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## Kinematic Survey of Halo Stars from SDSS-DR2 with GSC2

Re Fiorentin, P.; Spagna, A.; Helmi, A.; Lattanzi, M.-G.

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## Contents

Introduction . . . . .	xii
<i>Catherine Turon &amp; Michael Perryman</i>	

### Session 1: Overview of the Mission, Design, and Scientific Performances

*Chair: Daniel Egret*

#### INVITED CONTRIBUTIONS

Introductory Remarks . . . . .	3
<i>J. Kovalevsky</i>	
Overall Science Goals of the Gaia Mission* . . . . .	5
<i>F. Mignard</i>	
Overview of the Gaia Mission* . . . . .	15
<i>M.A.C. Perryman</i>	
Gaia: The Satellite and Payload* . . . . .	23
<i>O. Pace</i>	
The Astrometric Instrument of Gaia: Principles* . . . . .	29
<i>L. Lindegren</i>	
Accuracy Budget and Performances* . . . . .	35
<i>J.H.J. de Bruijne</i>	
Photometric System Design and Performances . . . . .	43
<i>C. Jordi &amp; E. Hoeg</i>	
Radial Velocity Spectrometer Design and Performance* . . . . .	51
<i>D. Katz</i>	

#### POSTERS

The Astro Optical Response Model* . . . . .	59
<i>D. Busonero, M. Gai, D. Gardiol, M.G. Lattanzi, D. Loreggia</i>	
RVS Wavelength Calibration: Simulation of Reference Stars . . . . .	63
<i>F. Crifo, D. Katz</i>	
The Gaia Parameter Database* . . . . .	67
<i>J.H.J. de Bruijne, U. Lammers, M.A.C. Perryman</i>	
Calibrating the Medium Band Photometer using Spikes . . . . .	71
<i>C. Fabricius, E. Høg</i>	
First Gaia Photometry . . . . .	75
<i>E. Høg</i>	
Japan Astrometry Satellite Mission for Infrared Exploration (JASMINE) . . . . .	77
<i>N. Gouda, T. Yano, Y. Yamada, Y. Kobayashi, T. Tsujimoto, The JASMINE Working Group</i>	

## Session 2: Galaxy Census, Formation and Evolution

Chair: Karri Muinonen

### INVITED CONTRIBUTIONS

Gaia Census and Completeness* . . . . .	83
<i>A.C. Robin</i>	
Modelling the Galaxy for Gaia . . . . .	89
<i>J. Binney</i>	
Census of Binaries - the Big Picture . . . . .	97
<i>S. Söderhjelm</i>	
ISM, Extinction and Star Forming Regions* . . . . .	105
<i>J. Knude, C. Fabricius</i>	
The Thin Disc and the Bulge with Gaia . . . . .	113
<i>A. Vallenari, E. Nasi, G. Bertelli, C. Chiosi</i>	
Chemical Evolution of the Galaxy . . . . .	121
<i>P.E. Nissen</i>	

### ORAL CONTRIBUTIONS

Dynamical Streams in the Solar Neighbourhood . . . . .	129
<i>B. Famaey, A. Jorissen, X. Luri, M. Mayor, S. Udry, H. Dejonghe, C. Turo</i>	
Modelling Interstellar Extinction in Three Dimensions . . . . .	135
<i>D.J. Marshall, A.C. Robin, C. Reylé, M. Schultheis</i>	
The Galactic bulge as Seen by Gaia . . . . .	143
<i>C. Reylé, A.C. Robin, M. Schultheis, S. Picaud</i>	

