



**FIRST  
PLANCK**

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# **FIRST/PLANCK MISSION**

## **ANNOUNCEMENT**

**OF**

## **OPPORTUNITY**

**Proposals due: February 16, 1998**

PT-AO-03114 (Issue 0)

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**FOREWORD**

This Announcement of Opportunity (AO) covers the FIRST and Planck missions. FIRST is ESA's Cornerstone Mission CS4, Planck (formerly known as COBRAS/SAMBA) is ESA's Medium-sized Mission M3.

ESA recently decided to merge FIRST and Planck in the interest of saving considerable costs for the ESA Horizons 2000 Science Programme.

Essentially one spacecraft will be used to carry two payloads and it will be operated either in the FIRST or in the Planck mode. Further studies will be carried out in industry until early 1998 to elaborate the spacecraft design and to refine instrument interfaces. In parallel, an ESA internal study will assess the implications of performing the FIRST and Planck missions separately. The results of all these studies and the Principal Investigator (PI) proposals will be evaluated in spring 1998 and will be the basis for the submission to the ESA Science Programme Committee (SPC) for approval of the mission and the preselection of PIs and Mission Scientists (MS).

PI proposals are requested by 16 February 1998. The baseline for the AO is the merged FIRST/Planck mission. PI proposals are requested for this baseline mission. In May 1998 the SPC will preselect MS, PI's and instruments. The final mission implementation concept (either merged or separate missions) will be submitted for SPC approval at the same meeting.

On the basis of this decision, ESA will initiate, if appropriate, discussions with the PI's with a view to adapting the instruments to the approved implementation concept, and finalizing the technical and management interfaces.

These discussions will be conducted in full awareness of the constraints on both national and ESA resources for the FIRST/Planck program.

This phase must be brought to an end in February 1999 at the latest with the final confirmation of the payload complements by the SPC.

The FIRST/Planck Science Management Plan (SMP) (ESA/SPC(97)34, rev. 1) approved by the SPC is fundamental for the FIRST/Planck mission and the present AO. This AO will frequently refer to the FIRST/Planck SMP and its appended FIRST and Planck SMPs.

It is noted that the schedule information given in the SMPs is indicative only. The SMPs will not be regularly updated to give the latest schedule data. The latest valid schedule data and requirements are given in this AO.

The AO will be available in electronic form on a server. One hardcopy will be sent to those who have responded to the Calls for Letters of Intent.

Proposal responses to this AO shall be available in electronic form. Only a limited number of hardcopies shall be provided to ESA.

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**ACRONYM LIST**

AIV	Assembly Integration and Verification
AO	Announcement of Opportunity
AWG	Astronomy Working Group (ESA)
BOL	BOLometer instrument (for FIRST)
CMB	Cosmic Microwave Background
Co-Is	Co-Investigators
CS4	Cornerstone mission 4 (ESA's FIRST project)
DPC	Data Processing Centre (for Planck)
DPOP	Daily Prime Operational Phase
DSRI	Danish Space Research Institute
DTCP	Daily TeleCommunications Phase
EGSE	Electrical Ground Support Equipment
EM	Engineering Model
EOM	End Of Mission
ESA	European Space Agency
ESOC	European Space Operations Centre
FINDAS	FIRST Integrated Network and Data Archive System
FIRST	Far InfraRed and Submillimetre Telescope (ESA CS4)
FM	Flight Model
FPLM	FIRST Payload Module
FPST	FIRST/Planck Science Team
FPU	Focal Plane Unit
FS	Flight Spare
FSC	FIRST Science Centre
FST	FIRST Science Team
GSID	Ground Segment Interface Document
HEMT	High Electron Mobility Transistors
HFT	HETerodyne instrument (for FIRST)
HFI	High Frequency Instrument (for Planck)
ICC	Instrument Control Centre (for FIRST)
IIA	Instrument Implementation Agreement
IID-A	Instrument Interface Document part A
IID-B	Instrument Interface Document part B
IOP	Initial Operations Phase
ITT	Invitation to Tender

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L2	2nd Lagrangian libration point
LFI	Low Frequency Instrument (for Planck)
LOU	Local Oscillator Unit
M3	Medium-sized mission 3 (ESA's Planck project)
MGSE	Mechanical Ground Support Equipment
MOC	Mission Operations Centre
MS	Mission Scientist
NASA	National Aeronautics and Space Agency
OIRD	Operations Interface Requirements Document
PDF	Portable Data Format
PFM	Proto-Flight Model
PHC	PHotoConductor instrument (for FIRST)
PI	Principal Investigator
Planck	formerly called COBRAS/SAMBA satellite (ESA M3)
PPLM	Planck Payload Module
QM	Qualification Model
SIRD	Science-operations Implementation Requirements Document
SMP	Science Management Plan
SPC	Science Programme Committee (ESA)
SSAC	Space Science Advisory Committee (ESA)
STM	Structural Thermal Model
SVM	SerVice Module
TBC	To Be Confirmed
TBD	To Be Defined

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**CHAPTER I.**

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## I. GENERAL INFORMATION

### 1.1 Proposal Information Package

This Announcement of Opportunity (AO) solicits proposals for the Principal Investigator participation in the FIRST/Planck Payloads together with FIRST Mission Scientists in open competition.

The Proposal Information Package consists of:

- this AO (PT-AO-03114)

and the following applicable documents:

- the combined FIRST/Planck Science Management Plan
- the FIRST Science Management Plan (ESA/SPC(97)22)
- the Planck Science Management Plan (ESA/SPC(97)8)
- the Instrument Interface Document Part A (PT-IID-A-04624)
- the Instrument Interface Documents Part B (IID-B) for FIRST
  - IID-B: PT-BOL-02124 Bolometer Instrument
  - IID-B: PT-HET-02125 Heterodyne Instrument
  - IID-B: PT-PHC-02126 Photoconductor Instrument
- the Instrument Interface Documents Part B (IID-B) for Planck
  - IID-B: PT-HFI-04141 High Frequency Instrument
  - IID-B: PT-LFI-04142 Low Frequency Instrument
- the FIRST/Planck Ground Segment Interface Document (GSID)
  - the FIRST/Planck Operations Interface Requirements Document (OIRD)
  - the FIRST Science-operations Implementation Requirements Document (FIRST-SIRD)
  - the Planck Science-operations Implementation Requirements Document (Planck-SIRD)
  - the FIRST/Planck Public Relations Plan (To be issued)

All documents are available in PDF for downloading from:

<http://www.estec.esa.nl/spdwww/first/html/first.html>



## 1.2 FIRST/Planck Mission Overview

### FIRST objectives

FIRST, the Far InfraRed and Submillimetre Telescope is an ESA cornerstone mission utilising a space-borne telescope and sophisticated, cryogenically-cooled, scientific instrumentation to perform far-infrared and submillimetre astronomical observations. As described in the System Level Study Report ESA SCI(93)6 FIRST is a **multi-user 'observatory type' mission** which targets the far-infrared and submillimetre part of the electromagnetic spectrum, covering approximately the wavelength range of 85- 600  $\mu\text{m}$ .

