

IV INPE Advanced Course on Astrophysics

Radio Astronomy for the 21st Century

São José dos Campos - SP - Brazil

September 12-16, 2011

Invited Lecturers

James Cordes - Cornell University (NY), U.S.A.

State of the art interferometry and related science

George Hobbs - Australia Telescope National Facility, CSIRO - Australia

Gravitational Wave Detection with radio pulsar timing arrays

Richard A. Perley - National Radio Astronomy Observatory (NRAO), U.S.A.

General concepts of radio interferometry and image synthesis

Paolo de Bernardis - University of Rome La Sapienza, Italy

Cosmic Microwave Background

Advisory Committee

Domingos Barbosa - Instituto de Telecomunicações, PT

Gordon Hurford - SSL - Berkeley University, USA

Hanumant Shankar Sawant - INPE, BR

Kyoto Shibasaki - NAOJ, JP

Marco Bersanelli - University of Rome La Sapienza, Italy

Pierre Kaufmann - CRAAM-Universidade Mackenzie, BR

Roy Booth - HartRAO, SA

Richard Manchester - Australia Telescope National Facility, CSIRO, AU

Yervant Terzian - Cornell University (NY), U.S.A.

Local Organizing Committee - LOC

Joaquim E. Rezende Costa (Chair)

Odylio D. Aguiar

José Carlos Neves de Araújo

Carlos Alexandre Wuensche

José R. Cecatto

José Williams S. Vilas Boas



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Divisão de Astrofísica



RATIONALE

Whether observing with a single antenna or a telescope array, Radio Astronomy has always caused a great impact on our knowledge of the Universe. Since 1950's, radio astronomers working on the issue of spatial resolution have been seeking for improvements in their measurements through a technique known as interferometry, because otherwise the sizes needed for the radio telescopes would be too large and, therefore, increasingly difficult to build.

That is why the 4th edition of INPE's Advanced School in Astrophysics will focus on Advanced Radio Astronomy. Simply put, it will offer an excellent opportunity to discuss particularities of modern radio astronomy in the realm of Astronomy: theory on modern radio interferometry, new radio receiver technologies, modern radio facilities, either already operating or planned for the upcoming decade. Also, potential applications are considered in the context of traditional and new scientific challenges such as the origin and evolution of the Universe, origin of life, new planetary systems, star formation, search for extraterrestrial intelligence, molecular synthesis, dark energy, pulsar investigations, energy storage-release processes, and gravitational wave detection.

As in many other fields of experimental research, Radio astronomy progressed in parallel with modern technologies, sometimes borrowing from them, sometimes pushing to a new lever. This partnership can be clearly seen in the development of receivers, cryogenics and state-of-the-art electronics. The free-fall trajectory of prices of electronic components in the last 20-30 years, particularly the Low Noise Amplifiers (LNA), made possible to build extremely sensitive receivers that allows for present measurements of physical observables that were unbelievable when Karl Jansky collected the first radio data from the Galaxy, in the 1930s. On the other hand, multibeam receivers and large area facilities are already changing the present paradigm of data acquisition rate and expected sensitivity, with impact not only in the astrophysical science (more data, more sources, deeper in redshift, in less observing time) but also in the efficiency of operation. SKA, LOFAR, ALMA, EVLA and HAUCA, among others, represent the state-of-art technology to face the pioneering scientific challenges of this new century.

The 4th INPE Advanced School in Astrophysics is an excellent opportunity for PhD students, pos-docs and reserchers from other areas to enter the Radioastronomy world, getting acquainted with its techniques, state-of-the-art instrumentation, operating facilities and the wonderful science that can be accessed through it.

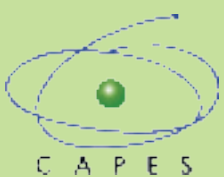
All the abovementioned topics will be addressed at INPE's IV Advanced School on Astrophysics by a team of expert lecturers:

Prof. Richard A. Perley graduated from the University of Maryland in 1977. He held a post-doctoral position at the VLA from 1977 through 1980, when he was appointed to the VLA's permanent staff. His research work through the mid 1990s was focussed primarily on radio galaxies and quasars, utilizing the VLA's extraordinary new capabilities for detecting and resolving these distant objects. In the mid 1990s, he was appointed the Expanded Very Large Array Project Scientist, and has since devoted most of his time to the development and testing of the greatly expanded capabilities of this facility.

