

MEMORANDUM OF UNDERSTANDING
CONCERNING THE DESIGN AND DEVELOPMENT
PHASE OF A LARGE MM/SUB-MM ARRAY

The European Southern Observatory (ESO) Garching

and

The following Organisations in its member states

Centre National de la Recherche Scientifique,

Max-Planck-Gesellschaft,

**the Netherlands' Foundation for Research in Astronomy and
Nederlandse Onderzoekschool Voor Astronomie**

and

**The United Kingdom Particle Physics and Astronomy Research Council
(PPARC) Swindon**

- hereinafter called "Signatories" -

Recognising

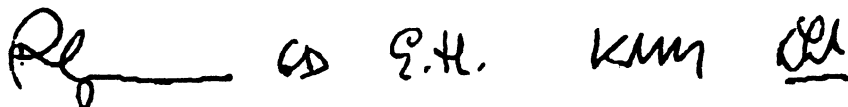
the potential of large interferometric arrays operating at millimetre and sub-millimetre wavelengths to contribute to the study of a wide range of astronomical problems;

the interest of the European astronomical community in developing such an array (LSA) to be constructed in Chile;

the interest of the astronomical community of the United States of America in developing an array (MMA) to be constructed in Chile;

the interest of other astronomical communities in participating in a large millimetre and sub-millimetre interferometric array project;

the potential advantages of combining these aspirations in a single global project;

The block contains five handwritten signatures in black ink. From left to right, they are: a long, flowing signature; a signature starting with 'CD'; a signature starting with 'P.H.'; a signature starting with 'KMM'; and a signature starting with 'DL'.

and Noting

the work already carried out in Europe, in particular the instruments already developed the Combined Report of April 1997 and the LSA/MMA Feasibility Study of April 1998 prepared by the working groups of the "LSA Consortium" including ESO, IRAM, NFRA and OSO;

the support given by the National Science Foundation to the US National Radio Astronomy Observatory (NRAO) to carry out a design and development phase over the period 1998-2001;

the Agreement between the European Southern Observatory (ESO) and NRAO signed in June 1997;

the progress made by ESO and NRAO in negotiating with the Chilean authorities over the use of a site on the Plateau of Chajnantor;

the Resolutions of the ESO Council of September 15, 1998;

the Signatories to this Memorandum of Understanding have Resolved

to pursue, over the period until 2001, a co-ordinated design and development programme, hereinafter referred to as "Phase 1", in conjunction to that being pursued by NRAO, drawing on the expertise and experience of a range of institutes and industries in Europe;

to negotiate collectively with NSF, NRAO, and other interested parties on the development of an international millimetre and sub-millimetre interferometric array project;

in pursuance of which they will

establish the structures and mechanisms necessary for European co-ordination in the implementation of the provisions of this MOU;

negotiate with NSF and others on the contents of an MOU formalising a global project.

Article 1

Scope and Purpose

1.1 This MOU comprises the main Articles together with Annexes, which are an integral part of the MOU. The Signatories commit themselves to 'best efforts' in meeting its provisions.

1.2 This MOU has as objective and establishes the commitment of the Signatories:

1.2.1 to pursue, over the period until 2001, a co-ordinated design and development programme, in conjunction to that being pursued by NRAO, drawing on the expertise and experience of a range of organisations, institutes and industries in Europe;

1.2.2 to negotiate collectively with NSF, NRAO, and other interested parties on the development of an international millimetre and sub-millimetre interferometric array project, to be formalised in a Memorandum of Understanding on a global project to be submitted to the Signatories;

1.2.3 to establish the structures and mechanisms necessary for European co-ordination in the implementation of the provisions of this MOU.

Article 2

Period of Validity

2.1 This MOU shall be deemed to enter into force on 1 January 1999 and to remain in force until either 31 December 2001 or the end of Phase 1, whichever is the sooner, unless extended.

2.2 The MOU shall not confer rights and obligations upon any Signatory until such time as they have signed the MOU.

Article 3

European Co-ordination Committee

3.1 Immediately after this MOU comes into effect, the Signatories shall establish a European Co-ordination Committee (ECC) to be responsible to them for the oversight of all activities carried out under the provisions of this MOU.

3.2 The ECC will comprise representatives of the Signatories in numbers in broad proportion to their intended contributions to the array project. The Signatories may change their appointees at any time by notifying the change in writing to the ECC.

3.3 The composition of the ECC is set out in Annex 1 and its Terms of Reference in Annex 2. New members may join the ECC as and when they become Signatories to this MOU under the terms of Article 11.

3.4 The Chair shall be selected by the ECC from among its members and will serve for a period not exceeding two years, after which the ECC shall select a new Chair.

