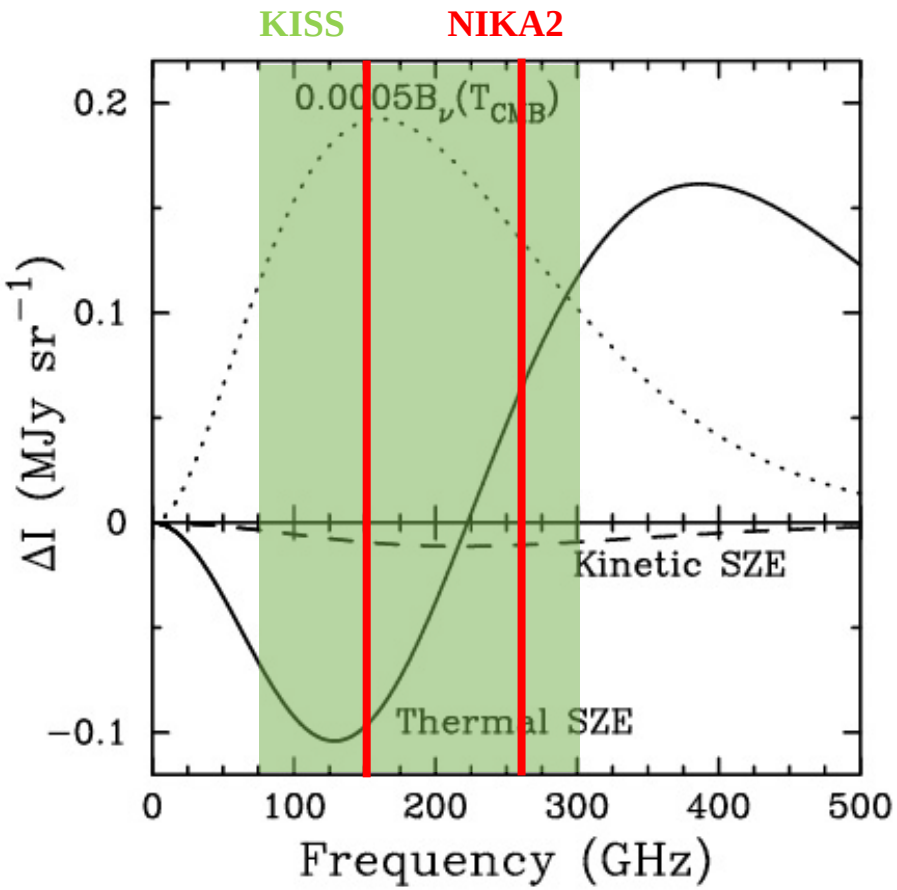


[Wright, E., L.: 2007]

I. Science context and requirements

SZE - state of art





Experiment	# frequencies	angular resolution @ 150 GHz	# pixels
Planck	9	5 arcmin	52
NIKA2	2	20 arcsec	3’000
KISS	100	4 arcmin	600
CONCERTO	150	50 arcsec	3’000

Observing several frequencies to separate the SZ components

GOAL

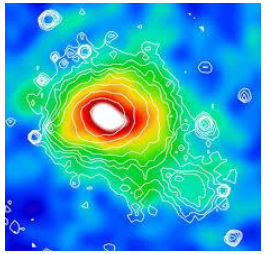
Low resolution spectroscopy observations of known low redshift galaxies at mm wavelenghts to map cluster physical properties from spectral distortions.

STRATEGY

Compensate relative expected low sensitivity with respect to Planck or photometric ground-based instrument by integrating longer (tens of hours per cluster).

Use spectroscopy to fully separate different components and extract physical information from spectral distortions: pressure, temperature, density, mass, LOS velocity

Possible target
COMA cluster



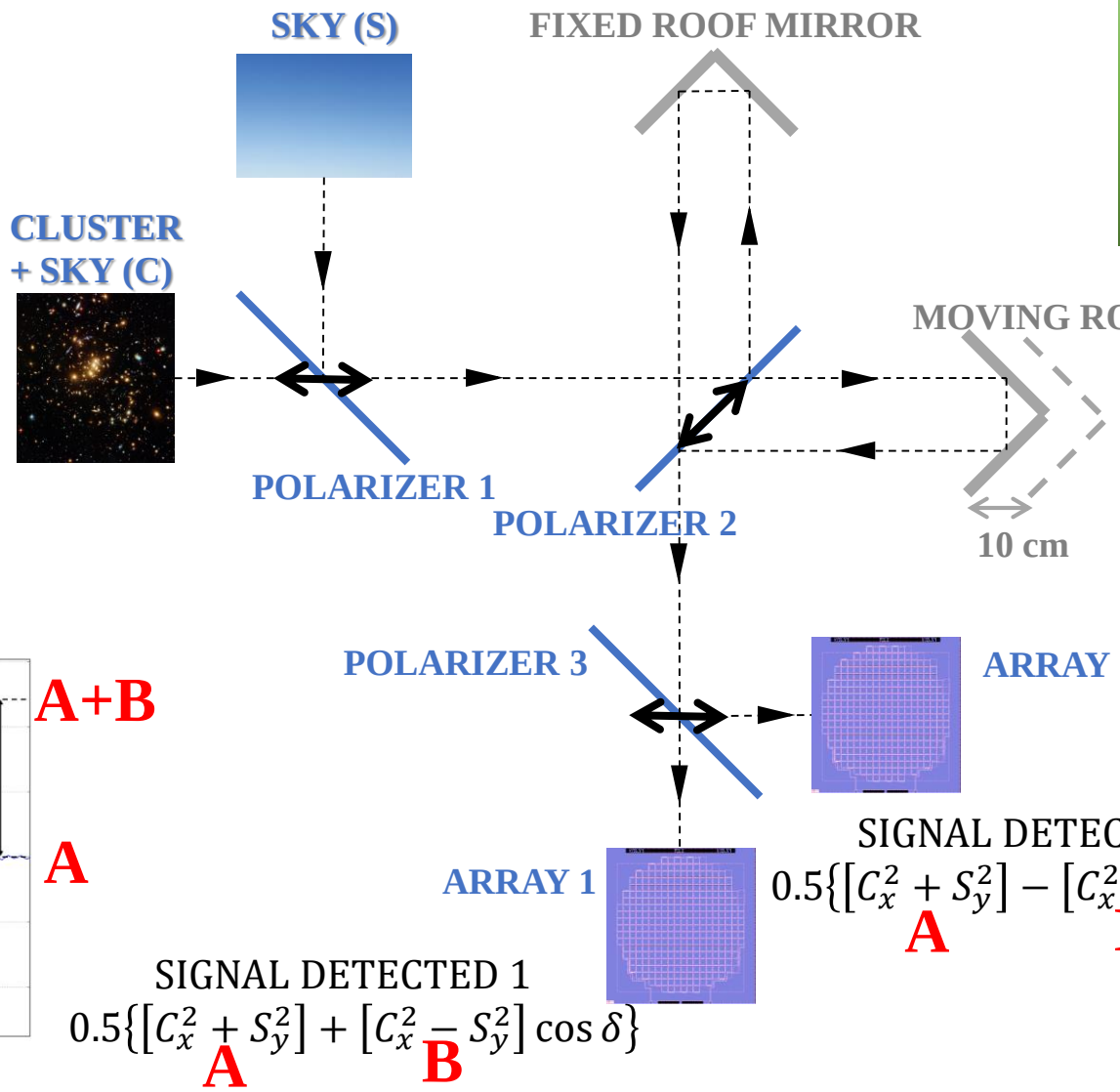
II. Observation strategy and instrument design

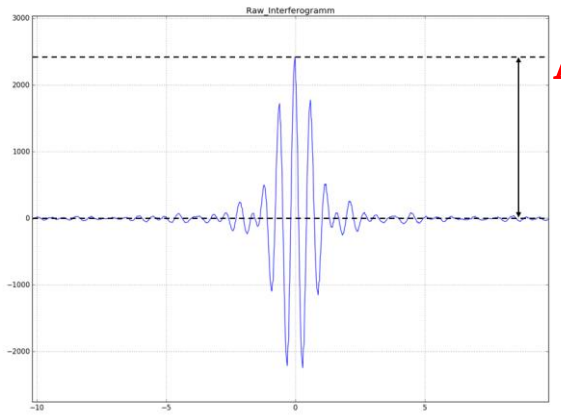
1) Low angular Resolution
low redshift clusters
2) Large FoV and band 100-300 GHz
~1 degree
3) Low Spectral resolution
~1.5-10 GHz at least 20 bins to separate properly different contributions
4) Maximum Sensitivity
photon noise detectors

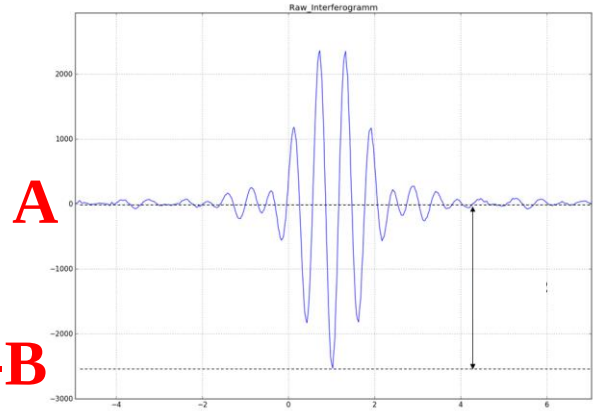
1) Telescope : 2.5 m - Quijote
~ few degrees corrected FP angular resolution from about 2 to 5 arcmin
2) FTS Technique - Fast MPI
10 cm excursion , fast acquisition, avoid 1/f noise from the atmosphere (it is ground based)
3) 2 Arrays of 300 pixels

MPI definition:
a **M**artin-**P**uplett **I**nterferometer measures the difference between the powers of the two input beams.

Necessity to be fast:
4 Hz moving mirror -> atmosphere fluctuations
4 kHz acquisition rate -> 100 points spectrum