Prof. James Cordes research interests include radio astronomy, neutron stars, pulsars, the interstellar medium, the search for extraterrestrial intelligence, signal processing techniques, statistical inference, and topics in computer science. He regularly makes observations using radio telescopes in Arecibo, Puerto Rico, the Very Large Array in New Mexico, the Parkes telescope in Australia, and the Very Long Baseline Array, headquartered in New Mexico. Cordes also makes infrared and optical observations using the Hale Telescope at Palomar and has taken part in joint radio and gamma-ray observations using the Compton Gamma-ray Observatory and X-ray Timing Explorer. He also uses the Hubble Space Telescope and the Chandra X-ray Satellite in his multiwavelength work. He is currently planning observations using the upgraded Arecibo Observatory and a new multiple-feed receiver system that involve deep searches for radio pulsars. He is also heavily involved in the Square Kilometer Array project, a next-generation radio telescope.

Prof. Paolo de Bernardis teaches Astrophysics and Observational Cosmology at the University Rome La Sapienza. He devoted his research activity, since 1982, to measurements of the Cosmic Microwave Background anisotropy and polarization. He has developed several balloon experiments including the very successful BOOMERanG, which detected for the first time oscillations of the primeval plasma. His expertise is in instrument development, including detector technologies (bolometers and KIDs), polarization modulators, mm-wave telescopes, calibrators, cryogenic systems. He is one of the Co-Investigators of the High Frequency Instrument on the Planck CMB mission. He has been awarded the Feltrinelli Prize (2001), the Balzan Prize (2006), the Dan David Prize (2009) and the Cocconi Prize (2011).

Prof. George Hobbs works as research scientist at CSIRO Astronomy and Space Science in Sydney, Australia. George's expertise is in studying radio observations of pulsars and has produced the standard software used Worldwide for analysing pulsar timing observations. He currently has a leading role in the Parkes Pulsar Timing Array project which has the main goal of making the first direct detection of gravitational waves. The project also has numerous secondary goals including searching for irregularities in terrestrial time standards, improving the Solar System ephemeris, studying the pulsar properties, probing the interstellar medium and using the pulsars as deep-space navigational aids.



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PRELIMINARY PROGRAM

Radio Astronomy for the 21st Century

Course I: General concepts of radio interferometry and image synthesis

Lecturer: Prof. Richard A. Perley (NRAO)

email: rperley@nrao.edu

Basic Interferometry I: Fundamentals, and the relation between Brightness and Visibility

Basic Interferometry II: Application to specific Geometries, with examples.

Polarimetry.

Imaging, Deconvolution, and Self-Calibration I: The essentials with application to narrow-band cases.

Imaging, Deconvolution, and Self-Calibration II: Advanced topics, wide-band applications, and non-coplanar baselines.

Course II: Compact Objects, the Dynamic Radio Sky, and 21st Century Radio Telescope Facilities

Lecturer: Prof. James Cordes (Cornell University)

email: jmc33@cornell.edu

Neutron Star and Compact Object Astrophysics

Plasma Propagation Effects (relevant to pulsars, transients, and VLBI)

Precision Astrometry (pulsar distance scale and velocities, Galactic center, Hubble constant, planet detection)

The Dynamic Radio Sky (transient and variable sources; underlying physics, detection methods)

New Radio Arrays and their Key Science Areas

Course III: CMB

Lecturer: Prof. Paolo de Bernardis (University of Rome La Sapienza, Italy)

email: paolo.debernardis@roma1.infn.it

Polarization

Lensing,

Sunyaev and Zel'dovich effect

Instrumentation breakthrough

Course IV: Gravitational Wave Detection with radio pulsar timing arrays

Lecturer: Prof. George Hobbs (CSIRO)

email: george.hobbs@csiro.au

Radio pulsars,

PTA (theory with single antenna, noise response to a GW signal, sensitivity),

Groups and Projects (SKA and others: Nanograv, PPTA, EPTA)