### POSTERS

Chemistry and Kinematics in the Solar Neighbourhood . . . . .	149
<i>O. Bienaymé, C. Soubiran, T. Mishenina, V. Kovtyukh, A. Siebert</i>	
From Detailed Galaxy Simulations to a Realistic End-of-Mission Gaia Catalogue* . . . . .	151
<i>A.G.A. Brown, H.M. Velázquez, L.A. Aguilar</i>	
Stellar Galactic Population Characterization using Gaia Photometry . . . . .	155
<i>J.M. Carrasco, C. Jordi, F. Figueras, J. Torra</i>	
Open Clusters and the Galactic Metallicity Distribution . . . . .	159
<i>L. Chen, J.L. Hou</i>	
What Gaia Will See: All-Sky Source Counts from the GSC2* . . . . .	163
<i>R. Drimmel, B. Bucciarelli, M.G. Lattanzi, A. Spagna, C. Jordi, A.C. Robin, C. Reylé, X. Luri</i>	
Galactic Extinction Model: New Developments . . . . .	167
<i>R. Drimmel</i>	
[ $\alpha$ /Fe] in the Thin and the Thick Disc: Towards an Automatic Parametrization of Stellar Spectra . . . . .	169
<i>P. Girard, C. Soubiran</i>	
Determination of Star Formation Histories from Gaia-Type Photometric and Astrometric Survey Data . . . . .	171
<i>B.R. Jørgensen, L. Lindegren</i>	

Structure of the Galactic Halo Towards the North Galactic Pole . . . . .	175
<i>T.D. Kinman, A. Bragaglia, C. Cacciari, A. Buzzoni, A. Spagna</i>	
Self-Consistent Distance Determinations for Lutz-Kelker-Limited Samples* . . . . .	179
<i>J. Maíz Apellániz</i>	
Tracing the Origin of the Solar Neighbourhood . . . . .	183
<i>B. Nordström, J. Andersen, M. Mayor</i>	
The Trouble with Isochrone Ages for Field Stars: A Cautionary Tale for Solar Neighbourhood Studies . . . . .	187
<i>F. Pont, L. Eyser</i>	
The Spiral Structure of Our Galaxy . . . . .	191
<i>D. Russeil</i>	
The Structure of the Thick Disc . . . . .	193
<i>A. Spagna, B. Bucciarelli, D. Carollo, R. Drimmel, M.G. Lattanzi, B. McLean, R.L. Smart</i>	
Combining Photometric and Astrometric Data to Identify Stellar Clustering at KPC-Distances* . . . . .	197
<i>R. Teixeira, G. Medina-Tanco, M. Corti, C. Ducourant</i>	
Probing Galactic Reddening with the 8620 Å Diffuse Interstellar Band . . . . .	201
<i>S. Vidrih, T. Zwitter</i>	

### **Session 3: Relativity, Solar System, Extra-Solar Planets**

*Chair: James Binney*

#### INVITED CONTRIBUTIONS

Relativistic Formulation and Reference Frame . . . . .	207
<i>S.A. Klioner</i>	
Astrometric Limits Set by Surface Structure, Binarity, Microlensing* . . . . .	215
<i>U. Bastian, H. Hefele</i>	
Asteroid Orbits with Gaia: Inversion and Prediction . . . . .	223
<i>K. Muinonen, J. Virtanen, M. Gramvik, T. Laakso</i>	
Gaia Observations of Asteroids: Sizes, Taxonomy, Shapes and Spin Properties* . . . . .	231
<i>A. Cellino, M. Delbò, A. Dell’Oro, V. Zappalà</i>	
Near Earth Objects . . . . .	239
<i>E. Høg, F. Mignard</i>	
Impact of Gaia on Dynamics and Evolution of the Solar System . . . . .	243
<i>P. Tanga</i>	
Detection and Characterization of Extra-Solar Planets with Gaia* . . . . .	251
<i>M.G. Lattanzi, S. Casertano, S. Jancart, R. Morbidelli, D. Pourbaix, R. Pannunzio, A. Sozzetti, A. Spagna</i>	

#### ORAL CONTRIBUTIONS

Relativistic Astrometry: the RAMOD Project . . . . .	259
<i>B. Bucciarelli, M.T. Crosta, F. de Felice, M.G. Lattanzi, A. Vecchiato</i>	
Can the Perturbation of a Stellar Motion in a Triple System Mimic a Planet?* . . . . .	263
<i>J. Schneider</i>	
The Study of Stars with Planets* . . . . .	267
<i>G. Cayrel de Strobel</i>	