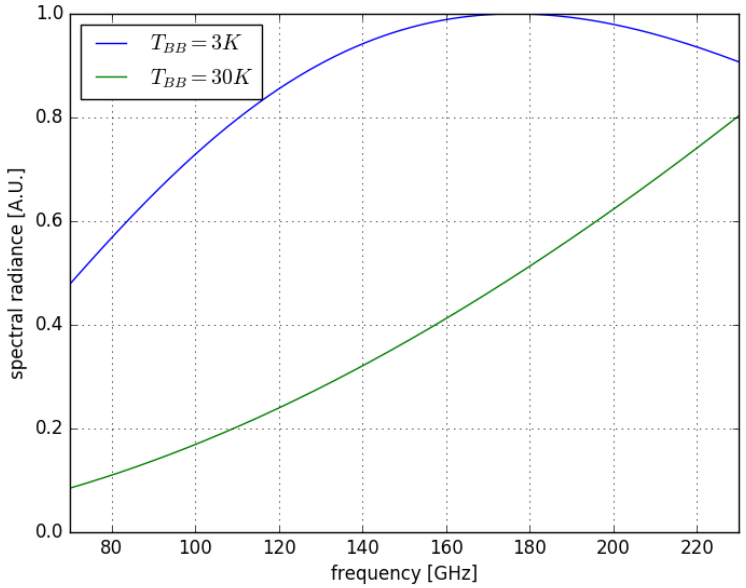




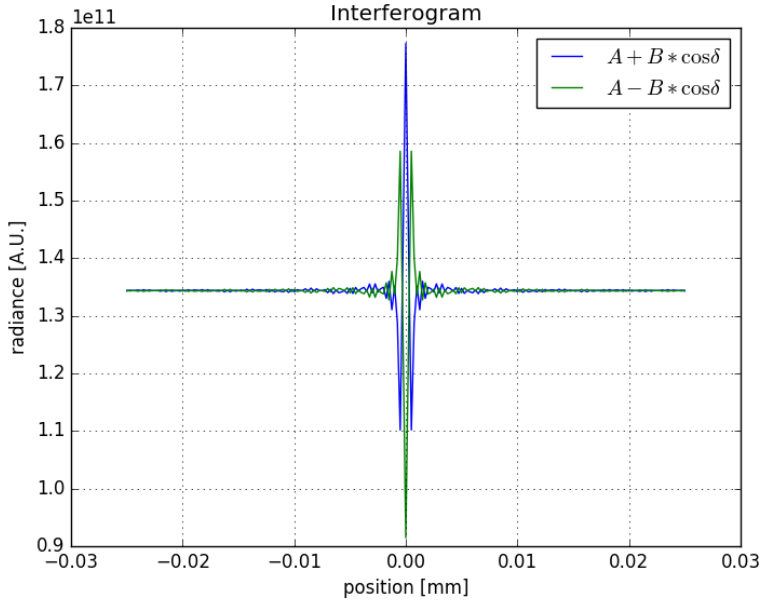


e.g.: naïf simulation of the MPI

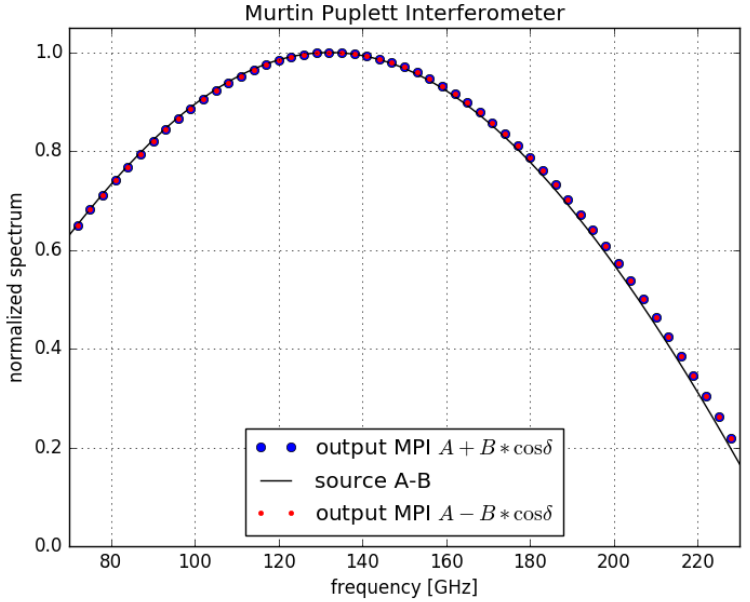
INPUT SIGNAL



INTERFEROGRAM



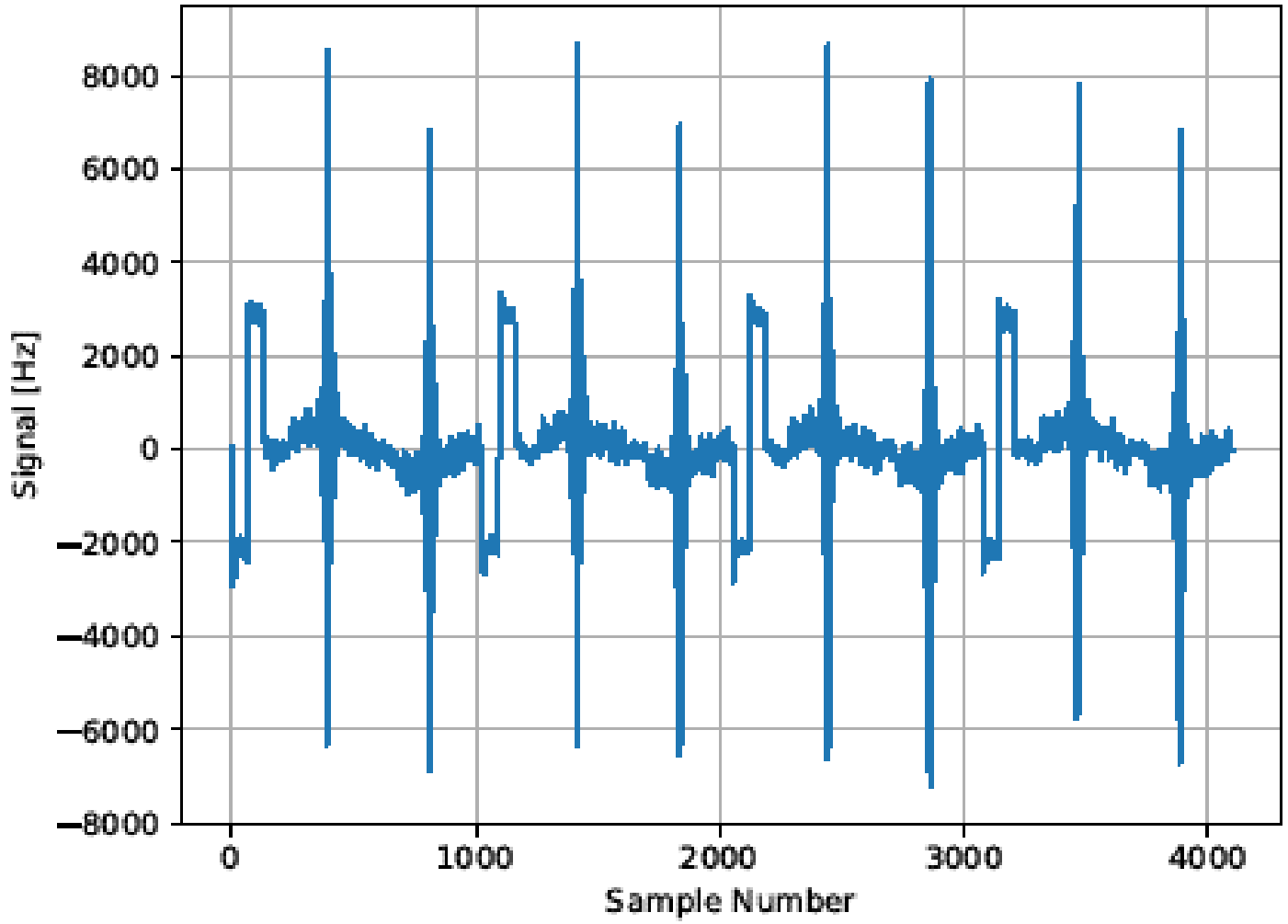
SPECTRUM



Interferometer

Fourier Transform

Real raw data – timeline modulation



"Smart" solution
against
data inflation

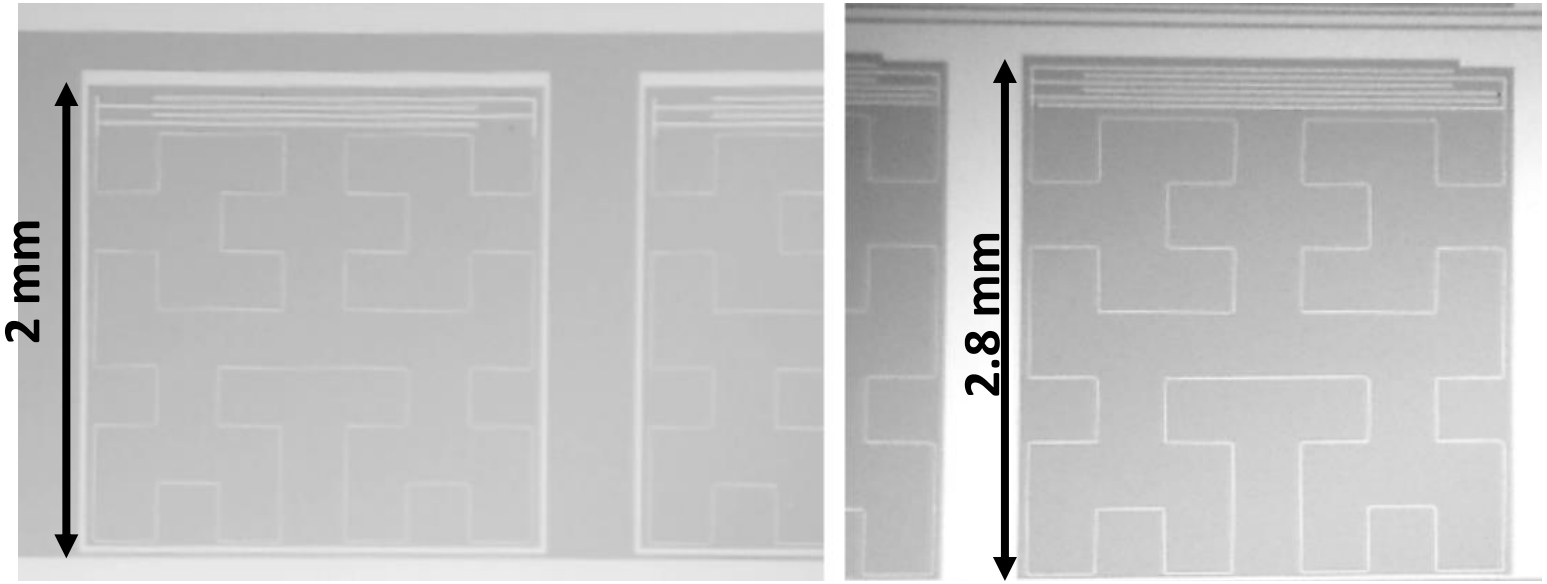
data rate:

NIKA2 ~ 1 Mb / s
KISS ~ 10 Mb / s

Time constant

$\tau_{qp} \sim tens\ \mu s$

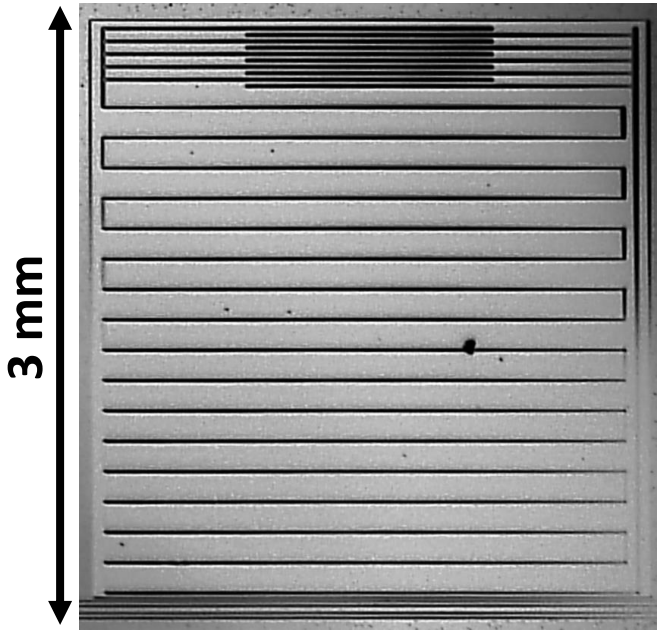
NIKA2 (260 & 150 GHZ)