SCHEDULE

	Monday	Tuesday	Wednesday	Thursday	Friday
9:00-10:15	I	II	III	IV	II
10:15 - 10:45			COFFEE-BREAK		
10:45 - 12:00	II	III	IV	I	II
12:00 - 14:00			LUNCH		
14:00 - 15:15	III	IV	I	II	I
15:15 - 15:45			COFFEE-BREAK		
15:45 - 17:00	IV	III	III	I	IV



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LECTURES

Richard A. Perley - National Radio Astronomy Observatory (NRAO), U.S.A.
General concepts of radio interferometry and image synthesis

- Lecture 1
- Lecture 2
- Lecture 3
- Lecture 4
- Lecture 5

James Cordes
State of the art interferometry and related science

- Lecture 1
- Lecture 2
- Lecture 3
- Lecture 4
- Lecture 5

Paolo de Bernardis - University of Rome La Sapienza, Italy
Cosmic Microwave Background

- Lecture 1
- Lecture 2
- Lecture 3
- Lecture 4
- Lecture 5

George Hobbs - Australia Telescope National Facility, CSIRO - Australia
Gravitational Wave Detection with radio pulsar timing arrays

- Lecture 1
- Lecture 2
- Lecture 3
- Lecture 4

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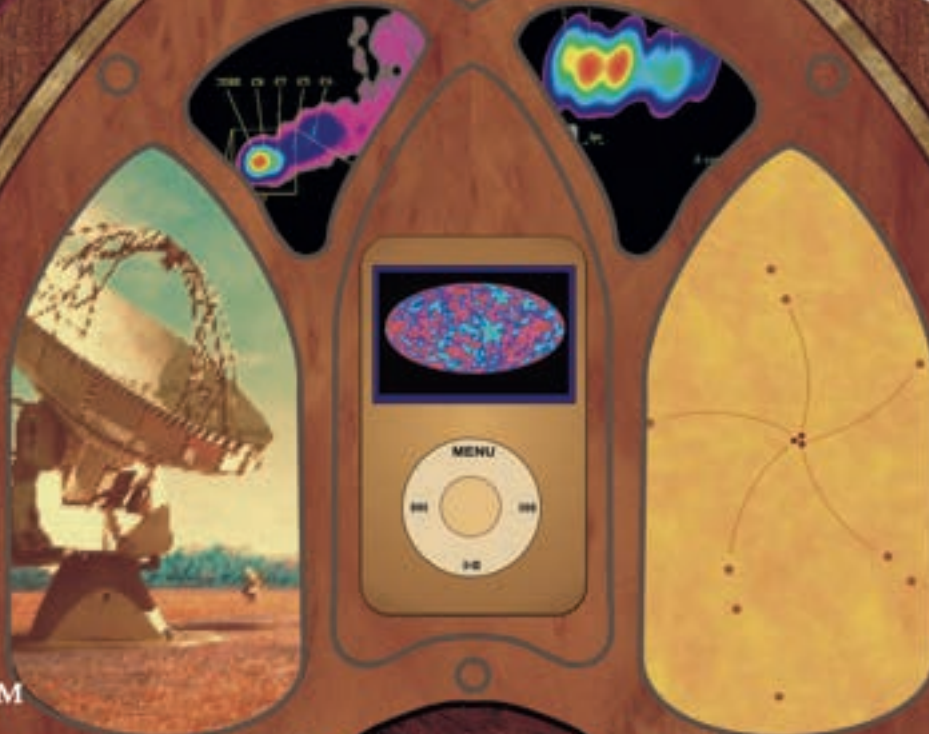


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IV INPE ADVANCED SCHOOL ON
ASTROPHYSICS

RADIO ASTRONOMY for the 21st Century



PROGRAM

General concepts of radio
interferometry and
image synthesis

Prof. Richard A. Perley
National Radio Astronomy
Observatory (NRAO) - NM/USA

State of the art interferometry
and related science

Prof. James Cordes
Cornell University - NY/ USA

Cosmic Microwave Background
(CMB)

Prof. Paolo de Bernardis
Università degli Studi di
Roma "La Sapienza" - Italy

Gravitational Wave Detection
with radio pulsar timing arrays

Prof. George Hobbs
Australia Telescope National Facility
CSIRO - Australia

São José dos Campos - SP
BRAZIL

September 12 - 16, 2011



Local Organizing Committee (LOC):