Following various studies, the FIRST project was selected by ESA's Science Programme Committee (SPC) in November 1993 for implementation as the fourth Cornerstone Mission (CS4) in the ESA Horizon 2000 programme, subject to reconfirmation.

### Planck objectives

Planck (formerly known as COBRAS/SAMBA) is the third Medium-sized mission (M3) of ESA's long-term scientific plan Horizon 2000. As described in the Phase A Study Report ESA SCI(96)3, the main objective of the Planck mission is to image over the whole sky the temperature anisotropies of the Cosmic Microwave Background (CMB) radiation, with a sensitivity  $\Delta T/T < \sim 2 \times 10^{-6}$  and an angular resolution of approx. 10 arcminutes.

To achieve this objective, the whole sky will be mapped in nine frequency channels ranging between 30 and 900 GHz, with a sensitivity and an angular resolution which allow the separation of the cosmological signal from all other sources of confusion. Thus, **Planck is essentially a survey project**, and as such will be developed and operated as a **Principal Investigator (PI) type mission**.

### FIRST/Planck implementation

A number of similarities between the Planck (M3) mission and the FIRST (CS4) mission have prompted ESA to study the possibility of combining the two projects.

The objective of this exercise is to ascertain whether a technical solution exists which combines both missions while preserving their respective scientific capabilities, thus giving rise to significant savings for the Horizons 2000 Programme. The technical part of the study has been carried out within ESA. For payload and scientific issues, ESA is being advised by a "Tiger Team" composed of scientists who are familiar and have been involved in the past with Planck and/or FIRST.

From the range of possibilities that have been considered the current combination is basically a FIRST satellite with the Planck telescope, together with the LFI and HFI scientific instruments in the Planck Payload Module (PPLM), mounted below the Service Module (SVM).

The Planck instruments are mounted to the SVM as an entity with the telescope and the cooler hardware.

The SVM, including the solar array, will be shared between Planck and FIRST. Planck and FIRST observations would be carried out consecutively and independently of each other.

The order in which observations will be executed is described in the combined FIRST/Planck SMP.

The ESA internal study has not found any technical and/or scientific show-stoppers to the combined mission.

Consequently, the FIRST/Planck satellite concept will be further detailed by industry. The industrial study work will begin in Sept.1997, and will be completed by March 1998.

**Spacecraft resource allocations, as specified for the scientific instruments in the IID-A, are based on present knowledge.**

**Resource allocations might have to be amended as a result of the Industrial study work. Furthermore, should the system studies reveal costs in excess of the allocation for the combined FIRST/Planck mission. Spacecraft resource allocations might have to be reduced to a level compatible with the instrument requirements as in the Payload Definition Document (PDD version 3, dated 3 January 1996) for FIRST and the phase-A study report (D/SCI (96) dated 3 February 1996) for Planck. Also other requirements (e.g. Product Assurance and Management) may be revised as a consequence of the cost ceiling imposed on the Project. This will be formalised by an update of the IID-A.**

In parallel with the industrial study ESA will continue the AO process for FIRST/Planck.

For Planck this AO covers:

- the HFI (High Frequency Instrument) with its DPC (Data Processing Centre)
- the LFI (Low Frequency Instrument) with its DPC

For FIRST this AO covers:

- the BOL (BOLometer instrument) with its ICC (Instrument Control Centre)
- the HET (HETerodyne instrument) with its ICC
- the PHC (PHotoConductor instrument) with its ICC
- the Mission Scientists (MS)

### **1.2.1. Scientific Objectives and Reference Model Instruments**

The prime scientific objectives for **FIRST** can be summarised as:

- Deep broadband photometric surveys in the 150-500 micron "prime" wavelength band and related research. The main goals will be a detailed investigation of the formation and evolution of galaxy bulges and elliptical galaxies in the first third of the present age of the Universe.

While optical/near-IR observations can detect the stellar light emerging from galaxies undergoing star-formation bursts out to very high redshifts they cannot unambiguously determine their total bolometric luminosity (i.e. star-formation rate) since the fraction, depending on dust content, of re-processed (into the IR) star-light is unknown. Only FIRST will be capable of observing the bolometric luminosity of high-redshift starburst galaxies!

Gravitationally lensed ultra-luminous IR galaxies such as e.g. FSC 10214+4724 already prove the existence of dusty high redshift starburst galaxies, and the spatially integrated emission of a (yet to be detected) population of such galaxies may already have been detected. The potential discovery of new classes of objects is an intriguing possibility!

- Follow-up spectroscopy of especially interesting programme objects discovered in the survey. The far infrared/submillimetre band contains the brightest cooling lines of interstellar gas. FIRST observations will give very important information on the physical processes and energy production mechanisms (e.g. AGN vs. star formation) in galaxies!
- FIRST will conduct detailed studies of the physics and chemistry of the interstellar medium in galaxies, both locally in our own Galaxy, as well as in external galaxies, including objects at high redshift. This includes implicitly the important question of how stars and planets form out of molecular clouds in various environments.
- Observational astrochemistry (of gas and dust) as a quantitative tool for understanding the stellar/interstellar lifecycle and investigating the physical and chemical processes involved in star formation and early stellar evolution in our own Galaxy. Virtually all major components of this lifecycle (e.g. cloud collapse, freeze out, disk formation, dust coagulation, and planetesimal formation) can be probed with FIRST.

The unique advantage of FIRST is its complete spectral coverage over a wide wavelength range, unhindered by the atmosphere. A thorough knowledge of these processes in our own Galaxy is a prerequisite for understanding galaxy- and star-formation at high redshifts.

- Detailed high resolution spectroscopy of a number of comets, high resolution molecular spectroscopy of the cool outer planets in lines only accessible from space, and searches for Kuiper-belt objects.
- From past experience, it is also clear that the "discovery potential" is significant when a new capability is being exploited for the first time. Observations have never been performed in space in the "prime band" of FIRST. Since a space facility is essential in this wavelength range, FIRST will be breaking new ground!

The prime scientific objectives for **Planck** can be summarised as:

- Measurements of the Cosmic Microwave Background (CMB) anisotropies to an accuracy of  $\Delta T/T < \sim 2 \times 10^{-5}$  over a wide range of angular scales.
- Tests of the inflationary models of the early universe.
- The detection of characteristic signatures in the CMB, which may have been created by topological defects.
- To measure the amplitude of structures in the CMB with physical scales which have sizes comparable to the voids and filaments observed in the galaxy distribution today.
- Measurements of the Sunyaev-Zeldovich effect.
- Produce high sensitivity maps over 98% of the sky over a wide range of frequencies which have never been studied at such high resolution and sensitivities.