as seen in J. Goupy yesterday

Hilbert geometry:
not polarized, 260 GHz
received polarized light

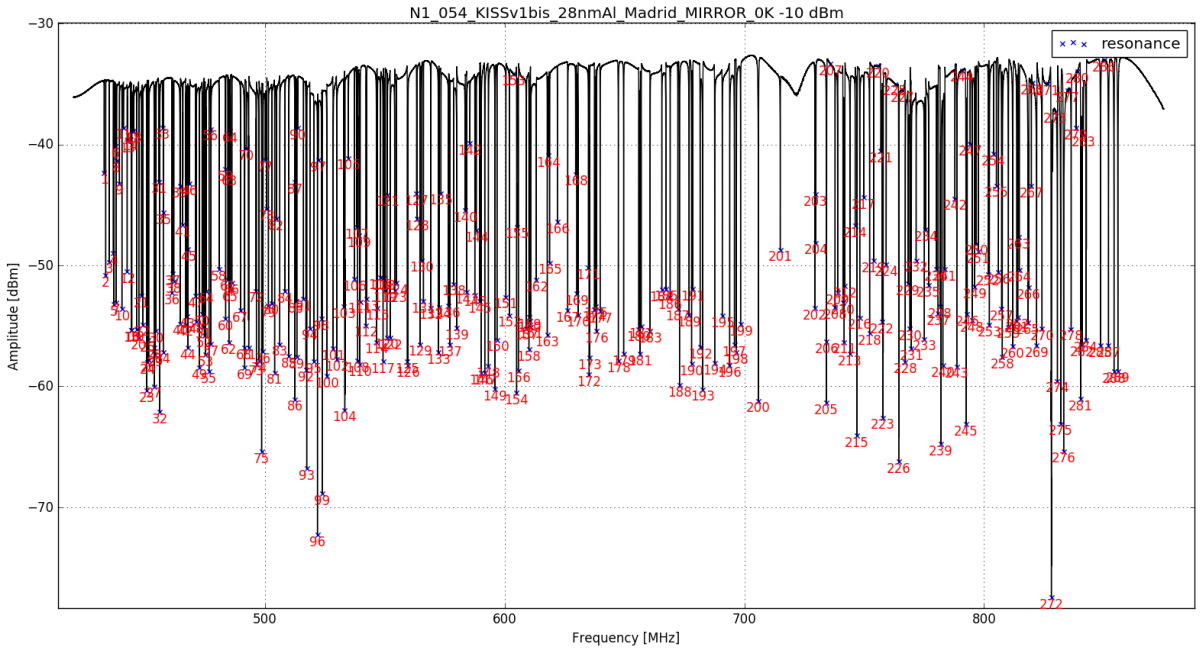
KISS (70÷300 GHz)



Standard meander:
polarized, aligned with
MPI polarizer

II. Observation strategy and instrument design

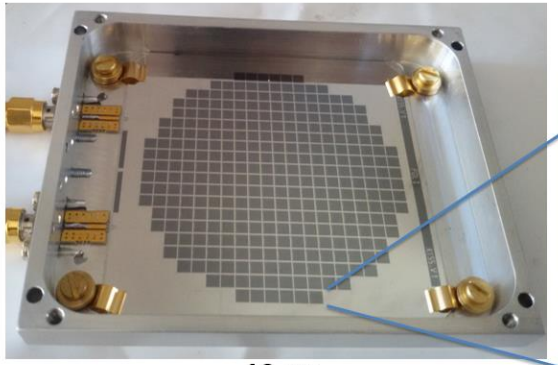
Fast Detectors: Kinetic Inductance Detectors



Multiplexed array
300 pixels

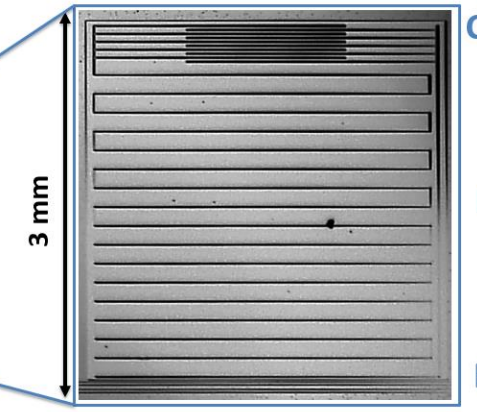
The realization of an array with a zoom over a pixel

KIDs reach the intrinsic limitation of sensitivity



Single KISS array of 316 pixels based on Ti-Al bilayers ($T_C \approx 0.95\ K$) .

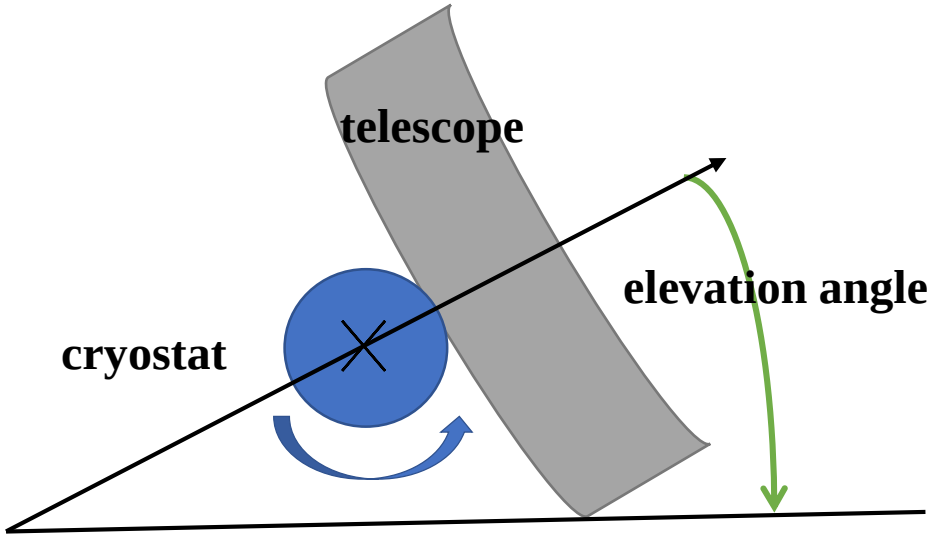
Superconducting LC circuit with high Quality factor

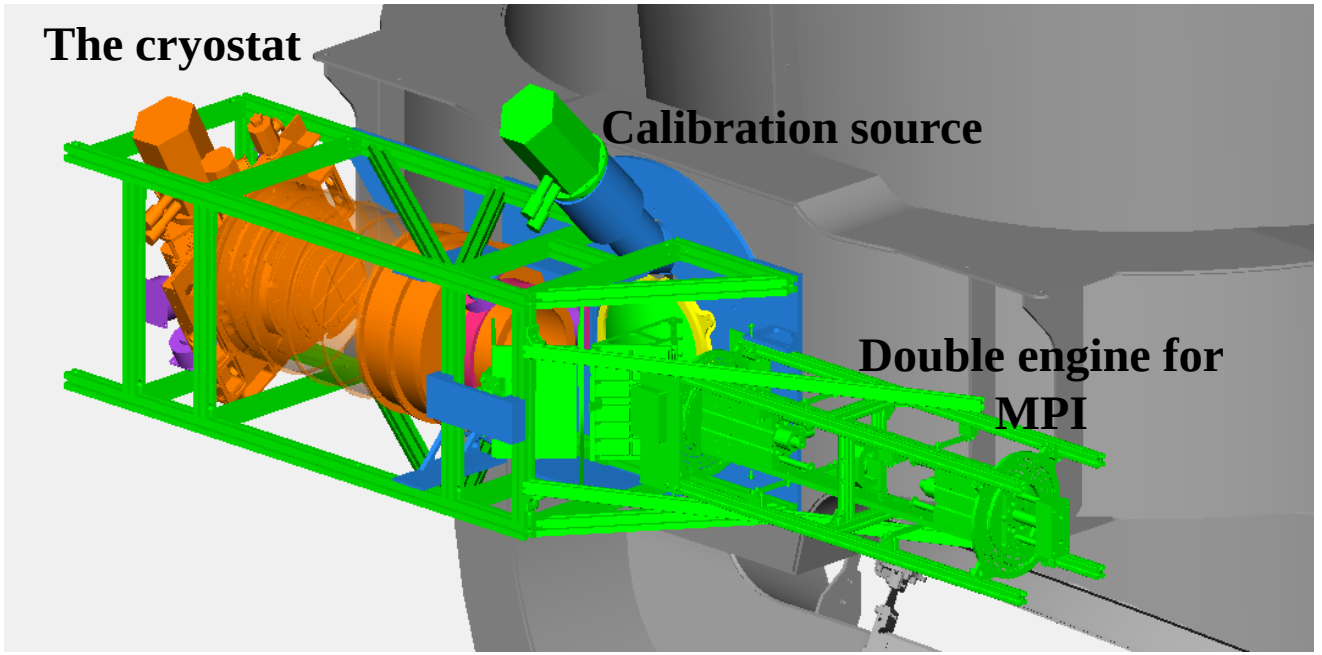


One of the 632 pixels within the KISS camera

Technological constraints:

- calibration source for the MPI
- double MPI engine to delete the vibrations
- stable temperature cryostat for the focal plane





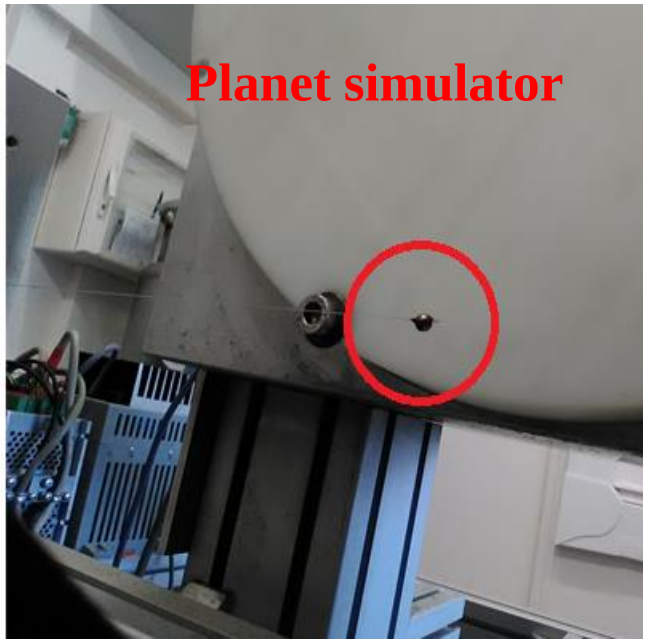
KISS installed at QUIJOTE telescope

III. Laboratory tests and characterization

October 2017 – October 2018

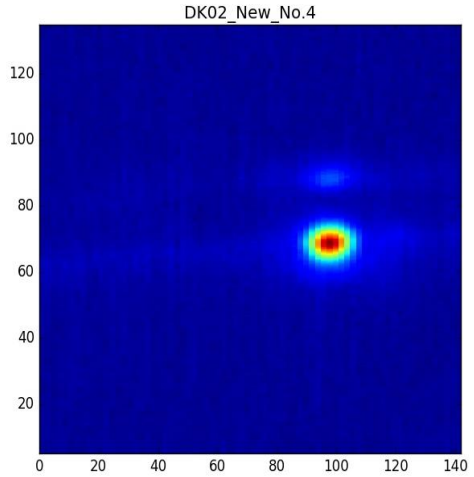
III. Laboratory tests and characterization

