

**Letter of Intent to Participate in the Gaia Data Processing**

15 January 2005

Dear Colleagues,

ESA hereby invites individuals or institutes in Member States, wishing to play a role in the Gaia data processing in the years 2006 onwards, to submit a 'Letter of Intent' to ESA outlining their possible future involvement.

Gaia is an approved ESA science mission aiming to determine accurate positions, distances, proper motions, and photometry for some one billion stars in our Galaxy and beyond, with radial velocities for a significant fraction. Comprehensive details are given at the ESA site <http://www.rssd.esa.int/Gaia> (including Information Sheets on the data analysis principles foreseen). The target satellite launch date is currently mid-2011 (to be confirmed by the ESA Science Programme Committee), with an operational period of 5 years. The final data products can appear only 2–3 years after the end of operations (i.e. around 2018), although early-release catalogues of astrometry and photometry are being considered. Data rights on specific objects in the traditional sense are not foreseen. Nevertheless, groups involved in the preparations for the data analysis will have deep and early insight into the results, facilitating early interpretation of the data and the early publications of results.

While ESA pays for the satellite in its entirety, including payload and operations, the data reduction is a task that will be carried out with major contributions from national funding. This request for Letters of Intent is therefore a step in developing the data reduction plans for Gaia, and will be followed by a more detailed Announcement of Opportunity some 5 years before launch.

Over the past four years, ESA and the Gaia scientific working groups have been developing a prototype data analysis system for Gaia. This prototype aims to provide a proof-of-principle of the approach now under study for the mission data analysis. In this model, satellite data will be ingested into a central data base, detected sources will be cross-matched to celestial objects, and the core processing (a global iterative adjustment of the astrometric data) will be carried out within a centralised processing environment. Shell tasks (for example, analysis of the photometric or radial velocity data, analysis of double stars and Solar System objects) will access the centralised data base for further processing. All of these processes will depend on algorithms and a processing infrastructure (both hardware and software) provided to a greater or lesser degree by the Gaia scientific community.

The development of more concrete plans for the next phase of the development of the data analysis, from early 2006 onwards, is now under consideration. To understand better the

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resources which may be available for the Gaia data processing, and to coordinate the procurement and integration of algorithms, indications of potential interest are now invited.

Foreseen contributions by individuals or multi-national groups may be in any area of the data analysis: for example, studies of specific algorithms, development of code, involvement in the core or shell tasks, plans for involvement in the development or execution of the operational system, provision of computational hardware at the contributing institute or at a central processing facility, or any other sort of associated expertise. The Gaia www site includes, under 'Opportunities for Research', some of the specific areas currently open for additional contributions. In addition, further details of open areas and opportunities for research can be found on the web sites of the individual working groups. Foreseen contributions may be over any relevant time interval, for example, related to activities which are already under way, planned for 2006-08 or beyond, or relevant only for the operational system post-launch (from 2012 onwards).

Two kinds of responses can be foreseen: those from institutes that are already familiar with Gaia due to their current involvement, and those from institutes attracted by the challenge represented by the data reductions but not yet involved in the Gaia effort. Subject to feasibility, this may include participation in the validation of the current prototype, or the proposal of different concepts for the data reduction.

It is not so relevant at this stage whether or not the foreseen contribution may overlap with existing activities, or how it might interface with other activities. On the other hand, potential participants may wish to discuss ideas first with members of the Gaia scientific working groups or Gaia Science Team.

The purpose of the present call for 'Letters of Intent' is to conduct a survey of the interest, and scale of effort that might be provided to the Gaia data processing task. Responses will not be considered as commitments. This call also aims to serve as an initiating step in the route to national funding approval. Within ESA, these letters will be used to consider and plan the next steps of the overall coordination.

The Letter of Intent should be submitted using the form found following the 'Letter of Intent' links on the main page of the Gaia www site (<http://www.rssd.esa.int/Gaia>). Please aim to provide sufficient details of your interests and commitments that further planning and coordination will be possible. In order to take these plans into consideration, a response by 20 March 2005 is requested.

Yours sincerely,

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and

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