Reference model instruments were defined for FIRST and Planck as follows:

For **FIRST**:

- HET, a heterodyne instrument. It performs high to very high resolution spectroscopy in approximately the 500 - 1200 GHz (250 - 600 micron) range. It is a multichannel mixer receiver with solid state local oscillators and a complement of back-end spectrometers. The mixers need to be operated at a temperature of around 2 K.
- PHC, an incoherent photoconductor instrument. It performs imaging line spectroscopy and photometry in the 85 - 210 micron range using a 16 x 25 stressed "bulk" Ge:Ga photoconductor detector array and an image slicer in combination with a long-slit grating spectrometer. The photoconductors need to be cooled to around 1.7 K.
- BOL, an incoherent bolometer instrument. It performs imaging photometry in the 200 - 600 micron range, simultaneously covering the same field in three bands, and in addition, spectroscopy in the 200 - 350 micron range, using bolometer detector arrays. The bolometers have an operating temperature of around 0.25 K.

For **Planck**:

- HFI, an array of bolometers covering the frequency range from approx. 160 - 900 GHz.
  - LFI, an array of tuned radio receivers, based on High Electron Mobility Transistors (HEMT) amplifier technology, and covering the frequency range between approx. 30 - 135 GHz.
-

The Planck telescope consists of a primary- and secondary mirror together with their mounting brackets and a baffle between the focal plane and the secondary mirror.  
The telescope will be provided by a Danish consortium led by the Danish Space Research Institute (DSRI) at Copenhagen.

### 1.2.2 FIRST/Planck Spacecraft Description

The spacecraft system is constituted by the spacecraft and the five scientific instruments. The instruments will be developed by national institutes and are not covered in this description; they are considered as external interfaces as defined in the IIDs part B.

The configuration follows a modular concept with a physical separation into a FIRST Payload Module (FPLM) located in the upper part, a Service Module (SVM) in the middle part and a Planck Payload Module (PPLM) in the lower part of the satellite when in launch position.

The major components of the FPLM are the 3.5 (TBC) metre telescope and the superfluid helium cryostat which accommodates the three FIRST Focal Plane Units (FPUs) of the scientific instruments. In the baseline configuration, it also accommodates the Local Oscillator Unit (LOU) for the HET instrument and a J-FET module of the BOL instrument, the helium tanks, and piping and control valves of the BOL dilution refrigerator. It also accommodates the startrackers.

The SVM provides all servicing functions to the two Payload Modules, to the instruments and for the spacecraft operations. In addition it accommodates the warm instrument electronics, the cryo electronics and the telescope's thermal control electronics.

The sun shield, which is functionally part of the SVM, protects the FPLM from direct solar radiation and is attached to the SVM and the FPLM.

The PPLM houses the HFI and LFI instruments and the Gregorian telescope. It is protected from direct solar radiation by an outer baffle attached to the SVM.

An example of the FIRST/Planck system mechanical configuration is depicted in Fig. 1.

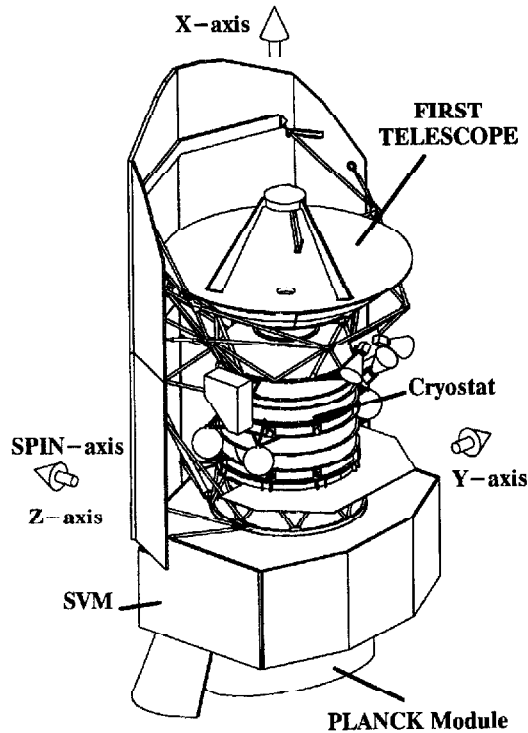


Figure 1: FIRST/Planck system mechanical configuration

### 1.2.3 System Aspects

FIRST/Planck will be launched by an ARIANE-5 launch vehicle from Kourou. After burnout and separation from the lower ARIANE composite the upper stage is ignited and will attain the required transfer trajectory towards L2.

Orbits around L2 are unstable and without corrections the orbit would deviate exponentially from the nominal one. Small correction manoeuvres, adding up to 2.5 m/s per year, and applied every month can however maintain the orbit close to nominal. The nominal operational orbit for FIRST/Planck is a Lissajous orbit around the 2nd Lagrangian Libration Point (L2) in the Earth/Moon - Sun system.

Before commencing the Scientific Operations Phase, the satellite will undergo:

- an Initial Orbit Phase (IOP)
- a Commissioning Phase
- a Performance Verification Phase

The FIRST/Planck instruments will not be switched-on during the Initial Orbit Phase.

After the Performance Verification Phase has been completed, the Scientific Operations Phase will begin.

FIRST/Planck will be operated in a "store and dump" scenario, i.e. data gathered will be stored on-board for a given time period for subsequent down loading.

The data acquired by the ground station will be routed through ESA's operational communications network to the Mission Operations Centre (MOC) at ESOC for subsequent distribution. A high degree of spacecraft as well as instrument autonomy will have to be implemented, given the relatively short ground-contact periods.

For the **FIRST** mission, the satellite will be 3-axis stabilised. Scientific observations will take place and data will be stored during a period of 22 (TBC) hours/day, the Daily Prime Operational Phase (DPOP). During the DPOP the spacecraft will execute autonomously its pre-loaded observation programme.

At the end of the DPOP, transmission of the stored data as well as real-time housekeeping and possibly science data will commence. This phase, the Daily Telecommunications Phase (DTCP), will last 2 (TBC) hours/day. During the DTCP, the observation /schedule parameters for the next DPOP are uplinked and verified for correctness and spacecraft housekeeping tasks (e.g. reaction wheel unloading) may be performed.

The MOC will exchange science-related information via the FIRST Integrated Network and Data Archive System (FINDAS), with the FIRST Science Centre (FSC) and the three Instrument Control Centres (ICCs)

For the **Planck** mission, the satellite will be spinning around its Z-axis at a rate of approx. 1 rev/minute.