## POSTERS

Probabilistic Representation of the Gaia Extragalactic Reference Frame* . . . . .	271
<i>A.H. Andrei, A. Fienga, M. Assafin, J.L. Penna, D.N. da Silva Neto, R. Vieira Martins, P. Soares Musumeci</i>	
Astrometric Representation of the Gaia Extragalactic Reference Frame from Ground Observations . . . . .	275
<i>A.H. Andrei, A. Fienga, M. Assafin, J.L. Penna, D.N. da Silva Neto, R. Vieira Martins</i>	
Observations of the Satellites of Jupiter and Saturn . . . . .	279
<i>J.-E. Arlot, V. Lainey</i>	
GAREX: a Relativity Experiment with Gaia* . . . . .	281
<i>M.T. Crosta, F. Mignard</i>	
Connection Between the ICRF and the Dynamical Reference Frame for the Outer Planets . . . . .	285
<i>D.N. da Silva Neto, M. Assafin, A.H. Andrei, R. Vieira Martins</i>	
Asteroid Sizes from Gaia Observations . . . . .	289
<i>A. Dell’Oro, A. Cellino</i>	
IMCCE Planetary Ephemerides: Present and Future . . . . .	293
<i>A. Fienga, J. Laskar, J.L. Simon, H. Manche, M. Gastineau</i>	
Determination of the PPN $\beta$ and Solar $J_2^\odot$ from Asteroid Astrometry* . . . . .	297
<i>D. Hestroffer, J. Berthier</i>	
Physical Models and Refined Orbits for Asteroids from Gaia Photometry and Astrometry . . . . .	301
<i>M. Kaasalainen, D. Hestroffer, P. Tanga</i>	
Refining the Relativistic Model for Gaia: Cosmological Effects in the BCRS . . . . .	305
<i>S.A. Klioner, M.H. Soffel</i>	
A Keck/HIRES Doppler Search for Planets Orbiting Metal-Poor Dwarfs . . . . .	309
<i>A. Sozzetti, D.W. Latham, G. Torres, R.P. Stefanik, A.P. Boss, B.W. Carney, J.B. Laird</i>	
Observing the Natural Satellites of Solar System Bodies with Gaia . . . . .	313
<i>P. Tanga, F. Mignard</i>	
A Ground-Based Network of Observers for a Gaia Follow-Up . . . . .	317
<i>W. Thuillot</i>	
Statistical Inversion of Gaia Photometry for Asteroid Spins and Shapes . . . . .	321
<i>J. Torppa, K. Muinonen</i>	
Asteroid Orbits with Gaia: Simulated Examples . . . . .	325
<i>J. Virtanen, K. Muinonen, F. Mignard</i>	
Gaia-Assisted On-Board Detection of Moving Objects* . . . . .	329
<i>S. Wolff</i>	

## Session 4: Technical Issues, Data Simulation, Reduction and Processing

Chair: *Carla Cacciari*

### INVITED CONTRIBUTIONS

The Gaia On-Board Scientific Data Handling* . . . . .	335
<i>F. Arenou, C. Babusiaux, F. Chéreau, S. Mignot</i>	
Gaia Astrometric CCDs and Focal Plane* . . . . .	343
<i>A.D. Short</i>	
Radial Velocity Spectrometer: Technical Issues* . . . . .	351
<i>M. Cropper, D. Katz, A. Holland, R. Bingham, B. Hancock, D. Walton</i>	
Modelling the Instruments and Simulating the Data Stream . . . . .	357
<i>X. Luri, C. Babusiaux, E. Masana</i>	
Design and Overview of the Data Processing* . . . . .	361
<i>J. Torra, F. Figueras, C. Jordi, X. Luri, E. Masana, C. Fabricius</i>	
Data Processing: Testing of Core Tasks* . . . . .	369
<i>F. Figueras, B. López Martí, C. Fabricius, J. Torra, C. Jordi, P. Llimona, E. Masana, X. Luri</i>	
Gaia Photometric Data Analysis* . . . . .	377
<i>A.G.A. Brown</i>	
A Prototype for Science Alerts* . . . . .	385
<i>N. Wyn Evans, V. Belokurov</i>	
Object Classification and the Determination of Stellar Parameters* . . . . .	393
<i>C.A.L. Bailer-Jones</i>	

