

Cross-Scale Instrument Data Sheet Invitation to the Community
Responses by end January 2008 (preferably by 23 January 2008)

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Dear Cross-Scaler,

As you know, Cross-Scale has been selected for the next phase in the Cosmic Vision process, an Assessment Phase that will run from now until the latter part of 2009. Following an intense period of study within the Concurrent Design Facility at ESTEC, the Agency will draft Invitations to Tender for two parallel industrial studies that will commence in 2008.

ESA has established a Science Definition Team (SDT) to support these activities. The major tasks of the SDT are to draft a Science Requirements Document and a Payload Definition Document (PDD). While much of the first document can be drawn from the proposal itself, and can be refined steadily over the coming year, the PDD is critical for the industrial studies in terms of accommodating a payload that will meet the science objectives, and devising the overall mission programmatic (orbit, ground segment, etc.) that will be necessary. Thus, core elements of the PDD are needed at the beginning of the industrial study.

Of course, the proposal gives an initial complement of instruments and their characteristics, both in terms of performance and accommodation requirements. Now is the time to take stock of that complement. Accordingly, the SDT decided to solicit from the wider community instrument details. This is an opportunity for everyone to re-assess the mission objectives and the means by which they may be realised. It is also an opportunity for the community-wide enthusiasm for the mission, which played an important part in its success, is maintained by pooling our collective wisdom to optimise the payload in terms of resources (mass, power, etc.) and return against the mission science objectives. In this way we will maximise our chances of success at the next selection stage.

The SDT has drafted a template Instrument Data Sheet, which you can find on the mission's community web-site at:

<http://www.cross-scale.org/News.html>

and on the documents pages. [A formal ESA set of mission web-pages is in the process of construction.] We invite you to complete these templates and return them to a coordinating member of the SDT (see below) by the end of January 2008, with a copy to me. If at all possible, it would be extremely helpful to have at least a first draft by 23 January, in advance of an SDT meeting scheduled for the next day.

In completing the template, please bear in mind the following points:

- 1 The objectives of the mission are to study fundamental plasma processes (shocks, reconnection, turbulence)
- 2 The mission concept involves quantifying the cross-scale coupling via the simultaneous measurement of quantities at 3 key scales: electron, ion, and fluid. This does NOT necessarily require a complete suite of instrumentation on all spacecraft at all scales, but rather much more focussed measurements, adequate to capture the COUPLING. Thus even the spacecraft on a single scale (e.g., ion scale) do not all need to carry identical instrumentation. This consideration is vital if we are to keep the mission feasible in terms of construction, delivery, launch capacity, operations, and data handling.
- 3 The payload given in the proposal could/should be used to provide a guide as to how much mass (and to a less critical extent power) can be carried into an appropriate, high-apogee orbit on 10 ESA spacecraft. It is also the result of our previous studies of the mission leading in the first instance to the Science Priorities Document.
- 4 An instrument AO of some kind is likely to be released early in 2010 for those

missions selected to proceed to the next phase (Definition Phase - B1) and against a more refined strawman payload. Thus payload candidates need a high degree of Technological Readiness and strong heritage.

5 The present exercise is NOT a formal call for instrument proposals, nor letters of intent, but is purely for the purpose of informing the present study phase of the mission. You may wish to consult with colleagues and submit joint Instrument Data Sheets in the spirit of a community effort.

6 Information culled from the responses will be entered in a non-attributable manner into the PDD, which will then get passed to Industry. Of course, the heritage of an instrument specification is important, and may well in many cases be sufficient to identify the submitter. The PDD, as a formal mission document, will also be publically available. If you have any remarks you wish to keep confidential, you should clearly indicate these in your response.

7 It may not be possible or relevant to make entries into all the requested elements in the Data Sheet. Please provide as much as you can, without worrying to much about the rest. Where things are preliminary just indicate so on the sheet.

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SDT Coordinators for this task by proposal instrument
(please refer to the proposal for details).
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MAG (dc magnetometer)
Rumi Nakamura
rumi.nakamura@oeaw.ac.at

CESA (combined thermal electron and ion detector; if this proves impractical, a solution involving an electrostatic ion detector may be required)
Philippe Louarn
Philippe.Louarn@cesr.fr

ICA (Ion Composition Analyser)
Philippe Louarn
Philippe.Louarn@cesr.fr

ACB (ac search coil magnetometer)
Jean-Louis Pincon
jlpincon@cnrs-orleans.fr

EDEN (electron density sounder)
Jean-Louis Pincon
jlpincon@cnrs-orleans.fr

E2D & E3D (2d electric field wire booms + axial 3rd-D rigid boom)
Andris Vaivads
andris@irfu.se

EESA (electron electrostatic analyser)
Chris Owen
cjo@mssl.ucl.ac.uk

ECA (3D energetic multi-species ion analyser)
Pat Daly
daly@mps.mpg.de

HEP (solid state high energy particle detector)
Pat Daly
daly@mps.mpg.de

ASP (active spacecraft potential control)

Steve Schwartz
s.schwartz@imperial.ac.uk

ACDPU (centralised processor for ac fields experiments - this is only
loosely defined in terms of functionality)
Steve Schwartz
s.schwartz@imperial.ac.uk

CPP (centralised processor, e.g., for particle experiments - this is
even more loosely defined)
Steve Schwartz
s.schwartz@imperial.ac.uk

Other instruments that combine or replace the functionality of the above, in terms of
measurement or meeting the equivalent science objectives
Steve Schwartz
s.schwartz@imperial.ac.uk

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If you have any questions or comments, let me know. Given the level of information that
is required, and the need for significant heritage, I don't think this exercise should
take you a lot of time to complete. But it is an important one for the SDT to conduct at
this stage, before other spacecraft characteristics get frozen.

Thanks for your inputs.

Regards,
Steve (on behalf of the SDT)
30 November 2007

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