During the ground visibility period, the data of a preceding observation period, i.e. stored data, will be telemetered to ground in a period between 2 and 3 hours, interleaved with the ongoing observations.

The MOC will exchange science-related information via FINDAS with the two Planck Data Processing Centres (DPCs).

In the science-operations phase, only the station at Perth will be used under normal conditions. Ground station coverage depends on the phasing of the orbit with respect to seasons and is nominally between 5 and 13.7 hours.

**FIRST** operations could continue until all helium has been consumed and the cryostat, with its payload, will start warming-up.

**Planck** operations end with the completion of the sky surveys.

Finally, all spacecraft subsystems will be switched-off at End of Mission (EOM).

### **1.3 Responsibilities**

#### **1.3.1 Mission**

ESA has responsibility for the overall FIRST/Planck mission design, execution and operations.

#### **1.3.2 Spacecraft**

ESA has the responsibility for the design, procurement integration and verification of the combined FIRST/Planck spacecraft and for integrating the FIRST scientific payload in the FPLM. For the Planck payload module, ESA prefers to allocate responsibility for its design, procurement, integration and test at module level to one or both PI's, in order to achieve better technical and management interfaces.

Support from ESA to the PI's in exchange for these additional activities, which were not foreseen in phase A, would be discussed and agreed during PI and instrument pre-selection.

#### **1.3.3 Scientific Operations**

**FIRST** scientific operations are described in chapter 3 of its SMP.

**Planck** scientific operations are described in chapter 4 of its SMP.

ESA is responsible for the design, procurement, integration and verification of the FIRST Science Centre (FSC) to be located at Vilspa.

#### **1.3.4 Scientific Instruments/Centres**

##### **1.3.4.1 General**

The PI has the responsibility for the design, procurement, integration, testing and provision of:

- the FIRST Scientific Instruments with their ICCs
- the Planck Scientific Instruments with their DPCs

as described in the SMP's.

##### **1.3.4.2 Commonality**

Commonality shall be pursued for design, procurement, integration, testing and operations. Commonality shall not be limited to the level of a (PI) consortium, but rather shall be overall and be applied Project-wide. The ESA Project team will take the lead on all commonality issues.

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Commonality shall include:

- the use of identical micro-processors/computers
- the use of identical software routines/tools
- the portability of test sequences from one level to the next
- the use of a limited set of components
- the use of a similar scheme for instrument telecommanding

The IID-A provides more detailed information.

#### **1.3.4.3 Parts Procurement**

ESA will set up a coordinated procurement system for Hi-rel electronic parts. This will ensure that common parts and designs are used wherever practicable. PIs will be encouraged to procure their electronic parts via this system.

#### **1.3.4.4 Instrument Model Philosophy**

The FIRST/Planck programme assumes a Satellite Model Philosophy, which for the scientific instruments means the:

- delivery of an Engineering Model/Qualification Model (EM/QM) (TBC)
- delivery of a ProtoFlight Model (PFM)
- delivery of a dedicated Flight Spare (FS) for units mounted inside the cryostat i.e. the BOL, IIET and PIIC FPUs
- delivery of a dedicated Flight Spare (FS) for the Planck FPU (HFV/LFI)
- availability of spare subassemblies for all other units

After the delivery of the PFM and for the duration of its testing, the EM/QM shall stay with the PFM for immediate replacement in the case of a failure in a PFM unit for which only spare subassemblies are available. The failed PFM shall be repairable within a period of 30 calendar days. The IID-A provides more detailed information.

#### **1.3.5 Operations**

ESA has the responsibility for the launch of the FIRST/Planck spacecraft.

ESA has the responsibility for FIRST/Planck spacecraft operations through the Mission Operations Centre (MOC) at ESOC Darmstadt and has the responsibility for the FIRST Science Centre (FSC) cf. para 1.3.3.

The PIs have the responsibility for scientific issues of their instruments and all activities related to their ICCs and DPCs.

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#### **1.4 Participation in the FIRST/Planck Programme**

The scientific community is invited to participate in the FIRST/Planck programme by responding to this Announcement of Opportunity which solicits proposals for Principal Investigators and Mission Scientists.

Individuals responding to this AO will be able to submit proposals in more than one category. However, success for an individual as a PI or Co-PI will automatically remove his/her candidature for a Mission Scientist position. The Mission Scientists must be independent of the PI consortium and must not be attached to any institute having a major role in any PI consortium.

It is expected that instrument proposals may need to be amended after submission, in joint discussions between ESA and the proposer(s), in order to arrive at a payload complement compatible with the scientific goals of the mission and the available resources.

A FIRST Science Team (FST) and a Planck Science Team (PST) will be formed to monitor and advise on all aspects of FIRST or Planck affecting scientific performance. Detailed information on the Science Teams is provided in the respective Science Management Plans.

For the combined mission a FIRST/Planck Science Team (FPST) will be formed. Detailed information on the composition of this team is provided in the combined FIRST/Planck SMP.

#### **1.5 Guaranteed Observing Time (FIRST only)**

Part of the observing time will be reserved as "Guaranteed" time for:

- the PI groups
- the Mission Scientists
- the Project Scientist and the FSC Operations Manager and their teams

The members of these groups may also, if they wish, compete on an equal basis for the non-guaranteed time (Open Time) available to the community.

The division between Open and Guaranteed time is defined in chapter 5 of the FIRST SMP.

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## 1.6 Schedule

Detailed schedule for the AO process for **FIRST/Planck**:

Call for Letters of Intent (FIRST/Planck)	11 Apr. 1997/10 Jan. 1997
Letters of Intent due (FIRST/Planck)	23 May 1997/14 Feb. 1997
Issue of the Announcement of Opportunity (AO)	30 Sep 1997
Questions for clarification due	31 Oct 1997
General clarification meeting	3 Dec 1997
Proposals due	16 Feb 1998
Evaluation phase	Feb through May 1998
Clarification and optimisation meetings	Mar through Apr 1998
Final recommendation by evaluation committee	End Apr 1998
AWG/SSAC review	May 1998
SPC preselection of PIs and MSs and approval of mission implementation concept	28 May 1998

Overall programme schedule for **FIRST/Planck** (TBC):

Issue of the Announcement of Opportunity (AO)	3 Oct 1997
Preselection of PIs and MSs by SPC	28 May 1998
SPC final confirmation of payload complement for FIRST/Planck	Feb 1999
Issue ITT for Phase B & CD	Mar 1999
Phase B & C/D	Apr 2000 through Jul 2005
Instrument MGSE/EGSE/Test software readiness for the purpose of FIRST Module and System level testing	Apr 2001
Instrument MGSE/EGSE/Test software readiness for the purpose of Planck Module and System level testing	Apr 2001
Instrument EM deliveries	Jul 2001
Instrument QM deliveries	Jan 2002
Instrument PFM deliveries	Jan 2004
Overall ICC/DPC readiness	Dec 2004
Instrument FS deliveries/availability of spare subassemblies	Jan 2005
Flight acceptance review	Jul 2005
Launch	Dec 2005
Nominal end of orbit operations (assuming 4.5 years cryostat lifetime)	Jun 2010
Nominal end of post-operations	Sep 2013
Historical Archive Phase	from Sep 2013 onwards

The overall programme schedule for Planck and FIRST in a stand alone configuration, not yet available, will be established in the course of 1998. The delivery dates for the Planck and FIRST payload will be agreed with the preselected PI's responding to the present AO.