### ORAL CONTRIBUTIONS

Applying Grid Technology to Gaia Data Processing* . . . . .	401
<i>S.G. Ansari, Y. Balague-Jordan, X. Luri, M. ter Linden</i>	
Gaia First Look* . . . . .	405
<i>S. Jordan, U. Bastian, H. Lenhardt, H.-H. Bernstein, S. Hirte, M. Biermann</i>	

### POSTERS

The Astrometric Model Implementation. Simulations and Data Reduction Compatibility Test* . . . . .	413
<i>G. Anglada-Escudé, J. Torra, E. Masana, X. Luri</i>	
The Gaia Instrument and Basic Image Simulator . . . . .	417
<i>C. Babusiaux</i>	
Design of the Gaia Photometric Systems for Stellar Parametrization using a Population-Based Optimizer* . . . . .	421
<i>C.A.L. Bailer-Jones</i>	
Simulation of the Clock Framework of Gaia . . . . .	425
<i>J. Castañeda, J.P. Gordo, J. Portell, E. García-Berro, X. Luri</i>	
The Windows Design and the Restoration of Object Environments . . . . .	429
<i>C. Dollet, A. Bijaoui, F. Mignard</i>	
The Gaia Focal Plane to Sky Mapping: A Sample of Calibration Issues* . . . . .	433
<i>M. Gai, D. Busonero, D. Gardiol, D. Loreggia</i>	



Gaia Optical Aberrations Described by Means of Orthogonal Polynomials . . . . .	437
<i>D. Gardiol, D. Bonino, D. Loreggia</i>	
Automatic Parametrization of Gaia Astrometrically Unresolved Binary Stars . . . . .	441
<i>T.A. Kaempf, P.G. Willemsen, C.A.L. Bailer-Jones</i>	
Gaia Telemetry Rate Simulations: A First Look at the Complete Picture* . . . . .	445
<i>U. Lammers</i>	
CHORIZOS: a Complete Photometric $\chi^2$ Code* . . . . .	449
<i>J. Maíz Apellániz</i>	
Minimum Distance Method of Classification Applied to Gaia Simulated Photometric Data . . . . .	453
<i>V. Malyuto</i>	
The Gaia System Simulator* . . . . .	457
<i>E. Masana, X. Luri, G. Anglada-Escudé, P. Llimona</i>	
Observing Faint Binaries with Gaia . . . . .	461
<i>P. Nurmi</i>	
Galaxy Simulations of Visual Binary Stars . . . . .	463
<i>P. Nurmi</i>	
A Bayesian Classification Algorithm for Gaia . . . . .	467
<i>S. Picaud, A.C. Robin, U. Bastian</i>	
The Payload Data Handling and Telemetry Systems of Gaia . . . . .	471
<i>J. Portell, X. Luri, E. García-Berro, E.M. Geijo</i>	
Design of a Basic Angle Monitoring System in Silicon Carbide . . . . .	475
<i>A.A. van Veggel, P.C.J.N. Rosielle, H. Nijmeijer, A.A. Wielders, H.J.P. Vink</i>	
Automated Identification of Unresolved Binaries using Medium Band Photometry . . . . .	479
<i>P.G. Willemsen, T.A. Kaempf, C.A.L. Bailer-Jones, K.S. de Boer</i>	
The JASMINE Simulator . . . . .	483
<i>Y. Yamada, The JASMINE Working Group</i>	
Optical System for JASMINE and CCD Centroiding Experiment . . . . .	487
<i>T. Yano, N. Gouda, Y. Kobayashi, T. Tsujimoto, T. Nakajima, et al.</i>	

