OBJECTIVES OF THE WORKSHOP

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The organisers of this Workshop on the future of European space astrometry have been greatly encouraged by the number and diversity of participants, and it is my pleasure to open these remarks by extending a very warm welcome to you all.

Over the last few years, the field of astrometry has witnessed remarkable changes, through the opening up of space as the measurement environment. The first space mission dedicated to astrometry, ESA's Hipparcos project, completed its measurements in 1993, furnishing a massive quantity of observational data of astonishing and unprecedented quality. One of the first presentations of the Workshop is a summary of the present Hipparcos results. For those of you who are not yet able to visualise the goals of a future space astrometry mission, I would ask you to reflect on what has been accomplished with Hipparcos—in terms of stellar distances, motions, detection and measurement of double and multiple stars, measurement of photometric variability, and so on—a future astrometry mission will be be able to do all these things, and more, and much much better!

While many eagerly await the fruits of this pioneering mission, astrometry has met with a resurgence of interest, and much well-deserved attention has been directed already to the prospects for the future. The global measurement principles having been dramatically demonstrated and validated, the eyes of some instrumentalists, observers, and theorists have already turned to what astrometry might possibly yield in the future. Although the Roemer proposal, with target astrometric accuracies at the level of about 0.1 milliarcsec, proposed by Erik Høg and collaborators for the recent ESA medium-mission round, found considerable scientific recognition from the ESA scientific advisory bodies, it did not quite gain the broad support needed to take it further.

The GAIA concept, proposed for a future ESA cornerstone mission, has, by pushing two orders of magnitude further in astrometric accuracy, captured the scientific and technological imagination of a very broad community—a technically ambitious but apparently feasible mission, employing two or three small interferometers to measure distances and motions of *tens of millions* of stars throughout our Galaxy, and promising dramatic results in all fields of stellar and galactic structure and evolution, as well as exciting spin-offs in more disparate fields such as relativity, and with the potential to revolutionise one of the 'hottest' topics in present astronomical consciousness—the search for planetary mass companions of stars. The possibilities here are indeed awesome. One of the subsidiary goals of this Workshop is to convince ourselves that the 10 microarcsec goal, needed to achieve these scientific objectives, is indeed feasible.

The GAIA concept obtained the support not only of the 'traditional' astrometric community. The reason why we are here today is that an independent review body, the Horizon 2000+ Survey Committee, chaired by Professor Woltjer and with senior scientists representing all areas of space research—γ-ray, X-ray, UV, optical, infrared and radio astronomy, fundamental physics, and solar system studies—and set up by ESA to establish scientific priorities for its long-term scientific

programme, recommended that ESA embarks on an interferometric cornerstone mission, dedicated to astrometry, assuming that a 10 microarcsec accuracy can be achieved.

Funding for the Horizon 2000+ programme has not yet been approved, and the recommendations of the Survey Committee have not yet been adopted by ESA's Science Programme Committee: the funding is to be discussed at an ESA Council Meeting, at ministerial level, to be held in October. The detailed implementation of the Survey Committee's recommendations would be a subsequent responsibility of the established scientific advisory groups of ESA.

So, up until now, the concepts underlying a future mission have been presented. But no Horizon 2000+ candidate missions have been finally approved, ESA has not appointed a study team for GAIA, and no technical activities specifically associated with an astrometric interferometer have yet been initiated within ESA.

Before I explain what our objectives are for the Workshop, let me address first the question of its timing. Would it not have been more appropriate to have waited until these meetings had taken place, so that we could have worked within the approved framework of the Horizon 2000+ programme? In one sense, of course, this might have been desirable. The counter argument is that an effort now will better identify the scientific support for the mission, provide further confidence in its feasibility, and will allow a more rigorous appraisal of its scientific goals, and the technological and organisational complexity to be more widely appreciated—fundamental issues when it comes to arguing for the mission's inclusion within the high-profile, long-term possibilities of ESA's scientific programme.

A second reason for holding this Workshop earlier rather than later, was the strong interest that the GAIA proposal has inspired, with pressure appearing from astronomers already recognising the massive significance of its potential results, pressure from scientists eager to investigate and optimise its scientific capabilities and objectives, and pressure from individuals with innovative views on how to study it, build it, operate it, and reduce and interpret the data that it will produce. The one hundred or so participants in this Workshop underlines this enthusiasm.