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**CHAPTER II.**

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## II. INFORMATION FOR POTENTIAL PRINCIPAL INVESTIGATORS

### 2.1 General Requirements

The proposals for FIRST /Planck PI participation shall be made bearing in mind the scientific and operational objectives of the mission and the current programme definition and constraints, especially with a view on the study of the combined mission.

It is emphasized that the Model Instruments as contained in the IID-Bs have been optimised to accomplish the overall scientific objectives of the mission. However, this is by no means exclusive and the actual instruments will be selected on the basis of responses to this AO.

PI participation may be optimised to accomplish the overall scientific aims of the mission. As a result, proposals may need to be amended after submission, in joint discussions between ESA and the proposer(s).

The proposed instruments must comply with the technical requirements contained in the IID-A.

If proposers feel that a greatly improved scientific return together with a mature and proven instrument concept may be obtained by exceeding one or more of these constraints, they may identify this as an option in their proposal, justifying it in the scientific section and explaining it in the technical section. However such options shall not impact on the overall costs imposed on both missions.

### 2.2 Programme Participation as Principal Investigator for FIRST/Planck

Each instrument group shall be headed by a single person, designated as the Principal Investigator (PI), the group members participate as Co-Is. The PI shall nominate an Instrument Manager and an ICC/DPC Manager with appropriate expertise and through them establish an efficient management scheme. Details of the management structure within a team will be as per the Instrument Interface Documents (IIDs).

The proposal must show that the PI and his/her Managers can exert adequate control over all aspects of the programme, including the required financial resources: where appropriate via the relevant Co-Is. As the nominated interface to ESA, the PI shall be responsible for ensuring that adequate funding and budgetary control procedures are in place for all aspects. All changes will be mutually agreed among the PIs, the respective Funding Agencies and the ESA FIRST/Planck Project. The PIs shall not assume any funding from ESA for any part of their programme.

Following Instrument selection, the formalisation of the agreement between the Agency, the Principal Investigator and his/her authorities will be achieved through the signature of an **Instrument Implementation Agreement (IIA)**.

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The IIA will be signed by the PI, the authorities of his/her Institute, the Funding Agency and ESA to signify the commitment of all parties to support the agreed requirements contained in the Instrument Interface Documents (IIDs) A and B, the FIRST-SIRD, the Planck-SIRD and the Public Relations plan with a view to successful implementation of the project.

The IIA will be signed by all parties as part of the selection procedure for PIs and MSs. The response to this AO shall include an IIA letter duly signed by the PI, his/her Institute and the funding Agency as certification that the proposal is supported.

In this context the use of ESA facilities by PIs will be on a cost reimbursement basis.

The PI shall represent the single point formal interface for the instrument with the ESA Project Office. He may delegate day-to-day management and liaison with ESA to his/her Managers.

The Co-Investigators will assist the PI in meeting his/her responsibilities as defined in the team's internal management structure. The PI may delegate specific responsibilities to a Co-Investigator.

After selection, the IID-B will be iterated by the project for each instrument. A draft IID-A is contained in this AO package. The IID-A and IID-B define the FIRST/Planck technical and programmatic requirements (including management and control procedures), specify in detail the interface information applicable to each instrument and the planning applicable to each instrument. The IID becomes the formal interface control document and formal reference for all progress reporting and it shall be placed under formal configuration and change control once agreed and signed off by the parties involved.

In addition the FIRST/Planck Operations Interface Requirements Document (OIRD) will be iterated, for all instruments, between ESA and the PI teams in order to establish the final set of requirements. The OIRD will become an annex to the IID-A.

The FIRST/Planck Ground Segment Interface Requirements Document (GSID), the FIRST Science-operations Implementation Requirements Document (FIRST-SIRD) and the Planck Science-operations Implementation Requirements Document (Planck-SIRD) will similarly be iterated with the ICC and DPC Managers in order to finalise the corresponding requirements on the ICCs and DPCs.

### **2.2.1 Responsibilities of the PIs**

Responsibilities of **FIRST** PIs are described in Appendix A2 of its SMP.

Responsibilities of **Planck** PIs are described in Appendix B1 of its SMP.

### 2.3 Scientific Data Policy

Policy for **FIRST** is described in chapter 5.3 of its SMP.

Policy for **Planck** is described in chapter 5.2 of its SMP.

### 2.4 Public Relations Plan

Policy for **FIRST** is described in chapter 5.4 of its SMP.

Quote "5.4 Public Relations (PR)

*ESA will be responsible for planning and carrying out Public Relations (PR) activities related to all aspects of the FIRST programme and the results thereof. A general outline of PR activities will be included in the AO\* in the form of a Public Relations Plan (PRP). The PRP and guidelines for its implementation will be part of the agreements between ESA and the selected PIs and MSS. The active cooperation of all scientists involved in the FIRST mission is essential for the success of the related PR activities. For this purpose, the Project Scientist will initiate and identify opportunities for publishing project-related progress reports and scientific results. PR materials suitable for release to the public will be provided by the members of the FIRST upon their own initiative or upon request from the PS at any time during the development, operational and post-operational phases of the mission. Indeed, as noted in appendix A (Support ESA on Public Relations activities related to FIRST, in particular by providing materials appropriate for release to the press or participation in ESA media events on request from the PS, in accordance with the Public Relations Plan), the PIs of the instrument/ ICC consortia have the obligation to supply ESA with such materials. The exact nature of these materials, if not specified in the PR Plan, is to be defined at the appropriate time."*

Unquote.

Policy for **Planck** is described in chapter 5.3 of its SMP.