3.5 The ECC shall establish its Rules of Procedure, including those for the selection of the Chair.

3.6 The ECC shall meet not less than three times per year.

Article 4

Project Management in Phase 1

4.1 The ECC shall appoint a European Project Manager (EPM), who will act as Project Leader, and a European Project Scientist within 31 days of this MOU coming into force.

4.2 The EPM shall set up a European Project Team, drawing on resources offered by the Signatories, and within 60 days of appointment shall submit a Project Phase 1 Management Plan including the composition of the Project Team and Work Programme to the ECC for approval.

Article 5

Work Programme in Phase 1

5.1 The objective of Phase 1 is to completely define a joint project to construct and operate an international millimetre and sub-millimetre interferometric array (hereinafter called "Phase 2") and to negotiate an agreement for the implementation of Phase 2. The definition shall include Level 1 scientific and technical requirements, proposed technical and management approaches, and the estimated cost and schedule for Phase 2. The Phase 1 Work Programme shall demonstrate both the feasibility of the proposed technical approach to meet the Level 1 requirements and the reliability of the estimated cost and schedule. Demonstration of these characteristics by measured performance on prototype components and subsystems, including a European prototype antenna, is part of the objectives of Phase 1.

5.2 A preliminary Work Programme is attached for reference.

Re G. S.H. LMM BLS

Article 6

Resource Contributions to Phase 1

- 6.1 The Signatories agree to contribute specified resources in cash and in kind to enable the Work Programme of Phase 1 to be carried out.
- 6.2 These resources shall be agreed by the ECC and set out in Annex 3, subject to confirmation by the contributing Signatory, and shall be periodically reviewed. The in-cash resources shall be administered on behalf of the Signatories by ESO, which will report to the ECC on its use.
- 6.3 The equipment supplied under this MOU shall be used to enable the execution of the Work Programme. The contributing Signatory shall remain the owner of this equipment, unless otherwise agreed by the Signatories. The rules and regulations of each Signatory shall apply for procurement of this equipment.
- 6.4 The ECC may propose that the Signatories modify the Resource Contributions and hence Annex 3. Any changes will only become effective when agreed by the relevant Signatories.

Article 7

Reporting and Accounting

- 7.1 The EPM shall maintain detailed records of work done, and shall submit quarterly progress reports to the ECC, detailing work done against the agreed Work Programme, resource utilisation and contributions, in cash or in kind, made by the Signatories.
- 7.2 The ECC shall report on all activities, progress and resource utilisation at regular intervals, and not less than annually, to the Signatories.

Article 8

The European Negotiating Team

- 8.1 Immediately after this MOU comes into effect, the Signatories shall establish a European Negotiating Team, which will be responsible for all formal negotiations with NSF/NRAO and other agencies or institutions (with the exception of Chile - Article 10) which are not Signatories to this MOU. The European Negotiating Team shall consist of representatives of the Signatories in numbers in broad proportion to their intended contributions to the array project. The Signatories may change their appointees at any time, by notification in writing to the ECC and all other Signatories.

8.2 The European Negotiating Team shall consult the Signatories as necessary and report regularly to the ECC.

Article 9

Liaison with NRAO/NSF

9.1 All formal liaison on the technical level with NRAO shall be carried out by the European Project Manager and the Project Team under his control.

9.2 All formal liaison with NSF shall be carried out by the European Negotiating Team.

Article 10

Liaison with Chile

10. All formal liaison with the relevant bodies in Chile on behalf of the Signatories and the ECC will be carried out by ESO, which will consult the Signatories where necessary and report regularly to the European Co-ordination Committee.

Article 11

New Signatories

11. New Signatories, in particular research organisations or national funding agencies, may join the MOU at any time by application to the ECC and subject to the unanimous agreement of all existing Signatories. Their rights and obligations shall be made clear in an amendment to this MOU.

Article 12

Amendments

12. This MOU may be amended at any time with the agreement of all Signatories. Any amendment must be in writing, signed and dated by all Signatories, and becomes an integral part of the MOU on the date that the last Signatory signs.

Ref. to 9.11. KMM RLL

Article 13

Withdrawal

13.1 A Signatory may withdraw from this MOU subject to one year's written notice of termination and to a consultation between the Signatories with a view to reaching an equitable settlement.

13.2 In the event that a Signatory withdraws, the MOU will be amended to reflect the new circumstances under which it will continue.

Article 14

Default

14.1 A Signatory in default of its obligations under this MOU will be served notice of its default in writing by the Chair of the ECC, acting on behalf of the other Signatories.

14.2 If the defaulting Signatory has not rectified its default to the satisfaction of the ECC within 31 days of the serving of notice, it shall be deemed to have sought withdrawal and must negotiate in good faith with the other Signatories to reach an equitable settlement for its withdrawal under Article 13.

