NEVEC: the NOVA ESO VLTI Expertise Centre

Eric J. Bakker[1], George Miley[1], Rens Waters[2,1], Rudolf Le Poole[1], Walter Jaffe[1], Huub Röttgering[1], Isabelle Percheron[1], Jeff Meisner[1], Jeroen de Jong[1], Dap Hartmann[1], Bill Cotton[3,1], Björn Heijligers[1], Roy van Boekel[2,4,1], Andreas Glindemann[4,1], Luigi d'Arcio[5,1], and Wilfried Boland[6,1]

[1] NEVEC, Leiden Observatory, P.O. Box 9513, NL-2300 RA Leiden, The Netherlands
[2] Astronomical Institute, University of Amsterdam, Kruislaan 403, NL-1098 SJ Amsterdam, The Netherlands
[3] NRAO, 520 Edgemont Road, Charlottesville, VA 22903-2475, USA
[4] ESO, Karl-Schwarzschild-Str. 2, D-85748 Garching bei München, Germany
[5] SRON, Sorbonnelaan 2, NL-3584 CA Utrecht, The Netherlands
[6] NOVA, Leiden Observatory, P.O. Box 9513, NL-2300 RA Leiden, The Netherlands

Abstract. This paper gives an overview of the **N**OVA **E**SO **V**LTI **E**xpertise **C**entre (NEVEC) activities which include work on MIDI, PRIMA, next generation VLTI instruments, VLTI's calibrators program, instrument models, data formats, commissioning, education, algorithm development, and scientific exploitation of VLTI data. Special attention is given to the Dutch interest to participate in the development of next generation VLTI instruments.

1 Memorandum of understanding

The NOVA ESO VLTI Expertise Centre (NEVEC) is a joint venture between the Netherlands research school for astronomy (NOVA) and the European Southern Observatory (ESO). NEVEC's headquarter is located at Leiden Observatory with a second office at the University of Amsterdam. NEVEC is funded by NOVA and formulated in a Memorandum of Understanding signed on 31 May 1999. The mission of NEVEC is as follows:

- Development of instrument modelling, data reduction, and calibration techniques for VLTI
- Accumulation of expertise relevant for second-generation VLTI instruments
- Education in VLTI

2 NEVEC's work breakdown structure

NEVEC is structured through the definition of work packages (WP). See also http://www.strw.leidenuniv.nl/~nevec

WP 00: management. Management requires co-ordination of activities of 15 scientists involved with a total person-power consumption of about 6 person-years/year, supervision of 18 person-years funded by NOVA (1999-2005). University staff and NEVEC guests provide additional person-power.

WP 01: MIDI. In close collaboration with the Max Planck Institute for Astronomy at Heidelberg, the Observatory of Paris Meudon, and ASTRON at Dwingeloo, NEVEC designs and develops software to operate and analyse data from the mid-infrared interferometric instrument for the VLTI (MIDI). The main NEVEC efforts are focused on software and overall software management. Additionally, NEVEC works on fringe tracking algorithms, operating analysis, template files, analysis of MIDI sensitivity, and commissioning.
WP 02: PRIMA. The number of reference objects for PRIMA around a science object is restricted. To anticipate this, a survey has been initiated, the pre-PRIMA Survey Project, that first selects a reference object, followed by a search for science objects within the isopistonic patch of that reference object [1].
WP 03: next generation instruments. A number of studies are being conducted aiming at developing conceptual designs for next generation VLTI instruments [2], [3], [4], [5].
WP 04: instrument calibration. The objective is to provide a catalogue with a sufficient number of sources to be used as calibrator targets for VLTI instruments. The compiled data base can be used to calibrate the instrumental visibility factor for VINCI, AMBER, and MIDI [6].
WP 05: instrument models. The VLTI end-to-end model has been developed by ESO. NEVEC is involved in improving the atmospheric simulator.
WP 06: data formats. NEVEC is playing a leading role in establishing FITS Binary Table formats for storing optical/IR interferometric data. A generic format for "all" optical interferometers was developed along with specialisations for the VLTI. In addition software has been developed to access and manipulate data in these formats.
WP 07: commissioning. NEVEC provides support to ESO in active commissioning of VINCI at Paranal, and in software development to process and analyse VINCI data (technically and scientifically) in order to improve the performance of the VLTI.
WP 08: education. A number of activities have been conducted including the organisation of a summer school from 18 to 22 September 2000 at Leiden Observatory on "Space and Ground based Optical and Infrared interferometry" [7].
WP 09: algorithms. The objective is to develop and analyse algorithms for phase tracking/delay estimation, group delay tracking, and fringe visibility estimation. This analysis could be applied to the current VLTI hardware and also to the VLTI infrastructure feeding a photon-counting NIR detector.
WP 10: science. The objective is to facilitate, initiate, and execute the scientific exploitation of VLTI data by mobilising the scientific community with a focus on research on Active Galactic Nuclei, circumstellar disks, evolved stars, and astrometry.
WP 11: interfaces. The objective is to support the Dutch involvement in VIS/IR interferometry through providing an interface between ESO and ESA on one side, and the non-profit organisations and industries within the Netherlands on the other side.

3 NEVEC achievements

Achievements from NEVEC over the period 1999 to 2001 are:

- Leading software development for MIDI (with MPIA Heidelberg)
- Participating in VLTI commissioning (as part of the ESO team)
- Defining VLTI FITS binary table (in close collaboration with ESO)
- Conducting VLTI calibrators program (in close collaboration with ESO)
- Initiating the pre-PRIMA survey (in close collaboration with ESO)
- Organising the summer school 2000 on optical/infrared interferometry (for ESO and ESA)

4 The road ahead

The ambition of NEVEC is to participate in a consortium to build next generation VLTI instruments aiming at faint source science, and to participate in upgrades of the instruments currently being built.

- MIDI operating at 20 microns [8]
- MIDI multi-beam combination
- GENIE (nulling)
- Beam combiner using fibres or integrated optics
- PRIMA feeding a Super Tunnel Junction (STJ) fringe sensor unit detector
- Multi-beam PRIMA
- Continued involvement with VLTI by providing support to ESO to work on VLTI related questions

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