Quote "5.3 Public Relations Plan

*ESA will be responsible for planning and carrying out Public Relations (PR) activities related to PLANCK. A general outline of PR activities will be included in the AO in the form of a Public Relations Plan (PRP)\*. This Plan must be formally agreed and adhered to by the PIs at the time of selection. The active cooperation of all scientists involved in the PLANCK mission is essential for the success of the related PR activities. For this purpose, the Project Scientist will initiate and identify opportunities for publishing project-related progress reports and scientific results. PR materials suitable for release to the public will be provided by the members of the ST upon their own initiative or upon request from the PS at any time during the development, operational and post-operational phases of the mission. Indeed, as noted in Appendix B.1 (Support ESA on Public Relations activities related to PLANCK, in particular by providing materials appropriate for release to the press or participation in ESA media events on request from the PS, in accordance with the Public Relations Plan), the PIs of the*



*instrument Consortia have the obligation to supply ESA with such materials. The exact nature of these materials, if not specified in the PR Plan, is to be decided at the appropriate time."*

Unquote

\* Dates TBD.

## **2.5 Contacts with ESA**

### **2.5.1 Contacts with ESA prior to Proposal Submission**

Any requests for further information and clarification for PI Proposals should be addressed to :

F. Felici  
ESTEC  
P.O. Box 299  
NL-2200 AG Noordwijk  
The Netherlands  
Phone: Int. +31-71-565 3439  
Fax: Int. +31-71-565 5244  
E-mail: [ffelici@estec.esa.nl](mailto:ffelici@estec.esa.nl)

With a copy to:

S. Volonté  
ESA HQ, D/SCI  
8-10 Rue Mario Nikis  
F-75738 Paris Cedex 15  
France  
Fax: +33 1 5369 7236  
e-mail: [svolonte@hq.esa.fr](mailto:svolonte@hq.esa.fr)

For **FIRST** with copy to:

G. Pilbratt  
ESTEC/SA  
P.O. Box 299  
NL-2200 AG Noordwijk  
The Netherlands  
Phone: Int. +31-71-565 3621  
Fax: Int. +31-71-565 4690  
E-mail: [gpilbratt@astro.estec.esa.nl](mailto:gpilbratt@astro.estec.esa.nl)

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For **Planck** with copy to: J. Tauber  
ESTEC/SA  
P.O. Box 299  
NL-2200 AG Noordwijk  
The Netherlands  
Phone: Int. +31-71-565 5342  
Fax: Int. +31-71-565 4690  
E-mail: [jtauber@astro.estec.esa.nl](mailto:jtauber@astro.estec.esa.nl)

### **2.5.2 Contacts with ESA during Instrument Selection**

The ESA Project Office may arrange meetings with either individual proposer(s) and/or groups of proposers for engineering and operations clarification of the proposal(s), and for scientific engineering and operations optimization of the overall payload and its scientific complementarity. In addition, presentation to the ESA evaluation panels and the external evaluation committee may be requested. All proposers should be prepared to travel to ESA establishments for at least two such meetings. Further meetings will be scheduled to discuss management aspects and financial matters during the evaluation phase.

### **2.5.3 Contacts with ESA after Instrument Preselection**

Following the preselection of the instruments, an Instrument Implementation Agreement will be drawn up involving the PI, Co-Is, their institutes, national funding agencies and ESA to cover all aspects of their relationship (see Section 2.2).

Contacts with ESA on all scientific matters relevant to FIRST/Planck shall be through the ESA Project Scientists and on all technical, operational and managerial matters through the ESA Project Manager or his delegates.

### **2.5.4 Monitoring of Instrument Development**

For **FIRST** described in Appendix A2.4 of its SMP.

For **Planck** described in Appendix A5 of its SMP.

## **2.6 Contents of the Proposal**

### **2.6.1 General Requirements**

Proposals shall respond to the objectives and programme constraints described in this AO and shall provide all requested information to permit full evaluation against the criteria listed in Section 2.8. In particular, the proposals shall provide clear interface data to monitor the assessment and preliminary definition of detailed interfaces. Each proposal will be composed of three parts:

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1. Part I: Scientific and Technical Plan
2. Part II: Instrument Interface Document (IID-B)
3. Part III: Funding Proposal

Each part shall be written in English, shall be separately bound and all pages shall be numbered.

In addition the proposals shall include a draft of the Science Implementation Plan as called for in the SIRD.

## **2.6.2 Detailed Requirements for the Contents of PI Proposals**

### **Part I: Scientific and Technical Plan.**

Part I of the AO proposal shall not exceed **100 single-space typewritten A4 pages**, including illustrations, without reduction, and excluding cover page, executive summary and table of contents. It shall be self explanatory and shall contain all information needed for an evaluation of the proposal in the areas of the instruments, the ICCs, the DPCs and all related support. The proposal shall adhere to the table of contents below:

- Cover page
- Executive Summary (5 pages)
- Table of contents
- Scientific objectives and capabilities
- Technical description
- Data reduction and scientific analysis plans
- Test and calibration plans
- System level assembly, integration and verification
- Flight Operations
- Brief description of qualification and experience of the PI team (3 pages)
- Organisation and management structure of the PI Consortium

Each of these topics will be detailed below.

### **Cover Page**

The Cover Page shall include:

- The title of the proposal
  - The name, address, telephone, telefax and e-mail addresses of the **P r i n c i p a l** Investigator (PI), Co-Investigators (Co-Is), the Instrument Manager and the ICC/DP C Manager.
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## **Executive Summary**

The Executive Summary shall include the title of the proposal, the names and institutions of the investigators and summary information. The following aspects shall be addressed within the 5-page limit:

- Objectives of the proposal
- Instrument operations and scientific analysis with ICC/DPC
- Performance of the instrument proposed to fulfil its anticipated goals
- Summary of required spacecraft resources
- Management scheme
- Funding status
- Departures from constraints stated in this AO (incl. the Annexes)

It is anticipated that the proposals will remain within the technical and programmatic constraints of the FIRST/Planck programme as described in this AO. If proposed options violate any of these constraints a clear statement of each violation together with justifications shall be included in the Executive Summary. Further details of each violation shall be provided by the proposer in the appropriate sections.

## **Table of Contents**

As per the list in this chapter.

## **Scientific Objectives and Capabilities**

The section on Scientific Objectives and Capabilities shall state the general scientific capabilities of the proposed instrument. These should be addressed in the light of the global objectives of the FIRST/Planck mission.

The capabilities of the proposed instrument should be explained and compared, if relevant to those of the reference model payload and comparison with ground-based or space-based observation programmes shall be addressed. The capabilities of the proposed instrument should be explained. For example, the anticipated performance of the instrument in its nominal operation mode(s) under nominal in-orbit conditions should be described.

The baseline performance envelope of the instrument and performance evaluation criteria should be explicitly stated and summarized in tabular form.

Expected results should be outlined and discussed, as far as possible, in both qualitative and quantitative terms. If a proposal contains one or more options in the design which leads to violations of technical or programmatic constraints, the scientific justification shall be given in this section.