J. E. R. Costa (Chair)
O. D. Aguiar
J. C. N. de Araujo
C. A. Wuensche
J. R. Cecatto
J. W. S. Vilas Boas

Scientific Organizing Committee (SOC):

Domingos Barbosa
Instituto de Telecomunicações
Portugal

Gordon Hurford
SSL - Berkeley University/USA

Hanumant Shankar Sawant
INPE/Brazil

Kyoto Shibasaki
NAO/Japan

Marco Bersanelli
INFN/Italy

Pierre Kaufmann
CRAAM - Universidade Mackenzie
Brazil

Roy Booth
HartRAO/USA

Richard Manchester
Australia Telescope National
Facility - CSIRO / Australia

Yervant Terzian
Cornell University (NY)
USA

<http://www.das.inpe.br/school/>



Ministério da
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São José dos Campos (SJC)



With an estimated population of almost 700.000, São José dos Campos (SJC) is presently the 4th largest city in the state of São Paulo, and the largest and most important in the Paraíba Valley. Its area was first occupied in 1590 by a cattle farm, where today is the borderline between SJC and Jacareí cities. It received the status of town in April 22, 1864 and received its present name in 1871.

SJC is one of the largest industrial and technological centers of the country and the home of well known research centers, such as the Instituto Nacional de Pesquisas Espaciais (INPE), the Comando-Geral de Tecnologia Aeroespacial (DCTA), the Instituto Tecnológico da Aeronáutica (ITA), the Universidade do Vale do Paraíba (UNIVAP), and the Universidade Estadual Paulista "Julio de Mesquita Filho" (UNESP). São José dos Campos is also the home of EMBRAER (Empresa Brasileira de Aeronáutica), the 3rd largest aircraft company in the world, the largest and second oldest GM (General Motors) plant in Brazil, started 1958, and many other technological and electronics industries, totaling more than 700 companies.

Due to its privileged geographical position, between the mountain chains of Mantiqueira and Serra do Mar, SJC is very close to excellent leisure opportunities at the beach or up in the mountains. It is located between the metropolitan areas of Rio de Janeiro (330 km North), in Rio de Janeiro state, and São Paulo (80 km South), the two largest Brazilian cities.

How to get to SJC from São Paulo International Airport (Guarulhos)

By Car

From São Paulo International Airport to São José dos Campos take the Rodovia Presidente Dutra (Highway São Paulo-Rio de Janeiro. Distance: 79 Km = 50 Miles) or take the Rodovia Ayrton Senna (Rodovia dos Trabalhadores), drive 65 km and then merge to Rodovia Presidente Dutra driving more 23 km until São José dos Campos-SP (total of 88 km).

By Bus - Company Pássaro Marrom

Telephone numbers: (011) 6445-2505, 6445-3783 and 6445-3811
(012) 3921-9892

Site: www.passaromarron.com.br

Place: Terminal of Passengers 1 - wing A - Arrival Floor

Terminal of Passengers 2 - wing D - Arrival Floor

Schedules of exits from the Airport to São José dos Campos:

08:00 - 13:00 - 17:15 - 22:00

Schedules of exits from São José dos Campos to the Airport:

06:30 - 10:30 - 15:30 - 20:00

Service: 24h00.

Estimated Price: R\$ 200,00 = US\$ 90,00

By Taxi - Special Taxis

Telephone Number: (011) 6440-7070.

Place: Terminal of Passengers 1 - wing B - Arrival Floor

Terminal of Passengers 2 - wing C - Arrival Floor

Service: 24h00.

Estimated Price: R\$ 200,00 = US\$ 90,00

See the road maps



Region Main Attractions

São José dos Campos

Parque da Cidade (City Park)

Former house of the Olivio Gomes family. The architectonic design is signed by Rino Levi and landscaping is by Roberto Burle Marx. The park has a great nature area, lake and artificial island, besides tracks for hiking.

Santos Dummont Park

Located in the neighborhood of Vila Adyana, close to downtown São José dos Campos, the park has fish-breeding lakes and lots of birds and has 2 elementary schools. The park houses a unit of the third prototype of the Bandeirante airplane, used by the old National Aeronautics and Space Commission, presently, INPE - National Institute for Space Research. Its located on Rua Eng. Prudente Meirelles de Moraes, 1000.

