

Call for declaration of Interest in Science Instrumentation

Cosmic Vision Mission: STE-QUEST

1 Introduction

This Call for declaration of Interest in Science Instrumentation (CISI) is open to the European science community for enabling assessment studies of the science instruments of the STE-QUEST mission. STE-QUEST has been selected (ESA/SSAC(2011)5) following the ESA call for a Medium-size M3 mission opportunity in the Cosmic Vision (CV) 2015-2025 plan.

The European science community is invited to answer this Call by proposing dedicated studies on science instrumentation that would potentially be provided by the ESA Member States, should the mission be adopted. The studies will be nationally funded, in line with the general approach on the Science Payload studies and development that is described in the attached paper presented to SPC in February 2008 (SPC(2008)3). Although this SPC paper refers to M1/M2 missions, the general approach described will also be followed for the M3 missions under study.

The assessment studies on the science instrumentation will be conducted in parallel to the ESA system studies with the following general objectives:

- 1- Achieve progress on the technical definition of the science instrumentation in line with that achieved for the rest of the space segment through ESA System Studies (pre-Phase A /Phase A level).
- 2- Demonstrate compatibility of the proposed instruments design with system level boundary conditions and relevant spacecraft interfaces.
- 3- Through the above technical definition, enable a sound development risk assessment - including Technology Readiness Level (TRL) evaluation – as input to the mission down-selection at the end of the Assessment Phase.
- 4- Enable the instrument selection process (Announcement of Opportunities and selection) at the beginning of the Definition Phase.
- 5- Provide a preliminary programmatic analysis for the instruments procurement (development schedule, cost estimates).
- 6- Provide a preliminary view of the Member State interest in science instrumentation for the proposed mission.

The science instrumentation assessment studies are intended to secure the overall Cosmic Vision schedule implementation by improving the payload definition maturity whenever necessary. However, the instrument studies are not binding the Agency or the Member States to any commitment regarding the final payload selection that will occur through an open competition AO at the beginning of the Definition Phase. Vice-versa, Science Institutes can answer the future Payload AO without answering this Call.

2 Documents

The Call for declaration of Interest in Science Instrumentation includes the following documents:

- This document
- SPC(2008)3, “National Activities Parallel to The Cosmic Vision Studies”
- The Payload Definition Document (PDD) for the mission that is addressed in this Call, including general instrument accommodation constraints and the ESA reference payload design
- The Science Requirements Document (SciRD) for the mission that is addressed in this Call
- Information on the preliminary spacecraft design performed during the May/June 2011 Concurrent Design Facility study
- The initial mission science proposal, as submitted in response to the CV call. This document is given as background information only. The technical solutions presented in this document as well as programmatic aspects are not necessarily representative of the latest mission design.

3 Procedure for answering this Call

3.1 Eligible studies

In the case of the STE-QUEST mission, ESA is soliciting proposals to study, either jointly or separately, the two core science instruments defined in the PDD:

- Atomic Clock
- Atom Interferometer

The instrument study team shall be an ESA Member State science institute or a consortium of such institutes. European industry can be involved in the study team. In that case, the proposal will be subject to a harmonisation process at ESA, to avoid duplication of tasks that could already be addressed by the same industrial companies in ESA system studies.

The final selection of instrument assessment studies will be made by ESA, after consultation, if necessary, with the relevant Member States that would potentially fund the studies, based on technical relevance and programmatic constraints.

3.2 Scope of the study

The primary goal of the instrument studies is to reach a technical definition of the instrument that is sufficiently advanced for enabling a reliable development risk evaluation and a preliminary cost evaluation. This includes in particular:

- Technical definition of the item proposed for study

- Instrument interfaces with the spacecraft (including relevant resource budgets)
- Development plan, including model philosophy, verification approach, procurement scheme and schedule
- Definition of technology development activities and pre-developments if any, to be implemented before the Mission Implementation Phase
- Technology readiness analysis
- Schedule risk analysis and identification of critical paths
- Preliminary cost estimates

It is generally recommended to focus the study in particular on critical and new elements.

The instrument study primarily consists of engineering work, including models as required. However, hardware tests can also be proposed as part of the study, in particular if the foreseen tests address feasibility or specific design aspects. Technology development activities (hardware and demonstration prototypes, such as detectors, coolers or mechanisms) are outside the scope of this Call.

3.3 Proposal content and submission

The study proposal shall include a Technical proposal and a Management proposal (both in one document), with typical content as described here below.

Technical proposal (< 20 pages):

- Definition of the science payload item proposed for study
- Rationale for proposing the study. Scope of the study.
- Technical concepts, analyses and trade-offs
- Technology readiness aspects
- Study logic

Management proposal (< 20 pages):

- Study team organisation
- Study team background and summary curriculum vitae in relation to the study purpose of the team leaders
- Work breakdown structure and work package descriptions
- Meeting plan (see 3.4)
- Study outputs: reports, models, etc
- Proposed funding scheme of the study through Member States

While not strictly mandatory, endorsement or letters of support from Funding Agencies will be an element in the evaluation of the proposal. Letters of support do not count against the page limit.

The study team is requested to submit the proposal in electronic form (as a single PDF, no larger in size than 20 MB) to ESA at:

<http://sci.esa.int/ste-quest-doi2011>

The study proposal team is requested to send a copy of the proposal to the relevant Member States delegations.

3.4 Meetings

The study team will propose a meeting plan, including as a minimum a kick-off meeting, a mid-term review (typically in May 2012) and a final presentation (between the end of November and the beginning of December 2012).

The nominal meeting location will be at ESTEC.

The proposed meeting plan will be reviewed by ESA, in particular for appropriate phasing of the meetings with the industrial studies and with the other instrument studies, and agreed at the study kick-off.

3.5 Deliverables

The proposal shall indicate the deliverables which are planned to be provided at the mid-term review and at the final presentation. This list will be reviewed and agreed by the ESA study team. As a minimum, the data pack shall include:

- Instrument design report (summary of the analysis and design activities, including relevant resource and performance budgets)
- Instrument development plan
- Programmatic estimates

A subset of the documentation package, in agreement with the instrument consortium, shall be made available through ESA to industry in order to maintain consistency between the system level activities and the instrument studies.

3.6 Schedule aspects

The Proposal submission deadline is **4 November 2011 at 14:00 CET**.

The study kick-off assumption will be 28 November-2 December 2011.

The study duration will be 12 months.

The study schedule and activities shall be organised in such a manner to guarantee the provision of a first version of the instrument design report before the mid-term review, describing the baselined instrument design (following justified trades) and way forward. Synchronisation with the industrial studies will then allow the industrial contractors to optimise their spacecraft design taking into account this information for the second half of the study.

3.7 Interface with other studies and Proprietary Data aspects

For confidentiality reasons and in view of preserving the competitions that will take place on one hand for the science instrumentation at the beginning of the Definition Phase and on the other hand on the spacecraft manufacturing at the end of the Definition Phase, ESA will coordinate the information flow and act as single interface point between the instrument study teams, the mission Study Science Team and the industrial teams in charge of ESA system studies.