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## Technical Description

The section on Technical Description shall include a comprehensive detailed technical description of the proposed instrument. The compatibility of the basic design with the technical constraints of IID-A shall be demonstrated, design options which lead to violation of technical or programmatic constraints shall be clearly identified.

Attention shall be drawn to those aspects of the instrument design which help to ensure the required in-orbit operational lifetime, i.e. fail-safe elements, redundancy, reliability, back-up modes.

The current status and availability of the proposed technologies in a baseline design shall be defined together with the risk associated in any assumption of developing technologies. Ideas for, and the feasibility of, incorporating new advanced technologies should be clearly defined and identified as an option to the baseline design. The impact of these options upon scientific return for instruments, interfaces, schedule etc. should be explained together with provision of a risk assessment. The extent to which the proposed instrument design utilizes space qualified and space experienced hardware shall be stated.

The different functional operating modes (maximum 3 to 5) of the proposed instrument shall be stated and explained.

Modes which place different requirements on scientific operations and data analysis shall be described.

Detailed information on the on-board software and on the interfaces between the instrument and the spacecraft should be given in the Instrument Interface Document Part B, to be completed and submitted as Part II of the proposal.

## Data Reduction and Scientific Analysis Plans

In the case of proposals for FIRST the section on Data Reduction and Scientific Analysis Plans shall contain a comprehensive and detailed description of the ICC, defining the ways and means which will enable the ICC to fulfill the responsibilities and tasks specified in the FIRST-SIRD. Should there be deviations, these shall be clearly identified and justified.

The description shall include proposed infrastructure and hardware configuration and adequately address the technical, managerial and programmatic issues. The level of resources allocated to the various phases of the programme (development, operations/archive) shall be indicated. The proposal shall describe how the objective of commonality between the various levels of instrument testing and operations will be achieved.

In the case of proposals for Planck instruments, the section on Data Reduction and Scientific Analysis Plans shall contain a comprehensive and detailed description of the Data Processing Centres (as described in the Planck Science Management Plan), defining the ways and means which will enable the DPCs to deliver the scientific data products and fulfill the responsibilities and tasks specified in the Planck SIRD. Should there be any deviations from the SMP and SIRD, these shall be clearly identified and justified. The description shall include the proposed infrastructure

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and hardware configuration and adequately address the technical, managerial, and programmatic issues. The level of resources allocated to the various phases of the programme (development, operations, post-operations/archive) shall be indicated. A step by step description of the data processing pipeline shall be included. Any data processing tasks which are shared between the two Planck DPCs shall be clearly identified, and all required interaction between them shall be described.

It is required that the PI shall comply with the scientific data policy of the Agency as defined in the FIRST/Planck Science Management Plans. Any non-compliance shall be identified and substantiated in the appropriate section of the proposal.

#### **Test and Calibration Plans**

The section on Test and Calibration Plans shall describe all test and calibration (ground/pre-launch and in-orbit) plans and procedures deemed necessary to verify the correct functioning of the proposed instrument in order to achieve its scientific goals.

The availability of suitable test and calibration facilities (e.g. vacuum, thermal vacuum, detector laboratories, accelerators, computer facilities etc.) either in-house or in industry shall be demonstrated. The ground test and check-out equipment to be supplied for the instrument level testing shall be described in the IID-B.

#### **System Level Assembly, Integration and Verification (AIV)**

The section System Level AIV should state how the proposal complies with the project provided pre-launch AIV programme at spacecraft system level (see IID-A). Instrument requirements that do not comply should be identified together with any special requirements. The ground test and checkout equipment to be supplied by the PI to support the system level test programme shall be described in Part II (IID-B) of the proposal. Special services required from the launch vehicle shall be identified.

#### **Flight Operations**

The section Flight Operations shall describe the operational concept of the proposed instrument. The SMPs provide an outline of the science operations. Details (e.g. frequency of calibrations, mode changes etc.) should be provided. This section should identify specific requirements for flight operations support not addressed in the SIRDS.

#### **Brief Description of Qualifications and Experience of the PI Team**

The section on Brief Description of Qualifications and Experience of the PI Team should provide bibliographical information for the PI and all Co-I's plus key technical personnel. Extensive bibliographies are not required although key publications or key activities of particular relevance to the proposal should be listed. Attention should be drawn to previous experience in the particular field of the proposal including science data analysis and management of large collaborative projects.

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**Organisation and Management Structure of the PI Consortium**

The section on Organisation and Management Structure of the PI Consortium should show a functional organisational chart and how the PI establishes an efficient and effective management scheme for all aspects of his/her proposal, subdivided into the following area's:

- Instrument development
- ICC/DPC development
- Post launch operations

Organigramme of the management must be provided with names of Project Manager and key personnel and their past experience in managing complex instruments with large number of elements provided by Co-I's.

**Part II: Instrument Interface Document - Part B**

The proposers are requested to complete the outlined IID-B as provided on the Server. The purpose of IID-B is to document the PIs response to the technical and programming requirements of IID-A, it is established in such a format, that after selection it will become Issue 0 of IID-B. It will be maintained and updated at regular intervals.

The IID-B contains information relevant to:

- System Requirements
- Interface Requirements
- Ground Support Equipment
- Development and Verification
- Testing and Operations
- Product Assurance
- Programme, Schedule and Management

The information requested from the proposer is explained under each chapter heading. Further information not covered within the standard format may be added at the discretion of the proposer. Although there may be some duplication of information to be provided, the purpose of part II is mainly to provide factual information on all aspects of the proposal, whereas discussion, justification and risk assessment, etc. is to be provided in part I.

**Part III: Funding Proposal**

The PI shall include separate sections for his/her own resource provision and funding status as well as for the resource provision and funding status of each of the proposed CO-I's with the details of estimated resources for each PI or CO-I activity subdivided into the area's of:

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- Instrument development
- ICC/DPC development
- Post launch operations

with justification of:

- internal manpower resources
- other internal institute resources
- external contracts let by the PIs or Co-Is
- total funding requirements

These provisions being requirements on national sources for funds and manpower shall be stated and justified. The authorities for these resources shall be identified and the current status of the application stated. If the funding is not firm, the procedure to be followed to obtain the funding and the date by which a decision is expected shall be given.

The authorities responsible for providing the funding will be required to signify compliance by signature of the Instrument Implementation Agreement (IIA).

## **2.7 Proposal Submission Procedure**

### **2.7.1 Proposal Submission**

Proposals shall be available in electronic form and in hardcopy form.

