

# Call for APEX Heterodyne Facility Instrument Science Verification

## Summary

The APEX Swedish Heterodyne Facility Instrument (SHFI) has successfully passed its pre-shipment review, and will be installed on the APEX 12m telescope on Chajnantor in February and March 2008. SHFI will be equipped with three single pixel SIS heterodyne receivers covering the atmospheric bands at 211–270 GHz (APEX-1), 275–370 GHz (APEX-2), 375–500 GHz (APEX-3), and a heterodyne HEB receiver APEX-T2 operating at 1.25–1.38 THz.

ESO now invites proposals for science verification for APEX-1, APEX-3 (conditional to successful integration in the cryostat) and APEX-T2. All observations will be performed in service mode by the local APEX staff. All proposals should be sent to [cdebreuc@eso.org](mailto:cdebreuc@eso.org) by noon CEST on Tuesday 4 March 2008.

## Telescope and Instrument

APEX is a 12m submillimetre telescope situated at an altitude of 5107m on the Llano de Chajnantor in Chile, and is a collaboration between the MPIfR Bonn, the European Southern Observatory and the Onsala Space Observatory. More details on APEX can be found at <http://www.apex-telescope.org>. Since 2007, the APEX telescope has been equipped with a wobbling secondary, which will be available for all heterodyne observations. More details on the wobbler are at <http://www.apex-telescope.org/telescope/wobbler/>

The new SHFI contains four single-pixel receivers mounted in a single cryostat located in the Nasmyth A cabin of APEX. For details, see <http://www.apex-telescope.org/heterodyne/shfi/>. The four receivers are:

- APEX-1: a Single Side Band (SSB) SIS receiver covering 211–275 GHz with SSB receiver temperature  $T_{\text{rec}}$  around 130 K between 210 and 260 GHz and 180 K between 260 and 270 GHz. APEX-1 covers lower frequencies than currently offered at APEX, allowing observations during conditions with  $\text{PWV} > 2$  mm. It is therefore likely that a substantial amount of observing time may become available for this receiver. The observations are scheduled to be executed between March and August 2008.
- APEX-2: a Single Side Band receiver covering 275–370 GHz. SHFI replaces the current APEX-2A receiver, whose frequency coverage is assured by APEX-2 at similar sensitivity. As ESO has already invited regular APEX-2A proposals for period 81, the science verification proposals for APEX-2 will be selected from these regular proposals, and **no Science Verification proposals will be accepted for APEX-2.**
- APEX-3: a Single Side Band (SSB) SIS receiver covering 385–500 GHz with SSB  $T_{\text{rec}}$  around 320 K. As the SSB version of this receiver has not yet been mounted in the cryostat, this receiver is offered conditionally to successful integration and commissioning. Observations in this frequency range require the best quartile of precipitable water vapour conditions ( $\text{PWV} < 0.5$  mm). They will be dynamically scheduled throughout the first half year of operation, in collaboration with the other APEX partners. Only a limited amount of observing time will be available on APEX-3, so proposals should be short and self-contained.
- APEX-T2: a Double Side Band (DSB) HEB receiver operating at 1.25–1.39 THz with DSB  $T_{\text{rec}}$  around 1200 K. THz observations require excellent weather conditions ( $\text{PWV} < 0.2$  mm), available  $< 10\%$  of the time at Chajnantor. The SV observations of APEX-T2 will therefore be limited to only a few short programmes, and will also be scheduled dynamically. Note that due to the very stringent weather requirements, the on-sky commissioning of APEX-T2 may require several months. This receiver may only be available for science verification observations from August 2008.

Proposals are invited from the ESO community for the APEX-1, APEX-3 and APEX-T2 receivers. The ESO share of the APEX observations will be performed during night-time and morning (till 11am local time) in service mode by APEX and ESO staff.

## Observing Time Estimates

Observing time estimates should assume the above mentioned system temperatures, and a 60% overhead for slewing, pointing, focus and calibrations. An updated exposure time calculator is now available from <http://www.apex-telescope.org/heterodyne/calculator>.

## Science Verification Proposals

The purpose of Science Verification is to demonstrate the capabilities of the facility and its instruments to the wider community and to gather feedback from users to improve the performance. Proposals should be submitted as a single PDF file. They should contain as a minimum the following information:

- Principal Investigator and co-Investigators (+ institute and PI email)
- ESO User Portal ID of the PI
- Abstract
- Scientific Justification (guideline: up to 1 page plus figures)
- Source list (RA, DEC, **only in J2000**).
- Required weather conditions in terms of PWV.
- Observing time estimate, assuming the receiver temperatures mentioned above, and **including a 60% overhead**.

Proposals will be assessed on grounds of scientific merit, potential to demonstrate the range of telescope and instrument capabilities and feasibility with the current configuration. The certified, calibrated data will be made publicly available through the ESO archive. Successful proposers are required to work closely with the APEX team and to provide rapid feedback on the data.

## Deadline for submission of Science Verification proposals

All proposals should be sent to [cdebreuc@eso.org](mailto:cdebreuc@eso.org) by noon CEST on Tuesday 4 March 2008.

## Regular SHFI proposals

Pending successful on-sky commissioning, ESO may offer the SHFI during Period 82. This call will also include APEX-2.