## Session 5: Stars: Laboratories and Tracers

*Chair: Poul Erik Nissen*

### INVITED CONTRIBUTIONS

Stellar Interiors and Atmospheres in the Framework of the Gaia Mission . . . . .	493
<i>Y. Lebreton</i>	
Gaia Stellar Chemical Abundances and Galactic Archaeology . . . . .	501
<i>A. Recio-Blanco, F. Thévenin</i>	
Duplicity and Masses . . . . .	507
<i>D. Pourbaix</i>	
Variability Analysis: Detection and Classification* . . . . .	513
<i>L. Eyer</i>	
Metallicity and Age of Disc Stars . . . . .	521
<i>M. Haywood</i>	
The RAVE Spectroscopic Survey: Results From the First 44 000 Observed Stars . . . . .	529
<i>U. Munari, T. Zwitter, A. Siebert</i>	

## ORAL CONTRIBUTIONS

Determination of Stellar Rotation with Gaia and Effects of Spectral Mismatch . . . . .	537
<i>A. Gomboc, D. Katz</i>	
Emission Line Stars in the Framework of Gaia . . . . .	543
<i>I. Kolka, T. Eenmäe, A. Hirv, T. Tuvikene, M. Kama</i>	
Towards Accurate Stellar Photometry: the Role of C, N, O and Alpha-Process Elements . . . . .	549
<i>G. Tautvaišienė, B. Edvardsson</i>	

## POSTERS

Gaia Data Reduction Tasks for Double and Multiple Stars* . . . . .	557
<i>F. Arenou, S. Söderhjelm</i>	
Study of B and Be Stars by Gaia . . . . .	561
<i>D. Briot, N. Robichon</i>	
A PHOENIX Model Atmosphere Grid for Gaia . . . . .	565
<i>I. Brott, P.H. Hauschildt</i>	
Predicted Properties of Eclipsing Binaries Observable by Gaia . . . . .	569
<i>J. Dischler, S. Söderhjelm</i>	
Weighing Stellar–Mass Black Holes with Gaia . . . . .	573
<i>B. Fuchs, U. Bastian</i>	
Astrometric Binaries with a Variable Component . . . . .	575
<i>J.L. Halbwachs, D. Pourbaix</i>	
Orbit Determination for Gaia Spectroscopic Binaries* . . . . .	579
<i>S. Jancart, D. Pourbaix</i>	
Hipparcos Astrometric Binaries in the Ninth Catalogue of Spectroscopic Binary Orbits: A Testbench for the Detection of Astrometric Binaries with Gaia . . . . .	583
<i>S. Jancart, A. Jorissen, D. Pourbaix</i>	
Modelling Spectra of Fast-Rotating Stars: Beyond Spherical Approximation . . . . .	587
<i>U. Jauregi, A. Gomboc, T. Zwitter</i>	
Theoretical Modelling of Late-Type Giant Atmospheres: Preparing for Gaia* . . . . .	591
<i>A. Kučinskas, I. Brott, P.H. Hauschildt, H.-G. Ludwig, L. Lindegren, T. Tanabé, V. Vansevičius</i>	
$\alpha$ -Enhancement in Thin and Thick Disc Stars: An Atlas of Synthetic Spectra . . . . .	595
<i>M.L. Malagnini, M. Franchini, C. Morossi, P. Di Marcantonio</i>	
Gaia and the Fundamental Stellar Parameters from Double-Lined Eclipsing Binaries . . . . .	599
<i>P.M. Marrese, E.F. Milone, R. Sordo, M.D. Williams</i>	
Variability of B and Be Stars with Gaia . . . . .	603
<i>C. Neiner, A.-M. Hubert, Y. Frémat, M. Floquet</i>	
Physical Parameters of Stars in Close Binaries Derived from Gaia Photometry . . . . .	607
<i>P.G. Niarchos, V.N. Manimanis, K.D. Gazeas</i>	
Introducing Adapted Nelder & Mead’s Downhill Simplex Method to a Fully Automated Analysis of Eclipsing Binaries . . . . .	611
<i>A. Prša, T. Zwitter</i>	
Automatic Derivation of Stellar Atmospheric Parameters and Chemical Abundances . . . . .	615
<i>A. Recio-Blanco, A. Bijaoui, P. de Laverny, D. Katz, F. Thévenin</i>	