Now let me move to the objectives of this Workshop. GAIA has been presented as a concept capable of demonstrating and achieving certain scientific goals. The Horizon 2000+ Survey Committee did not, however, simply recommend the acceptance of GAIA as a project; rather, it recommended interferometric astrometry reaching an accuracy of 10 microarcsec. So let me stress this point carefully: this Workshop has not been organised to tell the community what ESA's future astrometric mission will look like *technically*—ultimately, it could look somewhat different.

The meeting is, in contrast, the opportunity for the scientific 'customers' to tell ESA what it would like to see from such a mission: what is the limiting magnitude, the target accuracies, the mission duration, the photometric (and even spectroscopic) capabilities, how might the data be acquired, reduced, and interpreted, and so on. These viewpoints will then be reflected in future studies which ESA will coordinate. So, over the next two and a half days, you are invited to be creative, and not to feel constrained by what has been written up so far. If you can see a way to do things better, we want to hear about it! And certainly do not be constrained by how things were done with Hipparcos!

The way the organisers have structured this meeting builds first around a series of papers during the plenary session: short presentations, with the purpose of getting ideas flowing. The presentations are divided into sessions: a scientific session, where we will hear some opinions about the scientific goals of a future astrometry mission; a specific session on 'auxiliary observations' where we will

hear of some new ideas for complementary observations and analysis techniques; a session on technological aspects; and a session on data acquisition and reductions.

On the second afternoon we will split into five parallel sessions, including one specifically related to mission critical aspects, where participants will be free to consider new techniques, key problem areas, and so on. These smaller sessions will be the opportunity for exploiting the intended spirit of this meeting: free discussions, and exchanges of ideas. We will all meet again on Wednesday morning, to collect together some of the main conclusions of this meeting.

How ambitious can we be? Let me recall that the time-scale of the astrometry mission is not yet established: launch could be somewhere in the period 2010-2015. Before the satellite design has to be finalised, many technological and scientific developments may have taken place. So it would seem appropriate to aim for a *baseline* design, which we believe GAIA fulfills, which does not call for technology excessively beyond present-day capabilities. This should ensure that astrometry will be ready to take 'pole position' within the Horizon 2000+ programme, if this is what should be required. But the ESA Cornerstone programmes must also provide European industry, and European scientists, with the opportunity for the development of advanced technology and other related tools: the environments to collect, calibrate, reduce and interpret data of a quantity and complexity perhaps inconceivable according to today's standards. To this extent, a set of more advanced 'options' which could be added to the baseline mission, for example in the areas of detector technology, would be desirable.

What happens after we leave this meeting will depend, in part, on what views emerge during the next few days. And, of course, it will depend on the decisions of the various ESA bodies later this year. If approved, a study team will be convened, the views and ideas generated at this Workshop will be very carefully considered, and appropriate technological studies will begin.

Now for a few words of gratitude, traditional in such introductory remarks, but no less sincere because of that. First, to the Scientific Organising Committee who have devoted time and effort to thinking about the goals of the meeting, and preparing for the parallel discussions, which will form a very important part of our deliberations over the next couple of days. We hope that we have achieved a programme consistent with the aims of the Workshop that I have just set out.

A special word of thanks are due to Professor Boksenberg and the RGO for kindly agreeing to host this joint RGO/ESA Workshop, and especially to the Local Organising Committee, chaired by Dr Floor van Leeuwen and supported by the Royal Greenwich Observatory, and in particular by Gill Harrison and Dr Margaret Penston. They have worked hard to prepare for this workshop; the organisation of such a meeting involves a large amount of behind-the-scenes work, and we are very grateful to them for making the workshop a reality.

Now let us hope for a stimulating, productive, and enjoyable exchange of ideas. And let us keep one thought uppermost in our minds—the vision of a galactic census that will provide observational material for generations of research programmes, a formidable three-dimensional stellar mapping in which everything moves. We are fortunate to be present at a time when the scientific potential of astrometry is enormous, and when the ability to achieve these goals is within reach. Over the next two days we will all have the possibility to play a role in the definition of what I feel could be one of the most remarkable scientific projects that most of us will ever have the opportunity of witnessing.