Banhado (Marsh)

The marshes of São José dos Campos are one of the most beautiful sights of the city, a true postcard. Its green area can be seen form many sites. Locals like to enjoy sunsets there.

Campos do Jordão

Parque Estadual de Campos do Jordão (Campos do Jordão State Park) Created in 1941, the park, also known as "Horto Florestal", offers tracks to hiking, snack-bar, ice-cream parlor, chapel, greenhouse, gymnastics area and picnic areas, restaurant, and souvenir shop. Open daily (from 8 a.m. to 8 p.m.). Address: Av. Pedro Paulo.
Ticket Price: R\$ 15,00 = US\$ 7,00



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HOTELS

The prices below have been quoted in May 26th. Please confirm the values at the booking. The event has no arrangement with any hotel.

Hotel Faro

Address: Rua Siria, 25 - Jd. Oswaldo Cruz - São José dos Campos - SP

Phone: +55 12 3512-9600

E-mail:

Single room: R\$ 119,00

Double room: R\$ 155,00

Plus 5% tax; Breakfast, parking and Internet included.

Hotel Ibis

Address: Av. Dr. Jorge Zarur, 81 - Tour I - Jardim Apolo - S.J. Campos

Phone: +55 12 3904-2400

E-mail: h6035-re@accor.com.br

Single room: R\$ 119,00

Double room: R\$ 119,00

Internet WiFi available, Breakfast: R\$ 13,00/day and Parking: R\$ 7,00/day

Hotel Lareira

Address: Rua Ademar Guedes de Oliveira, 193 - Vila Piratininga (próximo a Rodoviária Nova)

Phone: +55 12 3921-9829

Single room: R\$ 59,00

Double room: R\$ 88,00

Triple room: R\$ 120,00

Breakfast, parking and Internet included.

Hotel Lisboa

Address: Rua Major Antônio Domingues nº 344 - Centro

Phone: +55 12 3921-8155 - +55 12 3921-3564

E-mail: hotelisboa@hotellisboa.net

Single room: R\$ 70,00

Double room: R\$ 95,00

Triple room: R\$ 125,00

Breakfast, parking and Internet included.

Hotel Mercure

Address: Av. Dr. Jorge Zarur, 81 - Tour II - Jardim Apolo - S.J. Campos

Phone: +55 12 3904-2300

E-mail: h5168-re@accor.com.br

Single room: R\$ 194,00 + 5%

Double room: R\$ 214,00 + 5%

Internet WiFi available

Parking: R\$ 7,00/day

Breakfast: R\$ 20,00/day

Hotel Othon Intervale

Address: Rua Lupércio Antônio dos Santos, 31 - VI Bethania - São José dos Campos - SP

Phone: +55 12 3925-5500

E-mail:

Single room: R\$ 144,00

Double room: R\$ 166,00

Triple room: R\$ 196,00

Plus 5% tax; Breakfast, parking and Internet included.

Hotel Plaza

Address: Rua Presidente Bernardes, 33 - Jardim Paulista

Phone: +55 12 3947-7669

Single room: R\$ 74,00

Double room: R\$ 94,00

Triple room: R\$ 114,00

Breakfast, parking and Internet included.

Hotel Pousada Bandeirante

Address: Avenida dos Astronautas, 1021 - Jardim da Granja (está localizado na mesma avenida do INPE)

Phone: +55 12 3922-7506

Single room: R\$ 30,00

Double room: R\$ 50,00

Triple room: R\$ 75,00

Breakfast, parking included.

Hotel San Marco

Address: Avenida Dr. Adhemar de Barros, 457 - Vila Adyana

Phone: +55 12 3922-5244

Single room: R\$ 80,00

Double room: R\$ 105,00

Breakfast, parking and Internet included.

Shelton Inn Hotel

Address: Av. Dr. João Guilhermino, 287 - Centro - São José dos Campos - SP

Phone: +55 12 3941-8588

Single room: R\$ 130,00

Double room: R\$ 145,50

Triple room: R\$ 170,00

Breakfast, parking and Internet included.