Geometrical characterization

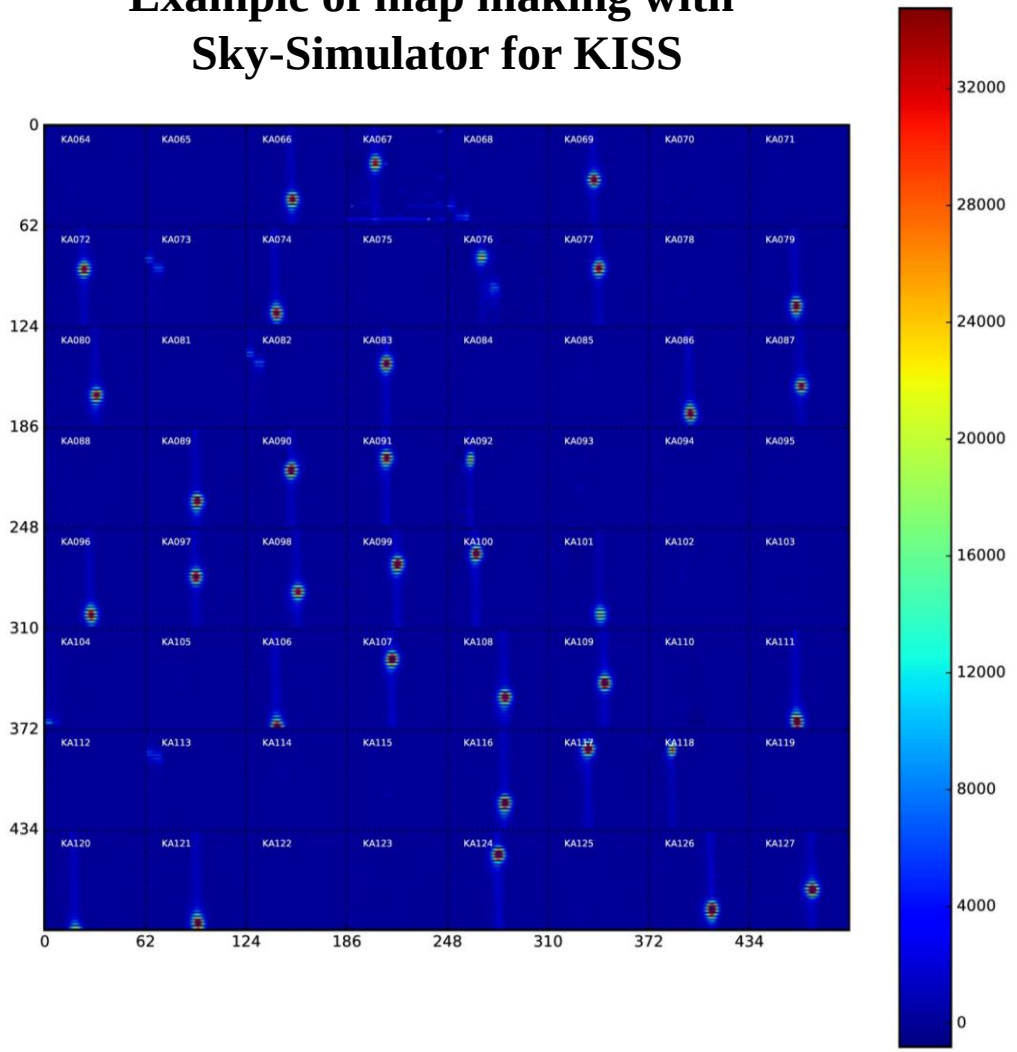


as seen in S. Shu yesterday

The Sky Simulator is a crucial tool to validate the instrument



Example of map making with Sky-Simulator for KISS



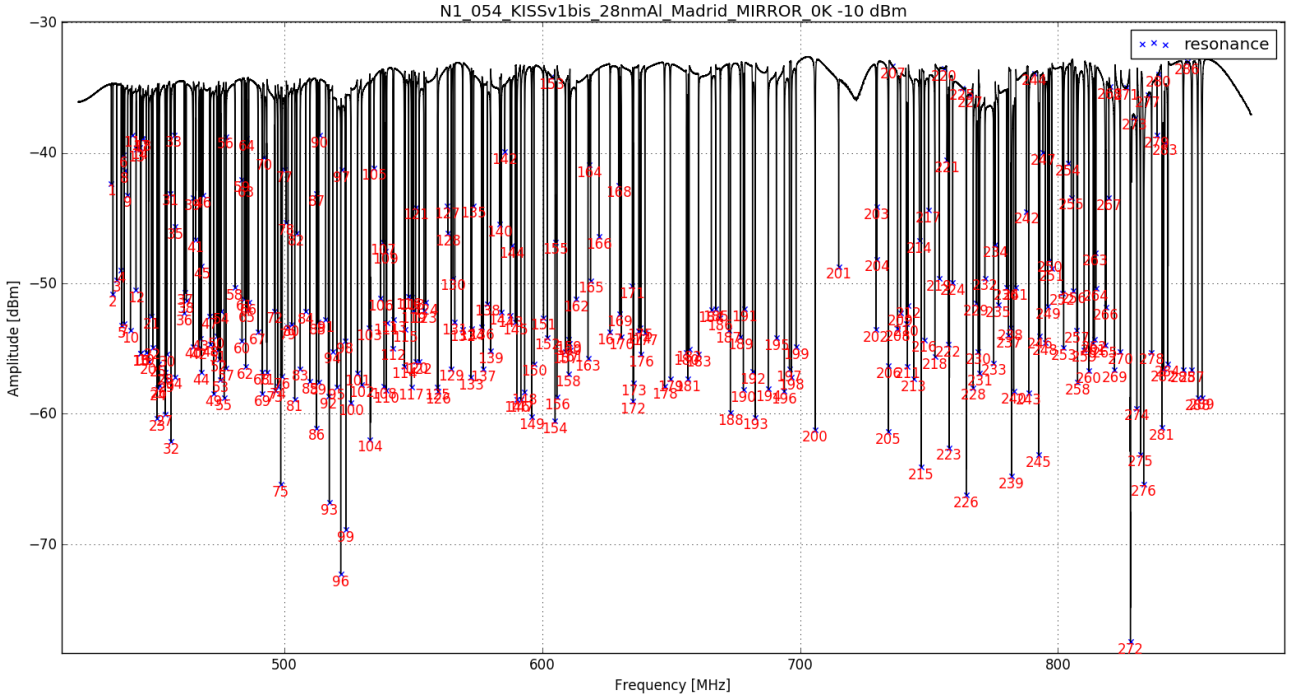
III. Laboratory tests and characterization

Geometry of the array

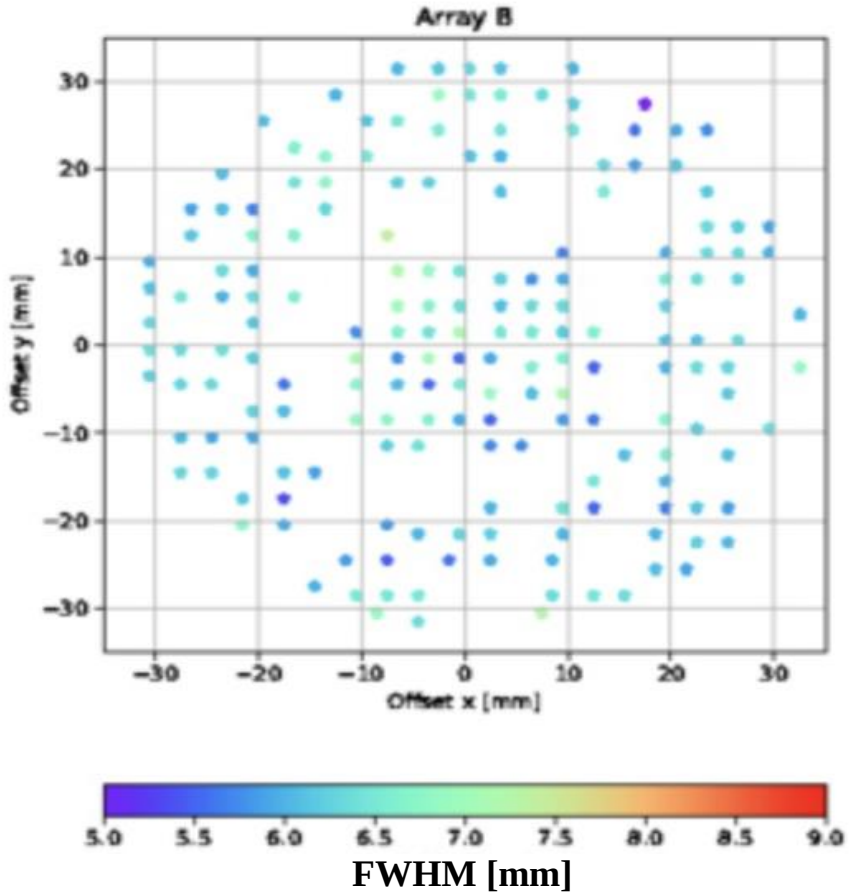
Each pixel is a frequency

Geometric distribution constrained with the sky-simulator

23	18	0	35
28	34	6	27
14	1	21	11
33	8	26	16



Geometrical characterization of the array



IV. Installation and observations

November 2018 – NOW

IV. Installation and observations

Chronological path

Installation [November 2018- January 2019]:

- transportation of the instrument (4-days journey)
- mechanical, electrical and network installation
- interface with the telescope

Operation in situ [February 2019 – June 2019]:

- maintenance in situ
- commisioning phase

Operation remotely [June 2019 – ¿October? 2019]:

- maintenance remotely (technicians formed)
- obervations [in progress]

KISS and the Teide vulcano

IV. Installation and observations

A long way to Tenerife





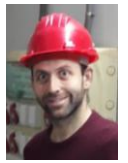


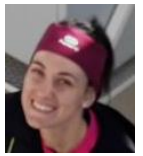
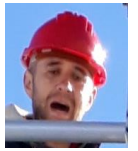






INSTALLATION TEAM








IV. Installation and observations

Observations

27 days of observation since February (and almost everyday to solve issues)

22 March 2019

Jupiter

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	size map	pointing mod	analysis
moon	--	5/4Khz	04h28	cold	sciencemap - H2O=11% - we stop before the end	23	255	size 240x150 ', step=10' v=5'/s	AzEl? (shift Az=1deg, El=0)	
moon	--	5/4Khz	05h28	cold	sciencemap - H2O=10% - we stop before the end	23	256	size 120x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
moon	--	5/4Khz	05h28	cold	sciencemap - H2O=10% - we stop before the end	23	257	size 200x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
moon	--	5/4Khz	05h44	cold	sciencemap - H2O=10% - we stop before the end	23	258	size 200x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
moon	--	5/4Khz	04h54	cold	sciencemap - H2O=11% - we stop before the end	50	259	size 200x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
moon	--	5/4Khz	05h00	cold	sciencemap - H2O=11% - we stop before the end	23	260	size 200x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
moon	--	5/4Khz	05h33	cold	sciencemap - H2O=11% - we stop before the end	50	261	size 200x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
Jupiter	--	5/4Khz	06h00	cold	sciencemap - H2O=11% - too slow, Jupiter in advance wrt the map. Not observed	50	262	size 200x120 ', step=5' v=5'/s	AzEl? (shift Az=1deg, El=0.5)	
Jupiter	--	5/4Khz	06h15	cold	sciencemap - H2O=10% - well in the middle. Maybe Jupiter observed	50	264	size 200x180 ', step=8' v=5'/s	AzEl? (shift Az=2deg, El=-0.5)	
Jupiter	--	5/4Khz	06h25	cold	sciencemap - H2O=12% - well in the middle. Maybe Jupiter observed	50	266	size 200x90 ', step=4' v=5'/s	AzEl? (shift Az=2deg, El=0)	
--	5/4Khz	05h41	cold	sciencemap - H2O=12% - well in the middle. Maybe Jupiter observed	50	267	size 200x120 ', step=4' v=5'/s	AzEl? (shift Az=0deg, El=0)		