Hardcopy proposals shall be submitted to ESA in accordance with the table below. Each part shall be separately bound. The proposals must be received at ESTEC **not later than 16 February, 1998**. (see Section 1). The proposer shall notify (fax/e-mail) the addressee in the table below:

- when the proposal has been mailed stating the actual mailing date.
- the details on the electronic form of the proposal for example a server address

For the hardcopy version ESA will confirm in writing that the proposal has been received. The addressee in the table should be contacted in case the confirmation is not received two weeks after submission.

Part III of the proposal (Funding Proposal) may be sent under separate cover and if confidentiality is required this should be clearly stated.

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Addressee: Original plus copies as below to:

F. Felici  
ESTEC  
P.O. Box 299  
NL-2200 AG Noordwijk  
The Netherlands  
Fax: Int. +31-71-565 5244  
e-mail: ffelici@estec.esa.nl

Item	Copies to be sent
Executive Summary	5
Part I (Science/technical plan)	5
Part II (IID-B)	5
Part III (Funding)	5
Science Implementation Plan (Draft)	5

One complete copy by mail to:

S. Volonté  
ESA HQ, D/SCI  
8-10 Rue Mario Nikis  
F-75738 Paris Cedex 15  
France  
Fax: +33 1 5369 7236  
e-mail: svolonte@hq.esa.fr

### **2.7.2 Proposals from U.S. Investigators or with U.S. Investigator Involvement**

Potential proposals involving U.S. Principal Investigators and/or U.S. Co-Investigators requiring NASA support of any amount should send each twelve copies of their proposals to the address stated below at the same time as the submission to ESA. The proposals should include or be accompanied by a detailed cost proposal covering the costs to their funding authorities.

Proposals should be addressed to:

FIRST Program Support Office  
Jorge Scientific  
400 Virginia Ave SW  
Suite #700  
Washington, DC 20024  
U.S.A.





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US Scientists planning to participate in this AO should also send a letter of intent to propose before 15 November 1997 to:

Dr. Harley A. Thronson  
Code SR  
NASA Headquarters  
300 E Street SW  
Washington, DC 20546  
U.S.A.  
e-mail: Harley.Thronson@hq.nasa.gov

**2.8 Selection Procedure and Evaluation Criteria**

For **FIRST** described in Appendix A1 and A2 of its SMP.

For **Planck** described in Appendix A2 and A3 of its SMP.

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## **CHAPTER III.**

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### **III. INFORMATION FOR POTENTIAL FIRST MISSION SCIENTISTS**

#### **3.1 Programme Participation as Mission Scientist**

This AO for participation as a FIRST/Planck PI also solicits proposals for FIRST Mission Scientists (MSs) for specific tasks.

The role of the MS is described in chapter 4.4 of the FIRST SMP.

#### **3.2 Contacts with ESA**

Prior to appointment, prospective Mission Scientists should contact ESA on matters of FIRST through the FIRST Project Scientist. After appointment, they will interact with the FIRST Project through the FIRST Science Team (FST) and the FIRST Project Scientist.

Requests for further information for MS proposals should be sent to the FIRST Project Scientist. Only written requests will be answered.

#### **3.3 Letter of Intent**

Individuals intending to make a proposal in response to this AO must send a "Letter of Intent" to the FIRST Project Scientist at the address given in chapter 2.5.1. The Letter must be received by mid November 1997.

The letter should contain the potential proposer's name, position, institute, address, telephone number, fax number, E-mail address and a brief summary of his/her interests.

The Project Scientist should be notified by telefax or email when the letter is dispatched.

Potential Mission Scientists from the United States should also send a copy of their Letter of Intent to NASA at the address given in chapter 2.7.2

#### **3.4 Contents of the MS Proposal**

Proposals should be as complete and informative as possible but should be limited to a maximum of 20 single-spaced, typewritten A4 pages in length including the cover page and a one (1) page Executive Summary.

Proposals shall be written in English. All pages must be numbered. The proposal shall contain the proposer's name, position, institute, address, telephone number, telefax number and e-mail address.

The scientific and technical experience and expertise of the applicant relevant to FIRST in astrophysical research, and in the light of the specific proposed task, should be described. The fraction of his/her time available for work on FIRST shall be stated.

The MSs must be independent of the PI consortium and must not be attached to any institution having a major role in any PI consortium.

The necessary support provided by the proposer's institution should be explicitly stated to ensure that the task stated in the proposal can be completed satisfactorily.

Applicants should explain how they would contribute to FIRST both inside the Science Team and also in a more general sense through interactions with the general astrophysics community. They should also state how they would plan to maintain contact with the PI teams, should that be required to perform their task.

It is required that Mission Scientists shall comply with the scientific data policy of the Agency as defined in chapter 5.3 of the FIRST Science Management Plan. Any non-compliance shall be identified and substantiated.

### **3.5 Proposal Submission Procedure**

Proposals shall be available in electronic form and in hardcopy form.

Five (5) hardcopies of the proposal, each separately bound, must be sent to the FIRST Project Scientist:

G. Pilbratt  
ESTEC/SA  
P.O. Box 299  
NL-2200 AG Noordwijk  
The Netherlands  
Fax: Int.+31-71-565 4690  
E-mail: gpilbratt@astro.estec.esa.nl

and one copy to:

S. Volonté  
ESA HQ, D/SCI  
8-10 rue Mario Nikis  
F-75738 Paris  
France  
Fax: +33-1-5369 7236  
E-mail: svolonte@hq.esa.fr

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The proposals must be received at ESTEC **not later than 16 February, 1998** . (see Section 1).  
The proposer shall notify (fax/e-mail) the Project Scientist.

- when the proposal has been mailed stating the actual mailing date.
- the details on the electronic form of the proposal for example a server address

For the hardcopy version ESA will confirm in writing that the proposal has been received. The Project Scientist should be contacted in case the confirmation is not received within two weeks after submission.

For U.S. proposals please refer to the information given in section 2.7.2.

### **3.6 Evaluation Criteria**

Evaluation criteria are listed in Appendix A.3.2 of the FIRST SMP

### **3.7 Finance**

For their attendance at meetings of the FIRST Science Team, the Mission Scientists - from ESA member states - will have their travel expenses and a per diem paid by ESA. In general, ESA will host the FST meetings. No other activities will be financed by ESA. U.S. Mission Scientists, if any, will be expected to provide their own funds for travel and subsistence, as no exchange of funds is possible.

### **3.8 US Mission Scientists**

NASA also welcomes proposals from individuals in the U.S. interested in serving as a Mission Scientist in the FIRST programme. For this position, NASA will base its decision to fund the position on the results of the evaluation by ESA of submitted proposals, as well as its own programmatic considerations. NASA requests that a single "courtesy proposal", identical to that submitted to ESA, be submitted to the FIRST Program Office of Jorge Scientific at the address given in section 2.7.2.

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