Identifying M Supergiants with Gaia* . . . . .	619
<i>G.M. Wahlgren, M. Lundqvist, A. Kučinskas</i>	

Extracting Stellar Parameters from Observed Spectra: The Role of Cross-Correlation and Minimum Distance Methods . . . . .	623
<i>T. Zwitter, U. Munari, A. Siebert</i>	

## Session 6: The Galaxy and Beyond

Chair: Catherine Césarsky

### INVITED CONTRIBUTIONS

The Fundamental Building Blocks of Galaxies* . . . . .	629
<i>P. Kroupa</i>	

Crowded Fields in the Milky Way and Beyond* . . . . .	637
<i>C. Babusiaux</i>	

Gaia, the Oldest Stars and the Early Universe* . . . . .	645
<i>M. Spite</i>	

Dark Matter in the Local Group . . . . .	651
<i>M.I. Wilkinson</i>	

Variable Stars as Standard Candles and Stellar Tracers* . . . . .	659
<i>G. Bono, M. Cignoni</i>	

Quasars with Gaia: Identification and Astrophysical Parameters . . . . .	667
<i>J.-F. Claeskens, A. Smette, J. Surdej</i>	

### ORAL CONTRIBUTIONS

Correcting Systematic Errors in the Determination of Proper Motions in the Galaxy . . . . .	675
<i>J. Kovalevsky</i>	

Globular Cluster Kinematics with Gaia . . . . .	681
<i>H. Baumgardt, P. Kroupa</i>	

### POSTERS

VLBI Survey of Weak Extragalactic Radio Sources as a Potential Link Between the Radio and Optical Reference Frames . . . . .	683
<i>S. Frey</i>	

Star Formation and Chemical Evolution of M31* . . . . .	687
<i>J.L. Hou, L. Chen, R.X. Chang</i>	

The Physics Behind the Non-Linearity of the Cepheid Period-Luminosity Relation . . . . .	691
<i>S. Kanbur, C. Ngeow</i>	

Beyond the Galaxy with Gaia: Evolutionary Histories of Galaxies in the Local Group* . . . . .	695
<i>A. Kučinskas, L. Lindgren, V. Vansevičius</i>	

Cool Carbon Stars in the Galactic Halo . . . . .	699
<i>N. Mauron, T. Kendall</i>	

Cepheid Period-Luminosity Relations: Galactic vs. LMC and the Results from <i>t</i> -Test . . . . .	703
<i>C. Ngeow, S. Kanbur</i>	

Classical Cepheids and RR Lyrae Stars as Standard Candles . . . . .	707
<i>A.S. Rastorguev, A.K. Dambis, M.V. Zabolotskikh</i>	
Kinematic Survey of Halo Stars from SDSS-DR2 $\cap$ GSC2* . . . . .	711
<i>P. Re Fiorentin, A. Spagna, A. Helmi, M.G. Lattanzi</i>	
Substructure and Tidal Debris in Local Galaxies: Models and Observations . . . . .	715
<i>J.E. Taylor</i>	
Statistical Methods for Calibrating Trigonometric Parallaxes . . . . .	719
<i>T. Tsujimoto, Y. Yamada, N. Gouda</i>	
The Classification of Cepheids by Pulsation Modes and the Problem of the Distance scale . . . . .	723
<i>M.V. Zabolotskikh, M.E. Sachkov, L.N. Berdnikov, A.S. Rastorguev, I.E. Egorov</i>	
Concluding Remarks: Gaia and Astrophysics in 2015–2020 . . . . .	729
<i>P.T. de Zeeuw</i>	
List of Participants . . . . .	735
Subject Index . . . . .	747

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## Introduction

Between 4–7 October 2004, a major symposium dedicated to the scientific aspects of the Gaia mission was held at the Observatoire de Paris, Meudon, France, as ‘Les Rencontres de l’Observatoire 2004’. Attended by 240 delegates, the four-day meeting was an opportunity to present the current status of the Gaia mission to the interested scientific community, and to hear about the results of investigations carried out in the various areas of the mission over the last four years.