19 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	size map	pointing mod	analysis
jupiter	23	5/4Khz	06h50	cold	sciencemap - H2O=4% - we didn't see jupiter	20	226	size 120x120 ', step=5' v=5'/s	AzEl? p.model offset=(-1,0)	-
jupiter	23	5/4Khz	6h59	cold	sciencemap - H2O=4% - we didn't see jupiter	20	227	size 120x120 ', step=5' v=5'/s	RaDec?	-
jupiter	23	5/4Khz	7h09	cold	sciencemap - H2O=4% - we didn't see jupiter	20	228	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(-2,0)	-
jupiter	23	5/4Khz	7h29	cold	sciencemap - H2O=4% - we didn't see jupiter (in telekiss: no source)	20	231	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(-2,0)	-
jupiter	23	5/4Khz	7h41	cold	sciencemap - H2O=4% - it seems to be visible	40	232	size 180x120 ', step=5' v=5'/s	RaDec?	todo
jupiter	23	5/4Khz	7h59	cold	sciencemap - H2O=4% - not sure	25	233	size 180x120 ', step=5' v=5'/s	RaDec?	-
jupiter	23	5/4Khz	8h11	cold	sciencemap - H2O=4%	50	234	size 210x120 ', step=7' v=5'/s	RaDec?	-
venus	23	5/4Khz	8h24	cold	sciencemap - H2O=4%	50	235	size 180x120 ', step=5' v=5'/s	RaDec?	-
venus	23	5/4Khz		cold	sciencemap - H2O=4% - not seen	50	240	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(-0.5,-0.5)	-
venus	23	5/4Khz	9h27	cold	sciencemap - H2O=4%	50	241	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(-1.5,-1) - nothing seen	-
venus	23	5/4Khz	9h25	cold	sciencemap - H2O=4% - nothing seen	25	242	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(-1.5,-1) -	-
venus	23	5/4Khz	9h34	cold	sciencemap - H2O=4%	25	243	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(-2,-1) -	-
venus	23	5/4Khz	9h40	cold	sciencemap - H2O=4% - IT SEEMS THERE: just one point	25	244	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(+2,-1)	todo
venus	23	5/4Khz	9h46	cold	sciencemap - H2O=4% - IT SEEMS THERE: just one point	25	245	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(+2,-1)	-
venus	23	5/4Khz		cold	sciencemap - H2O=4%	25	247	size 180x120 ', step=5' v=5'/s	AzEl? p.model offset=(+2,-1) - not seen	-

18 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	size map	pointing mod	analysis
moon	23	5/4Khz	19h40	cold	sciencemap - H2O=7% - we didn't see the moon	20	212	size 290x120 ', step=10' v=5'/s	RaDec?	-
moon	23	5/4Khz	19h55	cold	sciencemap - H2O=8% - we didn't see the moon	20	213	size 340x120 ', step=10' v=5'/s	RaDec?	-
moon	23	5/4Khz	20h12	cold	sciencemap - H2O=7% - we didn't see the moon	20	214	size 340x120 ', step=10' v=5'/s	AzEl? p.model	
moon	23	5/4Khz	20h33	cold	sciencemap - H2O=7% -	20	215	size 340x240 ', step=10' v=5'/s	AzEl? p.model	-
moon	23	5/4Khz		cold	sciencemap - H2O=6% - we saw the moon, the problem seemed to be that we lost the Moon because it flew away	20	219	size 90x120 ', step=10' v=5'/s	AzEl? p.model	
moon	23	5/4Khz		cold	sciencemap - H2O=6% -	20	220	size 60x60 ', step=10' v=5'/s, on the moon we see 100 kHz on KA, 80 kHz KB	AzEl? p.model	
moon	23	5/4Khz	21h54	cold	sciencemap - H2O=6% -	20	221	size 120x60 ', step=5' v=3'/s	AzEl? p.model	
moon	23	5/4Khz	22h05	cold	sciencemap - H2O=7% - we tried to anticipate the moon and we saw it, a discontinuity appears	20	222	size 120x60 ', step=5' v=3'/s	AzEl? p.model offset (-1,-1)	
moon	23	5/4Khz	22h13	cold	sciencemap - H2O=7% - we tried to anticipate the moon and we saw it	20	223	size 120x120 ', step=10' v=5'/s	AzEl? p.model offset= (-1.5,-1.5)	
moon	23	5/4Khz	22h20	cold	sciencemap - H2O=7% we saw the moon	20	224	size 120x120 ', step=10' v=5'/s	RaDec?	
moon	23	5/4Khz	22h26	cold	sciencemap - H2O=7% we saw the moon	20	225	size 120x120 ', step=10' v=3'/s	RaDec?	

15 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	23	5/4Khz	20h28	cold	sciencemap - nothing seen - H2O=35%	40	170	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	20h48	cold	sciencemap - nothing seen - H2O=35%	40	171	size 290x240 ', step=10' v=5'/s
moon	23	5/4Khz	21h15	cold	sciencemap - we saw the moon - H2O=36%	40	172	size 290x290 ', step=10' v=5'/s
moon	23	5/4Khz	21h35	cold	sciencemap - we saw the moon - H2O=36%	40	173	size 290x150 ', step=10' v=5'/s
moon	23	5/4Khz	21h47	cold	sciencemap - we saw the moon - H2O=36% - photo analyzed by A.J.	40	174	size 320x120 ', step=10' v=5'/s
moon	23	5/4Khz	22h03	cold	sciencemap - we saw the moon at 8 khz in amplitude - H2O=37% - photo analyzed by A.J.	43	175	size 320x120 ', step=10' v=5'/s
moon	23	5/4Khz	22h20	cold	sciencemap - we saw the moon a bit less than 8 khz in amplitude - H2O=37% - photo analyzed by A.J.	45	176	size 320x120 ', step=10' v=5'/s
moon	23	5/4Khz	22h32	cold	sciencemap - we saw the moon a bit less than 8 khz in amplitude - H2O=37% - photo analyzed by A.J.	50	177	size 320x120 ', step=10' v=5'/s
moon	23	5/4Khz	22h44	cold	sciencemap - we saw the moon a bit less than 8 khz in amplitude - H2O=37% - photo analyzed by A.J.	20	178	size 320x120 ', step=10' v=5'/s
moon	23	5/4Khz	22h53	cold	sciencemap - we saw the moon - H2O=32%	20	179	size 320x120 ', step=10' v=5'/s
moon	23	5/4Khz	23h04	cold	sciencemap - we saw the moon - H2O=36% - photo analyzed by A.J.	20	180	size 320x120 ', step=4' v=5'/s
moon	23	5/4Khz	23h13	cold	sciencemap - we saw the moon - H2O=36% - photo analyzed by A.J.	20	181	size 320x120 ', step=2' v=5'/s
venus	23	5/4Khz	8h22	cold	sciencemap - H2O=34%	40	168	size 120x120 ', step=5' v=5'/s
venus	23	5/4Khz	8h34	cold	sciencemap - H2O=34%	40	169	size 120x120 ', step=5' v=5'/s

14 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	23	5/4Khz	18h39	cold	sciencemap - source covered by clouds - H2O=35%	40	166	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	18h55	cold	sciencemap - source covered by clouds - H2O=39%	40	167	size 240x180 ', step=10' v=5'/s

14 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	23	5/4Khz	18h39	cold	sciencemap - source covered by clouds - H2O=35%	40	166	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	18h55	cold	sciencemap - source covered by clouds - H2O=39%	40	167	size 240x180 ', step=10' v=5'/s

13 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	23	5/4Khz	20h15	cold	sciencemap - H2O=25%	40	158	size 180x180 ', step=10' v=5'/s
moon	23	5/4Khz	20h28	cold	sciencemap - we saw the moon - H2O=25%	40	159	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	20h45	cold	sciencemap - we saw the moon - H2O=25%	40	160	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	21h07	cold	sciencemap - we saw the moon - H2O=25%	40	161	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	21h30	cold	sciencemap - we saw the moon - H2O=25%	40	162	size 240x180 ', step=10' v=5'/s
moon	23	5/4Khz	21h48	cold	sciencemap - we enlarged in elevation because it seems that is there the problem H2O=25% - photo analyzed by A.J.	40	162	size 240x240 ', step=10' v=5'/s
moon	23	5/4Khz	22h09	cold	sciencemap - we saw the moon - photo analyzed by A.J.	40	163	size 240x240 ', step=10' v=5'/s
moon	23	5/4Khz	22h36	cold	sciencemap - we saw the moon, really low in elevation - photo analyzed by A.J.	40	164	size 240x240 ', step=10' v=5'/s

12 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	-	5/4Khz	14h18	sky	sciencemap - no modulation	40	154	size 290x120 ', step=10' v=5'/s
moon	-	5/4Khz	14h43	sky	sciencemap - no modulation	40	155	size 290x120 ', step=10' v=5'/s
moon	-	5/4Khz	14h57	sky	sciencemap - no modulation	40	156	size 400x120 ', step=10' v=5'/s

11 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	-	5/4Khz	13h54	cold	sciencemap	40	143	size 180x120 ', step=6' v=5'/s

2 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
jupiter	23	5/4Khz	7h37	cold	sciencemap	20	138	size 100x100 arcmin, step=6' v=3'/s
jupiter	23	5/4Khz	7h49	cold	sciencemap	20	139	size 100x100 arcmin, step=6' v=3'/s
jupiter	23	5/4Khz	8h02	cold	sciencemap	40	140	size 100x100 arcmin, step=6' v=3'/s
jupiter	23	5/4Khz	8h14	cold	sciencemap	40	141	size 80x80 arcmin, step=6' v=1.5'/s
jupiter	23	5/4Khz	8h29	cold	sciencemap	40	142	size 120x120 arcmin, step=6' v=1.5'/s

1 March 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
moon	23	5/4Khz	8h36	cold	sciencemap - we didn't see the moon in trace	40	129	size 180x180 arcmin, step=7' v=6'/s
moon	23	5/4Khz	8h54	cold	sciencemap - we didn't see the moon in trace	40	130	size 240x240 arcmin, step=10' v=6'/s
moon	23	5/4Khz	9h15	cold	sciencemap - it seems visible	40	131	size 290x290 arcmin, step=10' v=10'/s
moon	23	5/4Khz	9h31	cold	sciencemap - moon in subscan 15,17 /30totale	40	132	size 290x290 arcmin, step=10' v=10'/s
moon	23	5/4Khz	10h02	cold	sciencemap - moon in subscan 7/15total in pixel KB065 & KB180 (kiss tuning wasn't working properly)	40	134	size 180x180 arcmin, step=10' v=8'/s
moon	23	5/4Khz	10h22	cold	sciencemap - we saw something but maybe we're going too fast	40	135	size 120x120 arcmin, step=5' v=6'/s
moon	23	5/4Khz	10h33	cold	sciencemap - we saw the moon in trace itfamp few kHz	40	136	size 100x100 arcmin, step=6' v=3'/s
moon	23	5/4Khz	10h45	cold	sciencemap - we saw the moon in trace itfamp few kHz	20	137	size 100x100 arcmin, step=6' v=3'/s

25 February 2019

name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
Electrical Test	-	-	12h27	cold		40	-	NO GOOD RESONANCES - we disconnected the old instrument that was connected to the ground analyzed()
Electrical Test	-	-	12h53	cold		40	-	NO GOOD RESONANCES - pumping bench pipes connected to the earth (floor ground) - R_[pumpingbench-earth]=0.02 ohm, R_[compressor-earth]=0.96 ohm
Electrical Test	-	-	13h08	cold		40	-	NO GOOD RESONANCES - as 12h53 + small pipes of dilution connected to compressor ones + bottom of pumping stage connected to the compressor
Electrical Test	-	-	13h51	cold		40	-	NO GOOD RESONANCES - PulseTube? in the ground floor
Electrical Test	-	-	15h48	cold		40	-	NO GOOD RESONANCES - all the pipes together, not anymore at the floor, but to the bottom of the compressor that is connected to the fork of the telescope