Hotel Urupema

Address: Avenida Nove de Julho, 1037 - Vila Adyana

Phone: +55 12 3921-1599

E-mail: hotelurupema@hotelurupema.com.br

Single room: R\$ 95,00

Double room: R\$ 120,00

Triple room: R\$ 150,00

Plus 5% tax; Breakfast, parking and Internet included.

Hotel Varanda

Address: Rua Itororó, 206 - Jardim Paulista (próximo a Rodoviária Nova)

Phone: +55 12 3922-3676

Single room: R\$ 59,00

Double room: R\$ 88,00

Triple room: R\$ 120,00

Breakfast, parking and Internet included.



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Registration is closed



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INPE Advanced Course - I

In Honor of Prof. Jayme Tiomno

September 12-16, 2005

São José dos Campos, SP Brazil

www.das.inpe.br/school

Invited Lecturers

Dr. Robert Caldwell

Dr. Scott Dodelson

Dr. Piero Madau



*A Roadmap
for
Cosmology*

Advisory Board: A. Olinto (U. Chicago, USA), E. Kolb (Fermilab, USA), J. Ostriker (U. Princeton, USA),
M. Novello (CBPF, Brazil), R. Carlberg (U. Toronto, CA), R. R. de Carvalho (INPE, Brazil),
R. Brandenberger (Brown Univ., USA), R. Blandford (Stanford Univ., USA), S. Carroll (U. Chicago, USA)

Local Organizing Committee (INPE): C. A. Wuensche,
C.V. Rodrigues, H. V. Capelato, O. D. Miranda, R. R. de Carvalho



Ministério da
Ciência e Tecnologia



Compact Objects

Home Rationale Program
Lectures Participants Poster
Photos Travel Info



O plug-in Adobe Flash Player não é mais compatível

INPE Advanced Course - II Compact Objects

September 10-14, 2007
São José dos Campos, SP Brazil

Invited Lecturers

Brian Warner
Cataclysmic variables

Kostas D. Kokkotas
Generation mechanisms of gravitational waves

Feryal Özel
Compact objects

Ronald A. Remillard
Accretion processes in neutron stars and black holes

Advisory Committee

- N. Andersson - University of Southampton - United Kingdom
- L. Bildsten - University of California at Santa Barbara - USA
- D. Blair - University of Western Australia - Australia
- A. Bruch - Laboratório Nacional de Astrofísica - Brazil
- M. Coleman Miller - University of Maryland - USA
- V. Ferrari - Università di Roma "La Sapienza" & INFN/Roma - Italy
- J.A. de Freitas Pacheco - Observatoire de la Cote d'Azur - France
- C. Hellier - Keele University - United Kingdom
- J. Horvath - University of São Paulo - Brazil
- J. McClintock - Harvard-Smithsonian Center for Astrophysics - USA
- R. Rothschild - University of California at San Diego - USA
- R. Sunyaev - Max Planck Institute for Astrophysics - Garching - Germany

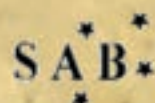
Local Organizing Committee

O. D. Aguiar, J. C. N. de Araujo, J. Braga, F. D'Amico, F. J. Jablonski, O. D. Miranda, C. V. Rodrigues

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Webmaster - Marcelo Bastos

ASTROSTATISTICS



III INPE Advanced Course on Astrophysics Astrostatistics

São José dos Campos - SP - Brazil
September 14 -18, 2009

Invited Lecturers

Tom Lored - Cornell University

Bayesian Statistics: a primer

Hedibert Lopes - University of Chicago

Bayesian Statistics: techniques and implementation

Eric Feigelson - Pennsylvania State

The Frequentist Approach for Astrostatistics

Esther Salazar - Universidade Federal do Rio de Janeiro

Hands-on Activities

Advisory Committee

Dani Gamerman - IM-UFRJ - Brazil

David Weinberg - The Ohio State University - USA

Devinder S. Sivia - St.John's College Oxford - UK

Jogesh Babu - Pennsylvania State - USA

Laerte Sodré Jr - IAG - University of São Paulo - Brazil

Local Organizing Committee

Carlos Alexandre Wuensche

Filívio D'Amico

Francisco Jablonski

José Carlos Neves de Araujo



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