The Gaia mission was proposed to ESA in 1994 as part of the ‘Horizon 2000 Long-Term Plan’, and supported by the Survey Committee if the achievement of accuracies of about 10 micro-arcsec at 15 mag could be demonstrated. It was approved by the ESA’s Science Programme Committee in 2000 after a two-year concept and technology study. From that time, the project has been through an intensive study phase which will end during the early part of 2005. The mission will then enter the detailed design and manufacturing phase shortly afterwards. The launch date is currently targeted for mid-2011. The Gaia 2004 Symposium was timed to coincide with the finalisation of this study phase.

The main purposes of the Symposium were: (i) to present to the scientific community the overall mission design, along with its detailed characteristics and performances; (ii) to bring to the attention of the scientific community the extraordinary potential of Gaia, and to share with the younger generation of scientists the expertise acquired during its preparation (and all phases of the Hipparcos mission); and (iii) to organise the next phases of scientific preparations of the mission: in particular the data reduction and, ultimately, preparation for the scientific exploitation of the data.

During the study phase, three major and closely related components of the project have been under study:

(1) A small ESA study team, led by study manager Oscar Pace, has directed two parallel industrial studies, undertaken by EADS Astrium and Alenia/Alcatel. The overall system aspects, including the payload, attitude control, and data handling sub-systems, launcher interface, thermal design, and the mass and power budgets, have been studied in detail. In addition, specific technical development activities have been running over the last two years in the most technologically critical areas to establish further confidence in their performance and feasibility: this includes a prototype of the large primary mirror manufactured in silicon carbide, flight representative CCDs, deployable sunshield, payload data handling electronics, etc.

(2) The scientific community, represented by ESA’s Gaia Science Team and chaired by the project scientist Michael Perryman, has directed the associated scientific studies and provided guidance to ESA on the technical aspects of the satellite and payload design impacting on the final mission accuracies. The goal of these activities is to converge on a satellite design which is scientifically optimised, and technically and financially feasible. Sixteen scientific working groups, representing more than 200 European scientists, were formed in 2004 to coordinate detailed scientific studies on aspects such as multiple and variable stars, solar system objects, relativistic formulation, on-board detection and data handling, accuracy analysis, etc. These groups have worked to improve confidence in the scientific objectives, the data processing requirements, and all other preparations needed before launch.

(3) The third major component of the Gaia end-to-end system is the data processing on-ground. This has always been understood to be a very challenging part of the mission, involving large data volumes, large numerical processing requirements, and numerous and complex algorithms including the core ‘global iterative solution’. Considerable attention has been given to this element over the past few years, with a comprehensive data simulation chain being built up under the direction of the simulation working group, and a detailed prototype of the data base and iterative solution now running on 18 months of mission data comprising 200 000 stars.

Presentations covered all scientific aspects of Gaia, and the detailed studies carried out by the working groups and science team over the past four years. These proceedings therefore represent a snapshot, as of October 2004, of the rapidly developing scientific aspects of the mission. As apparent in the 150 papers presented at the meeting, great advances have been made in all aspects of the mission design. Equally evident are the many challenges that lie ahead.

The three industrial organisations, EADS Astrium, Alenia, and Alcatel, as well as Observatoire de Paris, ESA, CNES, CNRS and INSU generously sponsored this Gaia 2004 Symposium. This allowed travel grants to be provided to 40 graduate and post-doctoral students. The many young scientists now involved in the Gaia mission, and attending the symposium, is a great testament to its interest and vibrancy.

As chair and co-chair of the Scientific Organising Committee, we acknowledge the contributions of all involved in making the symposium a success: the Scientific Organising Committee, the Gaia Science Team, and the International Advisory Committee; the Local Organising Committee under the leadership of Yves Viala; Karen O’Flaherty in charge of communication and proceedings aspects; the chairs of the various sessions; those who undertook the challenging but valuable task of summarising the poster contributions (David Katz, Ulrich Bastian, François Mignard, Michel Breger, and Xavier Luri); and of course the speakers and poster presenters.

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