



HIFI Science User Requirements Compliance Matrix

Version Draft 0.2 of 2008-10-06, by Michael Olberg

Abstract

This document lists per science requirement whether it is met by the HIFI instrument.

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Draft 0.1	2008-10-02	version produced for IFAR	Michael Olberg
Draft 0.2	2008-10-03	added figure for mixer performance	

Reference Documents

Doc. ref		Title
SRON-G/HIFI/SP/2000-001	RD01	Science User Requirements Document
SRON-G/HIFI/RP/2008-022	RD02	HIFI ILT summary report

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1 Compliance Matrix

Table 1: HIFI Science Drivers for Frequency coverage

Science Drivers:	HIFI Bands						
	1	2	3	4	5	6	7
Frequency range (GHz)	480–640	640–800	800–960	960–1120	1120–1250	1410–1700	1700–1910
Unique + Core							
(A) Water	X-H-S			X-H-S	X-S	X-S	X-S
(B) Molec. Universe	X	X	X	X	X	X	X
(C) [CII] at high z	X-S	X-S	X-S	X-S	X-S		
(D) ISM in Galaxies	X	X	X	X	X	X	X
(E) Diffuse ISM	X-H		X-H	X		X-S	X-S
Star Formation	X	X	X	X	X	X	X
Death of Stars	X	X	X	X	X	X	X
(F) SSO: Comets	X-H		X-H	X-H			
SSO: Planets	X	X		X	X	X	X

X = Required Band, H = HRS Required, S = Goal Sensitivity Required

Table 2: Science and instrument requirements. **Green** indicates that the requirement is met. **Yellow** indicates that verification is pending. **Red** indicates that the requirement is **not** met.

Requirements	HIFI Bands						
	1	2	3	4	5	6	7
Frequency range (GHz)	480–640	640–800	800–960	960–1120	1120–1250	1410–1700	1700–1910
Frequency Coverage	A,B,C, D,E,F	B,C, D,F	B,C,D, E,F	A,B, C,F	A,B, C,D	A,B,D, E,F	A,B,D, E,F
Goal Sensitivity ^a	A,C,E	C	C	A,C	A,C	A,E	A,E
Baseline Stability ^b	C	C	C	C	C	F	F
Spectral Resolution	A,E,F	F	E,F	A,F			
Pointing/Tracking Accuracy ^c	F	F	F	F		A,B, D,F	A,B, D,F
Instantaneous Bandwidth ^d	B,C,D	B,C,D	B,C,D	B,C,D	B,C,E	B,E	B,E
Beam Pattern	D,E	D,E	D,E	D,E	D,E	D,E	D,E
Observing Mode ^e							
– Frequency Switch	A,E,F	F	E,F	A,F	A	A,E,F	A,E,F
– Chopper	A,B,C	B,C	B,C	A,B,C	A,B,C	A,B	A,B
– Position Switch	A,D,E	D	D,E	A,D	A,D	A,D,E	A,D,E
– OTF Map	A,E		E	A	A	A,E	A,E
– Absorption studies	A,B	B	B	A,B	A,B	A,B	A,B

^aSee figure 1

^bTop driver for good baseline stability over all HIFI bands is the diffuse ISM. However, all programs require stable baselines.

^cThe pointing/tracking accuracy is demanding for comet observations and for the small beams at the highest frequencies.

^dThe large line widths of [CII] at high redshift and of the ISM in galaxies, as well as efficient line surveys require the large instantaneous bandwidths.

^eThe observation modes list the most important ways of observing with HIFI for each of the seven science drivers.

