



# INTERNATIONAL SCHOOL OF SPACE SCIENCE

## L'Aquila - ITALY

### Space Astrometry For Astrophysics

3-7 June 2019, L'Aquila (Italy)

#### Programme and Lecturers

##### FUNDAMENTAL ASTRONOMY AND STELLAR SURVEYS

B. Bucciarelli (INAF, Italy)  
*Astronomical reference systems and definition of BCRS/ICRF*

J. de Bruijne (ESA, The Netherlands)  
*The Gaia mission*

M. Ness (Columbia University, USA)  
*An overview of current spectroscopic surveys*

##### ASTRONOMICAL METHODOLOGIES

J. Rybizki (MPIA, Germany)  
*From astrometry to distances and velocities, using Bayesian inference*

M. Ness (Columbia University, USA)  
*Data driven approaches to deriving astrophysical parameters and ages*

J. Rybizki (MPIA, Germany)  
*Reconstructing the selection function of your sample*

##### GALACTIC DYNAMICS AND EVOLUTION OF THE MILKY WAY

J. Hunt (Toronto University, Canada)  
*The dynamical Galactic models*

T. Antoja (IEEC-UB, Spain)  
*Non-equilibrium signatures of the merging history of the Galaxy*

R. Sanderson (University of Pennsylvania, USA)  
*Weighing the Galaxy with Gaia*

##### BOARD OF DIRECTORS:

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U. Villante

##### GLOBAL AND DIFFERENTIAL RELATIVISTIC ASTROMETRY

C. Le Poncin-Lafitte (Obs. Paris, Syrte, France)  
*Relativistic inverse ray-tracing from within the solar system.  
Astrometric lensing one century after 1919*

A. Vecchiato (INAF, Italy)  
*The Global Sphere Reconstruction for Gravitational Astrometry*

S. Bertone (GSFC/NASA, USA)  
*Relativistic astrometric models in comparisons for Gaia*

B. Bucciarelli (INAF, Italy)  
*Methods of differential astrometry from global astrometric data*

##### CHEMO-KINEMATICS OF THE MILKY WAY

J. de Bruijne (ESA, The Netherlands)  
*Galactic clusters resolved by Gaia*

T. Antoja (IEEC-UB, Spain)  
*The kinematics of the Galactic disc(s)*

M. Ness (Columbia University, USA)  
*Unveiling the dynamical+chemical correlations in the Milky Way*

R. Sanderson (University of Pennsylvania, USA)  
*The Galactic halo and the stellar streams*

##### SCIENCE AND PEOPLE

M. Branchesi (GSSI, Italy)  
*Large collaborative research projects, my experience in Virgo-LIGO*

##### GENERAL INFORMATION

The School will be held at the Gran Sasso Science Institute in L'Aquila (<http://www.gssi.infn.it>). The number of participants is limited to 50. Applications, including a brief curriculum vitae, are due before **February 23, 2019**.

See the website [www.cifs-iss.org/application.asp](http://www.cifs-iss.org/application.asp) for details.

The fee of **800 Euro** includes board and lodging in shared double rooms at nearby hotels.

Some financial support will be available for a limited number of students on request.

All applicants will be notified by e-mail.

More detailed information will be provided later.

##### SCHOOL RATIONALE

The offered course is designed for PhD students, post-doctoral fellows and young researchers interested in understanding the scientific construction of the Gaia catalogue and its current and future scientific potential, in synergy with the large spectro-photometric surveys. With ESA's Gaia mission the framework of relativistic astrometry is required to translate photons to astrometric quantities, thus the fields of "Fundamental Astronomy" and "Fundamental Physics" are unified under the perspective of a consistent use of the theory of General Relativity. The lectures will focus on the dynamics, formation and evolution of the Milky Way, as well as on gravitational astrometry, fields of study that are already rapidly expanding after the delivery of Gaia DR2. Astrophysical topics will be addressed from both the theoretical and observational points of view in the context of current and future Gaia data releases, while some sessions will be devoted to practical exercises on the scientific topics and methodologies presented, using data from Gaia DR2.

General topics include fundamental astronomy and stellar surveys, global and differential relativistic astrometry, chemo-kinematics of the Milky Way, Galactic Archeology, and Galactic dynamics. Some specific topics include stellar streams in the halo, stellar clusters, non-equilibrium dynamics in the disk of the Milky Way, inference of physical parameters and, one century after the famous experiment on the light deflection by the Sun in 1919, astrometric lensing.

