

Table 16: MIDI limiting uncorrelated flux (LUF).

Telescopes	Beam combiner	Spectrograph	Limit (N mag)	Limit (Jy@12 μ m)
UTs	CORR_FLUX	PRISM	5.7	0.2
UTs	HIGH_SENS	PRISM	4	1
UTs	HIGH_SENS	GRISM	2.8	3
UTs	SCLPHOT	PRISM	3.2	2
UTs	SCLPHOT	GRISM	2	6
ATs	HIGH_SENS	PRISM	0.74	20
ATs	HIGH_SENS	GRISM	0.31	30
ATs	SCLPHOT	PRISM	0.0	40
ATs	SCLPHOT	GRISM	-0.44	60

6.12 MIDI, MID-infrared Interferometric instrument

MIDI is the VLTI instrument for N-band (8 – 13 μ m) interferometry. It is a two-beam recombiner giving values of moduli of fringe visibility (samples in the (u,v) plane) depending on the wavelength (spectral resolution: $R = 30$ or $R = 230$). MIDI is offered in both Service and Visitor Modes and can be used with either the UTs or the ATs. For a list of the offered telescope configurations, please refer to [the VLTI baseline page](#).

Starting with Period 88 a correlated flux mode is offered. In the MIDI fringe exposures the background can be subtracted without residuals because it is fully correlated. This is not possible for the photometry, and for this reason good fringe data can be obtained for fainter magnitudes than good photometry data. The correlated flux mode is suited for observations for which visibilities are not needed, *i.e.* when is intended to compare them to correlated flux observations of the same object at other projected baselines.

Important note: UT4 will not be available in April 2012 (Sect. 1.1). In addition, to allow for the installation of the Deformable Secondary Mirror, UT4 will not be available during part of Period 92. Large Programmes using UT4 with MIDI should take this limited availability of UT4 into account.

The main features of MIDI for Period 89 are:

- Interference fringes recorded in “dispersed-Fourier” mode (long slow scan with coherencing at 1-Hz rate).
- Spectrograph optics: either NaCl PRISM mode ($R = 30$), or KRS5 GRISM mode ($R = 230$). In correlated flux mode the PRISM is used.
- Beam combiner optics: either “HIGH_SENS” (no simultaneous photometric measurement of beams before combination), or “SCLPHOT” (simultaneous photometric measurement). In correlated flux mode the HIGH_SENS optics is used.
- Limiting uncorrelated magnitudes are given in Table 16.
- For MIDI, the correlated flux is defined by the uncorrelated flux (in Jy@12 μ m) multiplied by the estimated visibility. Except for the correlated flux mode, where the MIDI limiting correlated flux (LCF) limit is equal to the MIDI limiting uncorrelated flux (LUF) limit, the LCF can be obtained for each mode from the LUF of this mode using: $LCF = 0.5 \times LUF$ (see Table 16).
- Various spectral filters for acquisition images.

Details on MIDI and its instrumental modes can be found on the [MIDI web page](#).

The raw accuracy of the visibility measurements is typically better than 20%. The highest accuracy for calibrated visibilities can be obtained in SCLPHOT mode, provided target and calibrator are

both brighter than 15Jy for UTs and 200Jy for ATs. The visibility of the Science source is absolutely calibrated by observing a Calibration Source. Two calibration modes are offered: Science-Calibration (SCI-CAL) for normal accuracy requirements, or Calibration-Science-Calibration (CAL-SCI-CAL) for high accuracy requirements.

For the correlated flux mode, a CAL-SCI-CAL sequence is mandatory with the additional restriction that the same calibrator star should be used before and after the science target observations. Since correlated fluxes are not normalized like visibilities, they must be compared to other correlated fluxes of the same object taken at different baseline vectors in order to infer the source geometry. A single correlated flux measurement is not useful. As correlated flux measurements are obtained in Visitor Mode, source photometry is taken at the user's discretion. ESO does not guarantee this photometry to be useful, in particular for visibility calibration.

A proposal can consist of different observations of the same target with different baselines and/or hour angles in which case the observing time to be requested is simply computed as the number of required time-slots multiplied by the duration of one slot as given in Table 19. Time-constrained observations (*e.g.* variable objects) can be requested.

6.13 AMBER, Astronomical Multi-BEam combineR

AMBER is a near-infrared, multi-beam interferometric instrument, combining up to 3 telescopes simultaneously. In Period 89, AMBER can be used with UTs or ATs. For specifications of the UT and AT performances see Sect. 4.2.2 and Sect. 4.2.4. All possible triplets of UTs are available, and a number of selected AT combinations. For the telescope positions and baseline lengths of the different AT and UT baselines, please refer to [the VLTI baseline page](#).

Because of the limited availability of UTs for AMBER, any scientific programme on the UTs should be designed so that scientifically meaningful results can be achieved in a single night.

Important note: UT4 will not be available in April 2012 (Sect. 1.1). In addition, to allow for the installation of the Deformable Secondary Mirror, UT4 will not be available during part of Period 92. Large Programmes using UT4 with AMBER should take this limited availability of UT4 into account.

6.13.1 Spectral Modes and Coverage

The following spectral modes are offered: the Low Resolution H+K bands (LR-HK), Medium Resolution K band (MR-K), High Resolution K band (HR-K) and Medium Resolution H Band (MR-H). For central wavelengths and wavelength coverages for LR-HK, MR-K, MR-H and HR-K see [the AMBER web page](#).

6.13.2 Integration times, DIT

External fringe tracking with FINITO is available on both the UTs and the ATs. The use of FINITO allows the entire AMBER detector to be read, maximizing simultaneous spectral coverage. It also allows the AMBER DITs to be adjusted to yield sufficient signal-to-noise ratio per frame in the fringes. However, the DIT has to remain small since, even with the help of the fringe tracker, interferometric fringes get significantly blurred after integrations lasting seconds. Note that medium and high resolution are only offered with external fringe-tracking as standard setup.

If no fringe tracker is used (*i.e.* faint and/or extended objects, or airmass too high) the integration times with AMBER will have to be short to minimise the blurring caused by the atmospheric turbulence. In Low Resolution, without external fringe tracking, the maximum authorized DITs are set to 100ms on the ATs and 50ms on the UTs. If *absolute visibility* measurements is the goal, the shortest authorized DITs are recommended (see Table 2 in the Template manual); if *closure-phase* and *wavelength differential-mode* are the quantities of interest, the maximum recommended DIT should be used.