23 February 2019

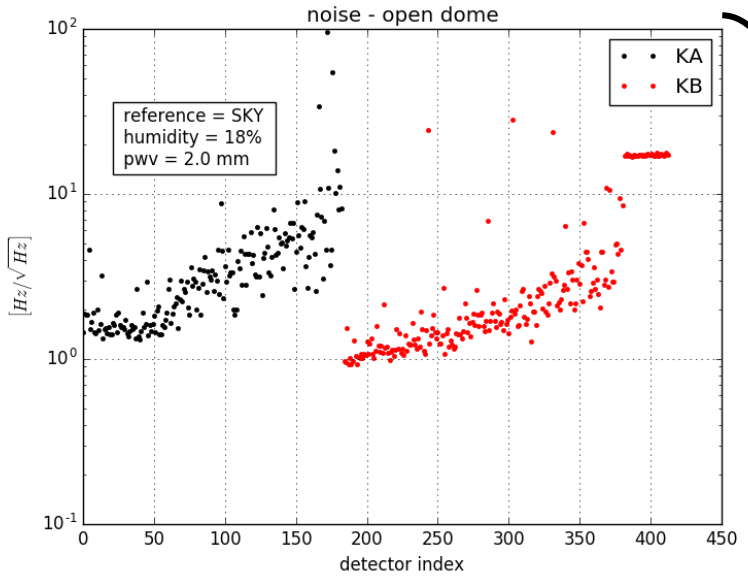
name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
0745+241	-	4 kHz	00h15	cold	sciencemap - photometry	10	104	size 30x30 arcmin, step=5' v=5'/s
moon	23	4 kHz	01h30	cold	sciencemap	10	105	size 90x90 arcmin, step=7' v=4'/s
moon	23	4 kHz	01h39	cold	sciencemap	40	106	size 180x180 arcmin, step=7' v=6'/s
moon	23	4 kHz	01h55	cold	sciencemap	40	107	size 240x240 arcmin, step=10' v=10'/s
moon	23	4 kHz	02h45	cold	sciencemap	40	115	size 240x290 arcmin, step=10' v=10'/s
moon	23	4 kHz	03h05	cold	sciencemap	25	116	size 290x290 arcmin, step=10' v=10'/s
moon	23	4 kHz	03h26	cold	sciencemap	40	117	size 290x290 arcmin, step=10' v=10'/s
jupiter	23	4 kHz	07h24	cold	sciencemap	40	118	size 60x60 arcmin, step=5' v=2'/s, deplacement +3 deg in elevation
jupiter	23	4 kHz	07h31	cold	sciencemap	40	119	size 60x60 arcmin, step=5' v=2'/s, deplacement +3 deg in elevation and +1 deg in azimuth
jupiter	23	4 kHz	07h39	cold	sciencemap	40	120	size 60x60 arcmin, step=5' v=2'/s, deplacement +2 deg in elevation
jupiter	23	4 kHz	07h47	cold	sciencemap	40	121	size 60x60 arcmin, step=5' v=2'/s, deplacement +2 deg in elevation and +1 deg in azimuth
jupiter	23	4 kHz	07h55	cold	sciencemap	40	122	size 60x60 arcmin, step=5' v=2'/s, deplacement +2 deg in elevation and -1 deg in azimuth
jupiter	23	4 kHz	08h02	cold	sciencemap	40	123	size 60x60 arcmin, step=5' v=2'/s, deplacement +2 deg in elevation and -1 deg in azimuth, it's the same of the previous one
-	23	4 kHz	08h20	cold	skydip 60 el	40	124	size 30x30 arcmin, step=5' v=2'/s
-	23	4 kHz	08h28	cold	skydip 75 el	40	125	size 30x30 arcmin, step=5' v=2'/s
-	23	4 kHz	08h45	cold	skydip 82.4 el	40	127	size 30x30 arcmin, step=5' v=2'/s
-	23	4 kHz	08h47	cold	sciencemap, compressor stopped	40	127	size 30x30 arcmin, step=5' v=2'/s

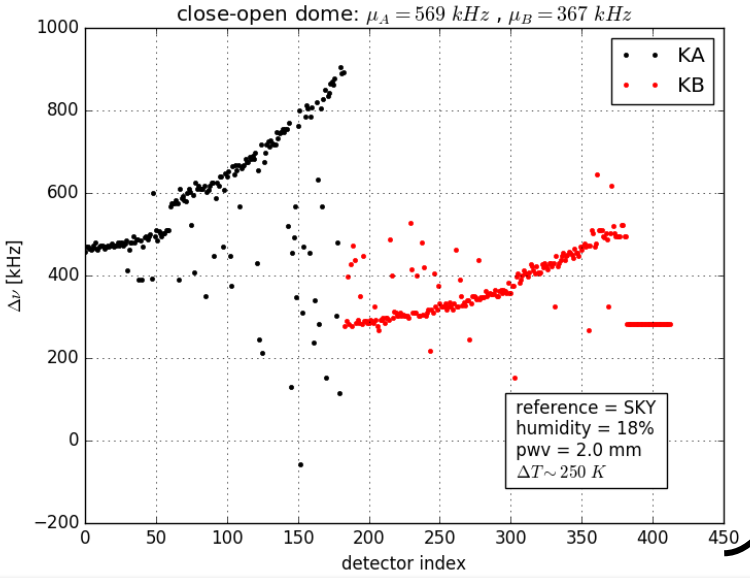
22 February 2019

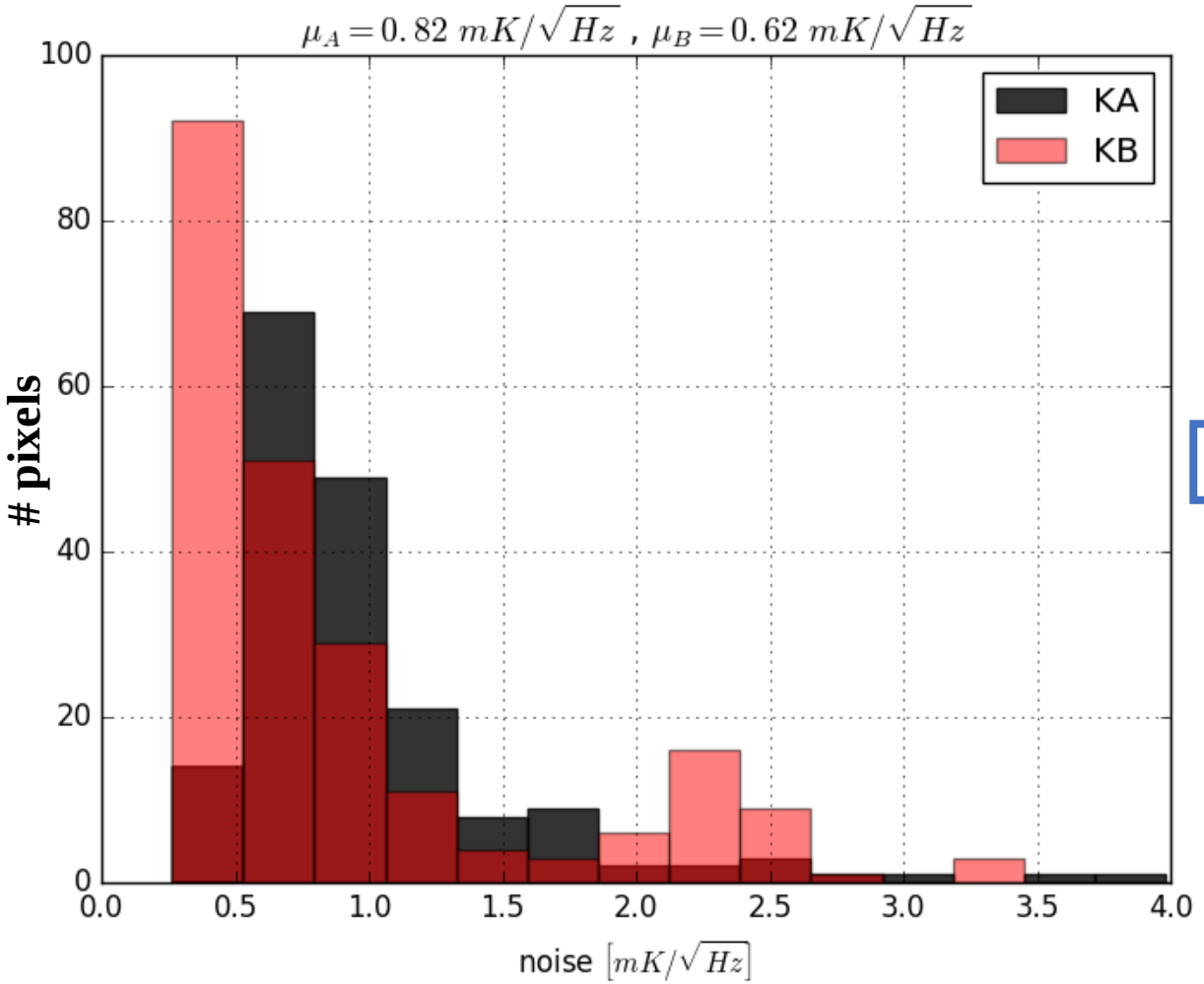
name source	OP [mm]	MP/Acq frequency [Hz]	time	second source	details	focus [mm]	scan number	Size map
crab	-	95 Hz	23h16m34s	cold	pointingmap - photometry	40	-	size 180x180 arcmin, step=5' v=30'/s
crab	-	95 Hz	23h37h40	cold	pointingmap - photometry	25	-	size 180x180 arcmin, step=5' v=30'/s
crab	-	95 Hz	23h44m07	cold	pointingmap - photometry	10	-	size 180x180 arcmin, step=5' v=30'/s

IV. Installation and observations

Sensitivity characterization







PRELIMINARY TEST

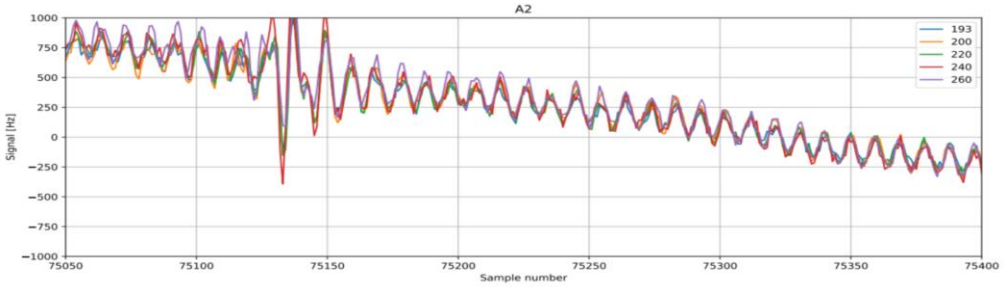
$$S = \Delta\nu/\Re$$

$\Re \approx 1.5$ kHz/K

FACTS
Commisioning phase in progress
and we are handling three major issues

1) Noise:

source of noise at 400 Hz.



2) Pointing Model:

pointing correction are of the order of degree especially at higher elevation angles. They are due to the different distribution of weight to respect to the previous instrument installed at the same telescope. We do not have many sources to calibrate.