Article 15

Disputes

15. Any disputes between Signatories on the meaning or implementation of the provisions of this MOU shall be resolved by negotiation between the Signatories.

Article 16

Intellectual Property Rights

16.1 The Signatories shall notify each other of any inventions or copyright work emanating from their contributions to Phase 1.

16.2 For intellectual property created during research and development activities designated by the Signatories as joint research and development, the Signatories shall obtain rights and interests by mutual agreement, on the basis of their relative contributions. If research and development activities are not designated as joint research, rights will be obtained in accordance with the policy of the signatory responsible for this research.

16.3 Each Signatory shall assure that the other Signatories are granted non-exclusive, royalty free licenses for the use of such intellectual property within the framework of this array project.

Date: November 6, 1998

For the European Southern Observatory



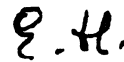
For Centre National de la Recherche Scientifique



For the Max-Planck-Gesellschaft



For the Netherlands' Foundation for Research in
Astronomy and Nederlandse Onderzoekschool Voor
Astronomie



For the United Kingdom Particle Physics and
Astronomy Research Council



ANNEX 1

COMPOSITION OF THE EUROPEAN CO-ORDINATION COMMITTEE (ECC)

The ECC shall be comprised of four members representing the European Southern Observatory (ESO), one member representing the Particle Physics and Astronomy Research Council of the United Kingdom (PPARC), and one member representing the Centre National de la Recherche Scientifique of France (CNRS). Each member can, at their discretion, be accompanied by an expert.

The members as of 1 January 1999 are:

ESO	Director General
PPARC
CNRS

ANNEX 2

TERMS OF REFERENCE OF THE EUROPEAN CO-ORDINATION COMMITTEE (ECC)

1. The ECC shall be responsible to the Signatories for the co-ordination and oversight of all activities carried out under the provisions of the MOU. (MOU Article 3.1)
2. The ECC shall establish its Rules of Procedure, including those for the selection of the Chair. (MOU Article 3.5)
3. The ECC shall select its Chair according to the Rules of Procedure. The Chair shall serve for a period not exceeding two years, after which the ECC shall select a new Chair. (MOU Article 3.4)
4. The ECC shall meet not less than three times per year. (MOU Article 3.6)
5. The ECC shall appoint a European Project Manager (EPM) and a European Project Scientist (EPS) within 31 days of the MOU coming into effect. (MOU Article 4.1)
6. The ECC shall review and approve the Project Phase 1 Management Plan, including the composition of the Project Team, and Work Programme that will be prepared by the EPM within 60 days of his/her appointment. The ECC may modify these plans. (MOU Article 4.2)
7. The ECC may propose to the Signatories to modify the Resource Contributions and Annex 3 of the MOU. (MOU Article 6.4)
8. The ECC shall report on all activities, progress and resource utilization at regular intervals to the Signatories. (MOU Article 7.2)
9. Any Signatory in default of its obligations under the MOU will be notified of its default by the Chair of the ECC, acting on behalf of the other Signatories. The ECC will monitor the rectification of this default. (MOU Article 14.1)
10. The ECC will serve for the duration of the MOU.
11. The ECC shall be the primary forum for interactions and decisions between the Signatories.
12. The ECC shall establish and control policy for Phase 1 of the program.
13. The ECC shall receive and comment on reports from the Signatories on negotiations with non-Signatories wishing to join the Phase 1 program.

14. The ECC shall review and approve the Scientific and Technical Requirements.
15. The ECC shall define and appoint such subcommittees as the ECC deems necessary.

ANNEX 3

PHASE 1 RESOURCE CONTRIBUTIONS

Preliminary projections of Phase 1 resource contributions in kind and in cash were given by the Signatories at the 6 November 1998 meeting and are listed below. These projections are for planning purposes only and are subject to confirmation by the Signatories.

	In-kind Contribution	In-cash Contribution
ESO	3.6 MDM	7.2 MDM
PPARC	1 M£	1 M£
CNRS	6 FTE's	~ 2 MDM
MPG	5-6 FTE's	~ 2 MDM
NFRA/NOVA	tbd FTE's	tbd

Bob -
These numbers are very
provisional and conser-
vative. All Signatories
hope to get more
resources to
contribute.

Dick

ANNEX 4

COMPOSITION OF THE EUROPEAN NEGOTIATING TEAM (ENT)

The ENT shall be comprised of four members representing the European Southern Observatory (ESO), one member representing the Particle Physics and Astronomy Research Council of the United Kingdom (PPARC), and one member representing the Centre National de la Recherche Scientifique of France (CNRS).

The members as of 1 January 1999 are:

ESO	President of Council Director General
PPARC
CNRS