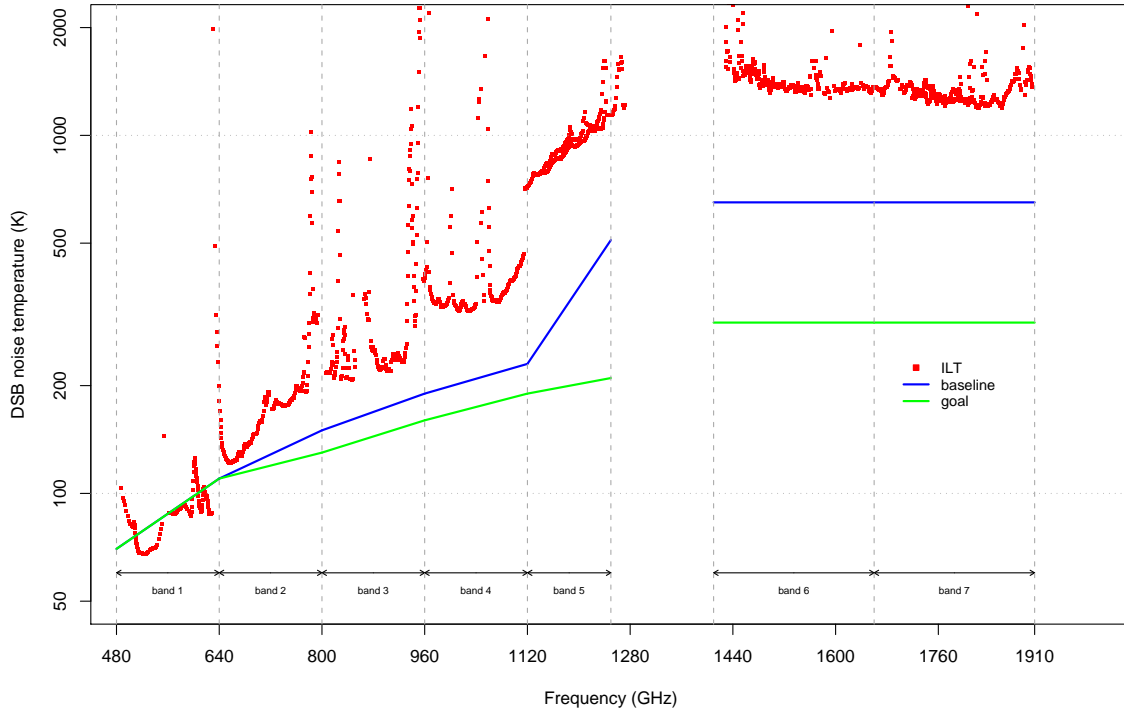


Figure 1: Current knowledge of mixer performance for HIFI.

A Use of HIFI by Key Programs

Table 3: Time requests for HIFI by GT- and OT-KPs

PI	Title	hours
Rolf Güsten	The HEXGAL (Herschel EXtraGALactic) Key Project: Physical and Chemical Conditions of the ISM in Galactic Nuclei	329
Edwin Bergin	HEXOS: Herschel Observations of EXtra-Ordinary Sources: The Orion and Sgr B2 Star-Forming Regions	311
Ewine van Dishoeck	Water in Star-forming regions with Herschel (WISH)	286
Cecilia Ceccarelli	HIFI Spectral Surveys of Star Forming Regions	270
William Langer	State of the Diffuse ISM: Galactic Observations of the Terahertz CII Line (GOT CPlus)	223
Valentin Bujarrabal	HIFISTARS: The physical and chemical properties of circumstellar environments around evolved stars	214
Carsten Kramer	Herschel M33 extended survey (HERMES): star-formation interplay with the ISM	143
Paul Goldsmith	Herschel Oxygen Project	139
Volker Ossenkopf	The warm and dense ISM	91
Christopher Martin	HIGGS: The Herschel Inner Galaxy Gas Survey	76
Paul Hartogh	Water and Related Chemistry in the Solar System	66
Maryvonne Gerin	PRISMAS: PRobing InterStellar Molecules with Absorption line Studies	14
Gran Olofsson	Stellar Disk Evolution	8
Neal Evans	Dust, Ice, and Gas In Time (DIGIT)	4

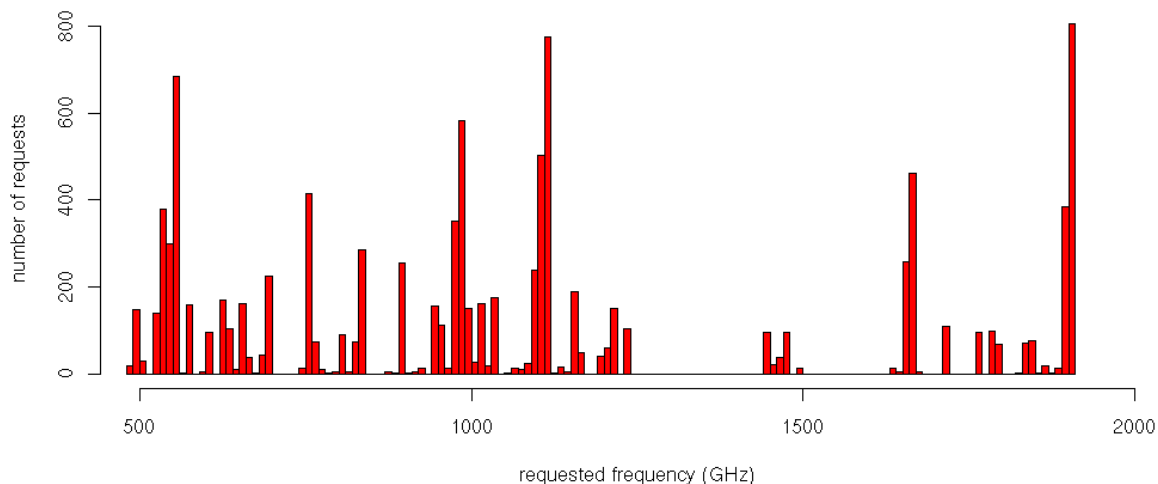


Figure 2: Histogram of proposed frequencies as part of GT and OT Key Proposals. Individual bins are 10 GHz wide.