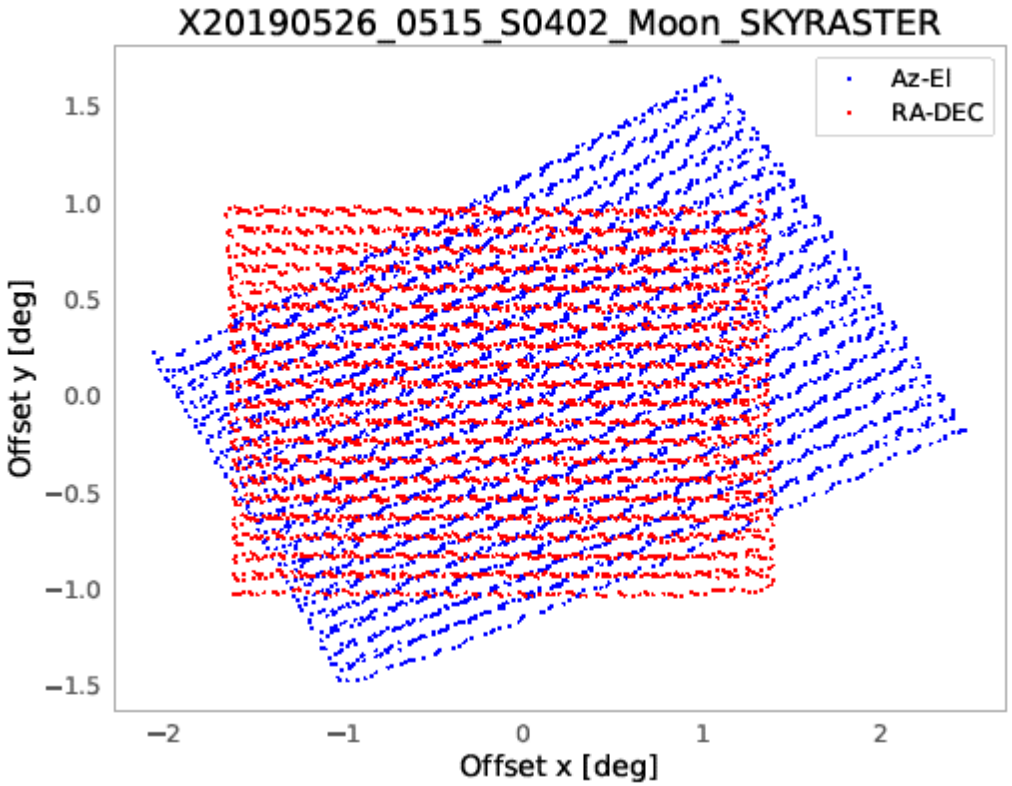
3) Point source detection:

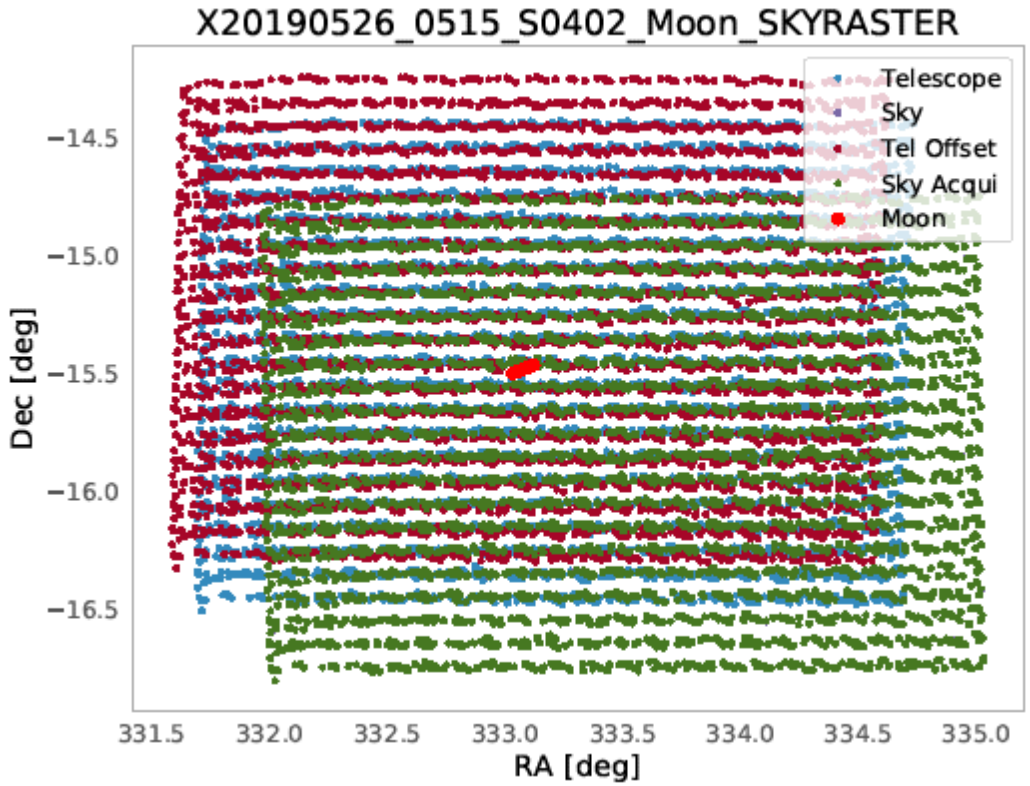
we did not detect a point source up to now. We are investigating the best focus and the possibility that something is wrong with the optics.

SIZE = 180 ’ x 120 ’

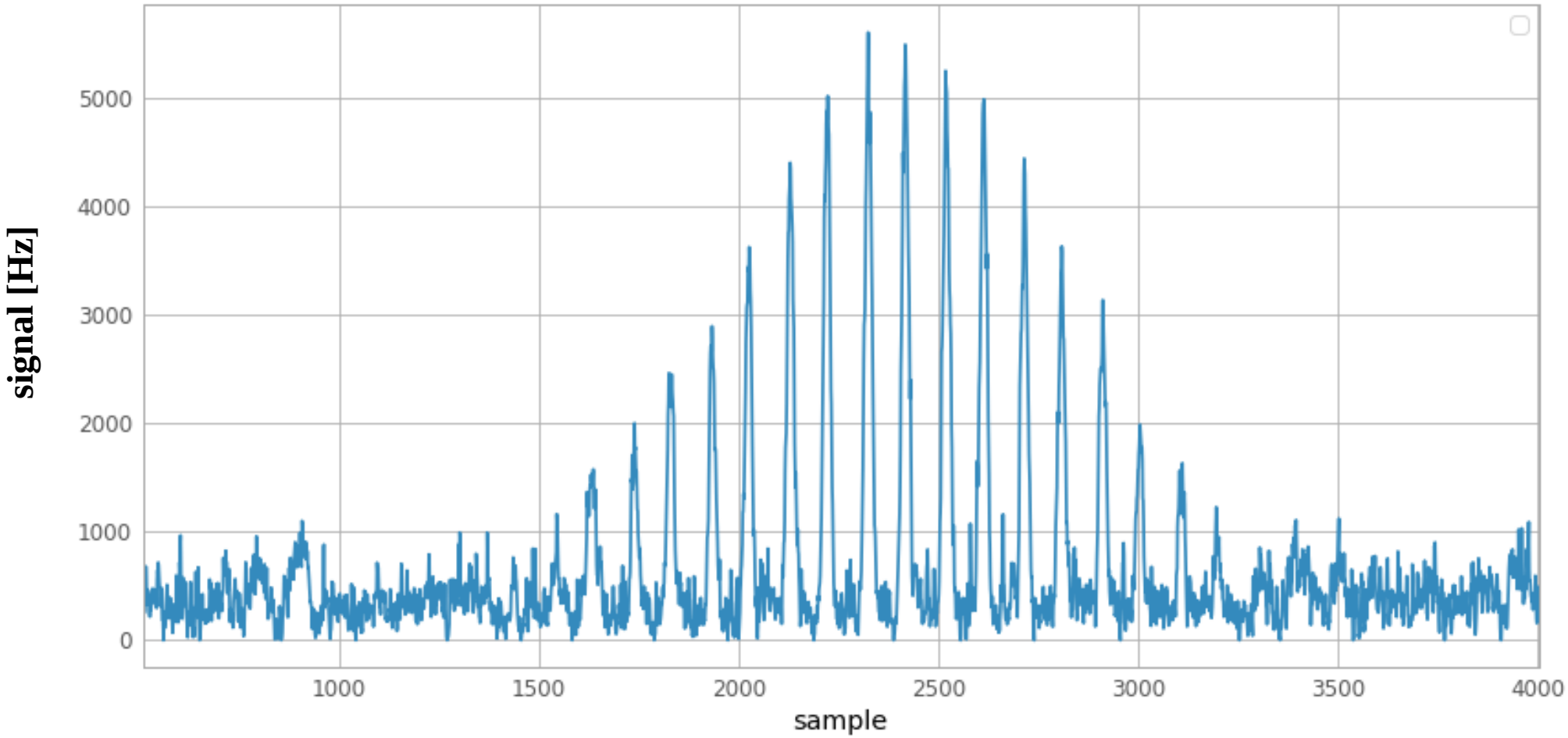
STEP = 3 ’

SPEED = 7 ’ / s



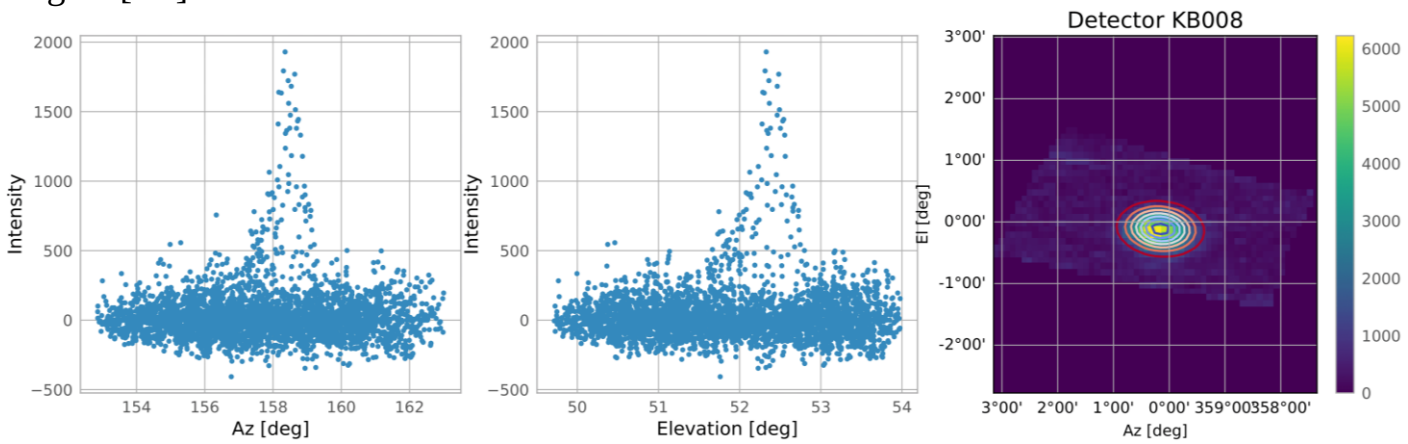


Single pixel timeline

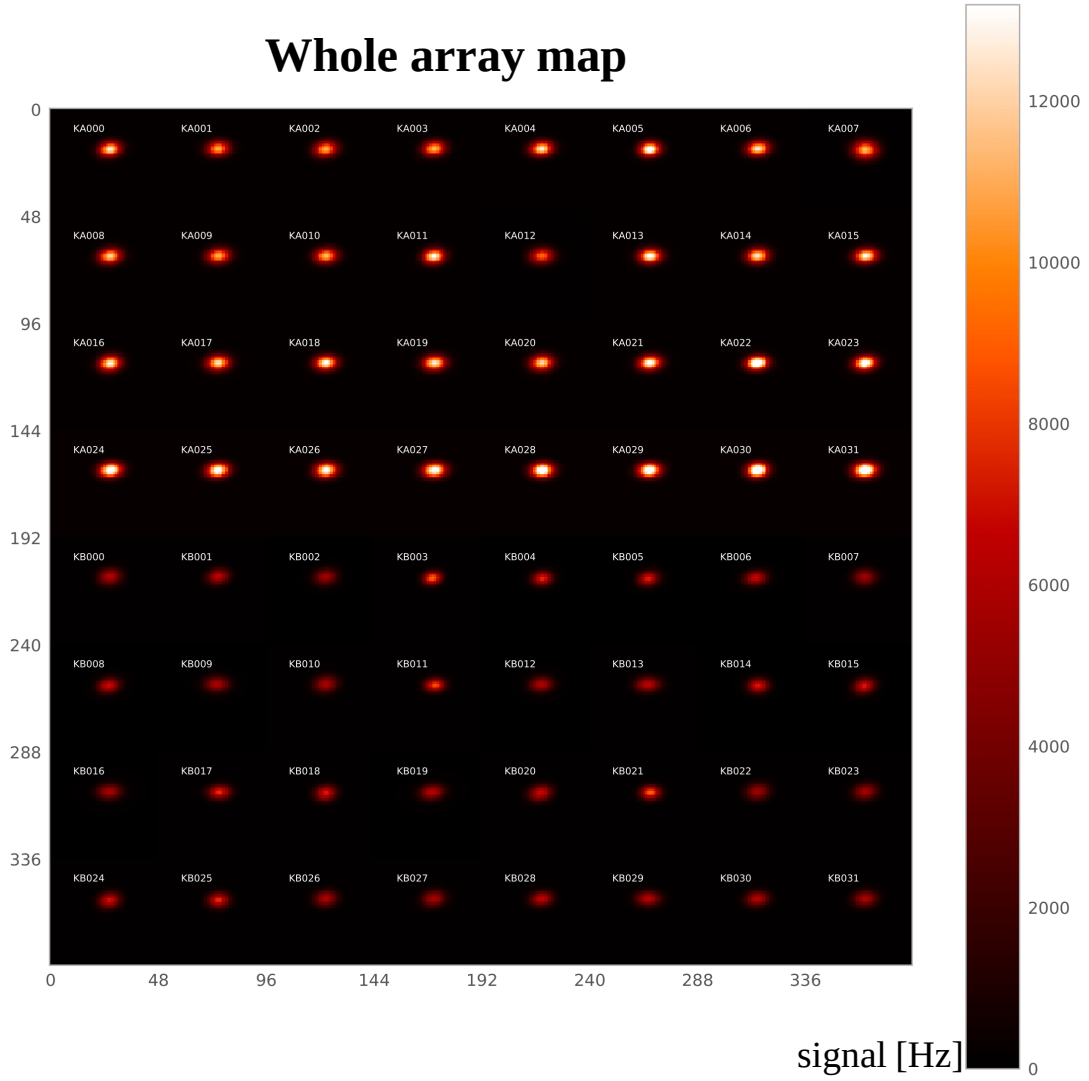


Single pixel map

signal [Hz]



Whole array map



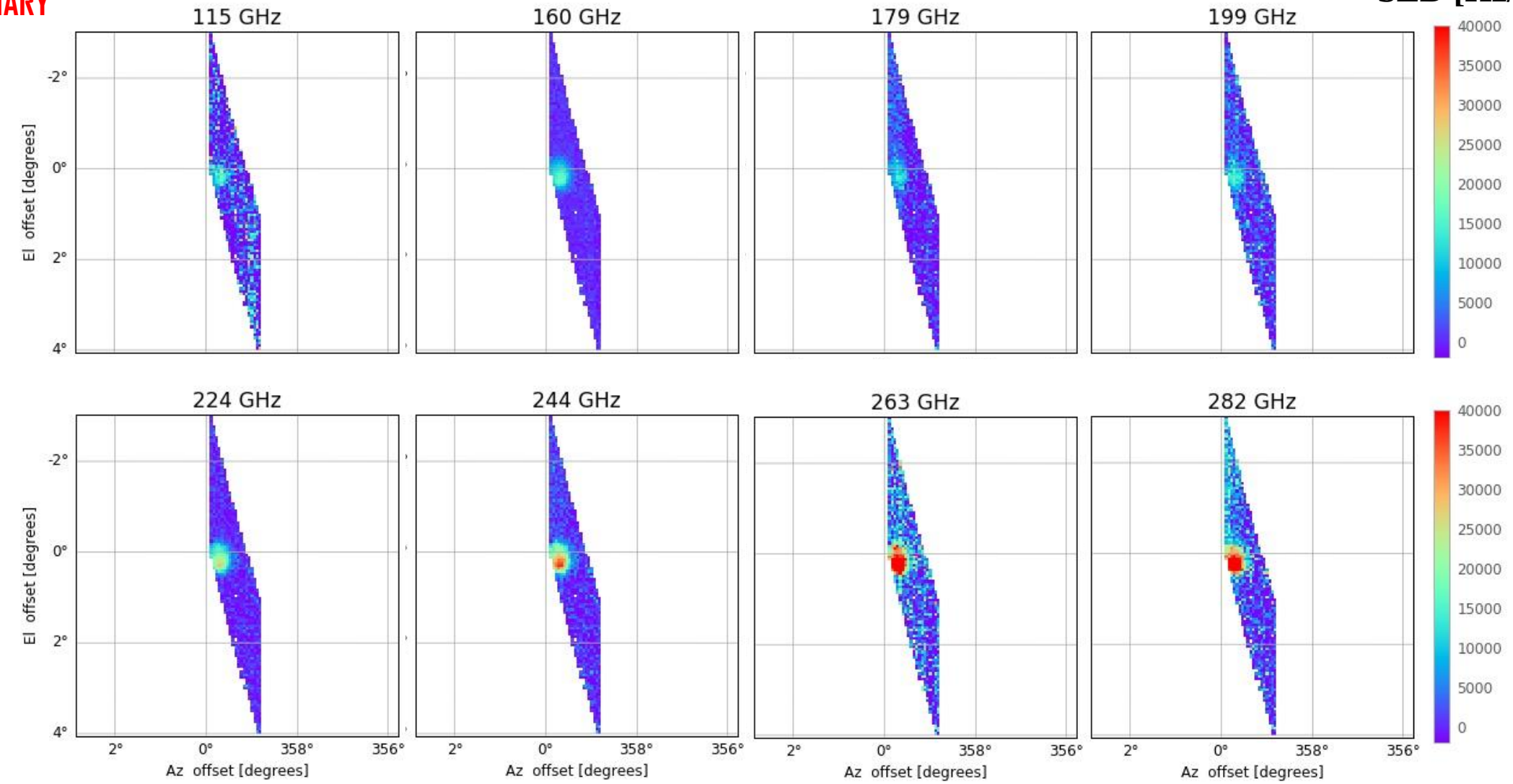
signal [Hz]

IV. Installation and observations

Moon spectrum-maps

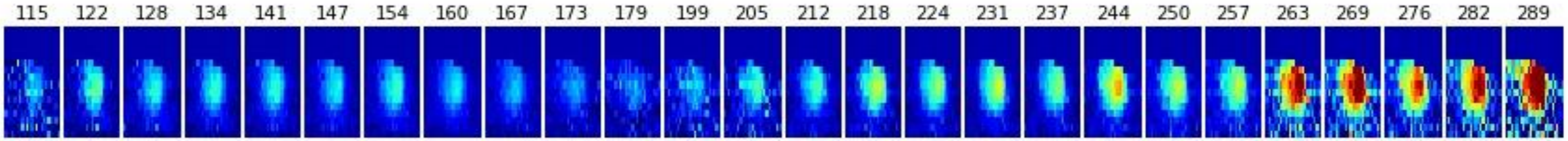
PRELIMINARY

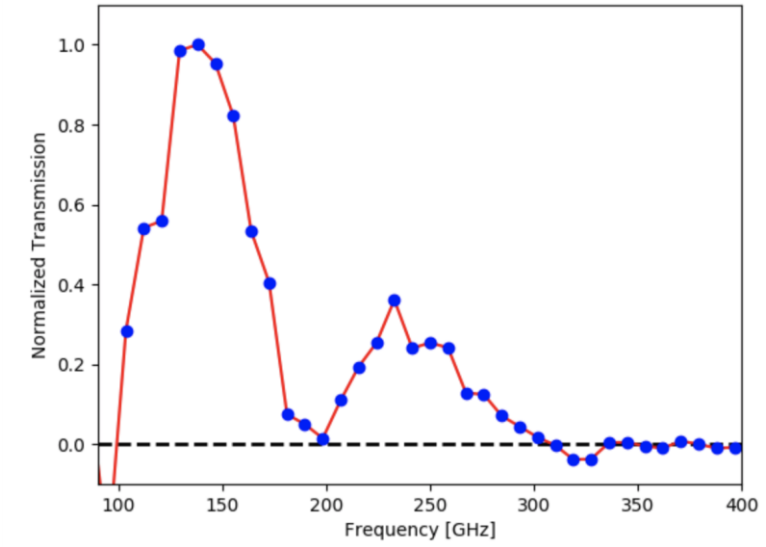
SED [Hz/sqrt(Hz)]



PRELIMINARY

[GHz] Moon SED **single pixel [Hz/sqrt(Hz)]**



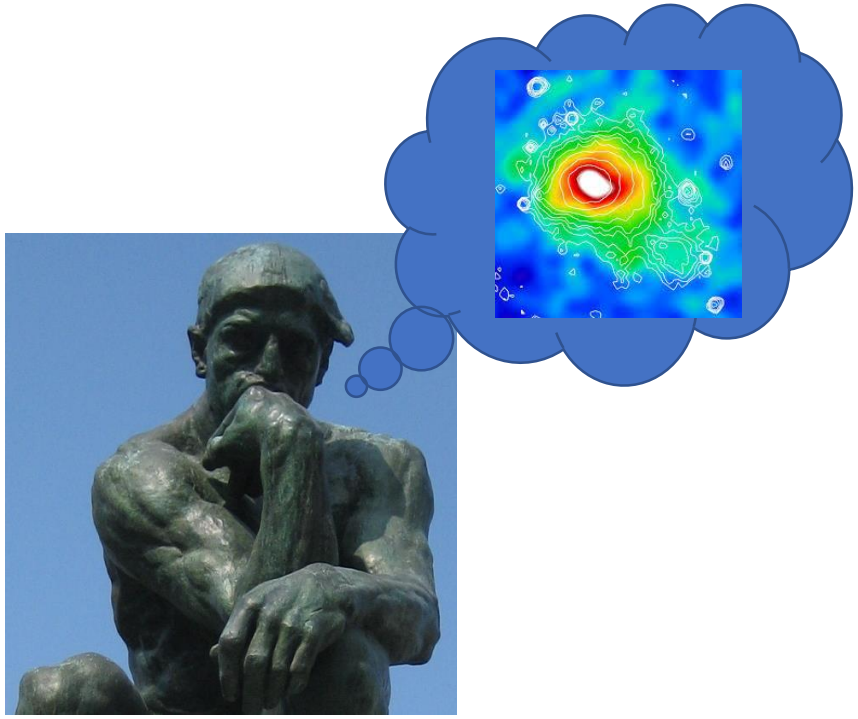


Demonstration of the mapping capability on multi-wavelenght

WHAT IS DONE
- installation
- sensitivity on the sky
- demonstration of mapping capability on multi-frequency

WHAT NOW
- point source detection
- calibration on sources (geometry, beam, skydips …)

WHAT IN THE FUTURE
- full characterisation of the instrument
- observation of clusters of galaxies
- technology and pipeline transfer to CONCERTO
  same concept of transfer from NIKA to NIKA2
  [see next talk of G. Lagache]



"Le Penseur" (Auguste Rodin)