

# the International Relativistic Astrophysics Ph.D. Erasmus Mundus Joint Doctorate Program

IRAP PhD

Following the successful scientific space missions by the European Space Agency (ESA) and the European Southern Observatory (ESO) in Chile, as well as the high energy particle activities at CERN in Genève, we have initiated a Ph.D. programme dedicated to create a pool of scientists in the field of relativistic astrophysics. After taking full advantage of the observational and experimental facilities mentioned above, the students of our programme are expected to lead the theoretical developments of one of the most active fields of research: relativistic astrophysics.

This program provides expertise in the most advanced topics of mathematical and theoretical physics, and in relativistic field theories, in the context of astronomy, astrophysics and cosmology. It provides the ability to model the observational data received from the above laboratories. This activity is necessarily international as no single university can have a scientific expertise in such a broad range of fields.

**We announce two calls: one with a deadline on 28 February 2011, sponsored by Erasmus Mundus, and the other with a deadline on 30 September 2011. The Erasmus Mundus program has a very competitive salary as well as comprehensive benefits.**

The Institutions participating in the IRAP PhD are: the international organization ICRANet as coordinating institution and the University of Nice Sophia Antipolis as the host Institution; the Albert Einstein Institute, Potsdam; the Brazilian Center for Physics Research (CBPF) and ICRA Brasil; the Free University of Berlin; Indian Centre for Space Physics, Kolkata; Observatoire de la Côte d'Azur, Nice; Shanghai Astronomical Observatory, China; University of Ferrara, Italy; University of Rome, la Sapienza, Italy; University of Savoie, Annecy, France; University of Stockholm, Sweden, Tartu Observatory, Estonia. The Final Ph.D. degree will be jointly delivered by the Academic Institutions participating in the program.

**We encourage applications from the most qualified and motivated candidates worldwide, independent of nationality, gender or background.**

**The Courses:** Each student will have to follow 180 hours of courses during the three years of the Ph.D. program. There is also a possibility to follow courses from other Physics, Mathematics, Astronomy and Astrophysics Ph.D. programs in each participating institution, after approval by the Faculty. Courses can be chosen from the following list:

**VERY HIGH ENERGY PHENOMENA IN ASTROPHYSICS**

Felix AHARONIAN  
Dublin Institute for Advanced Studies and  
Max Planck Institute für Kernphysik

**COSMOLOGICAL SINGULARITY**

Vladimir BELINSKI - ICRANet

**RELATIVISTIC EFFECTS IN ASTROPHYSICS**

Carlo Luciano BIANCO  
SAPIENZA Università di Roma and ICRANet

**OBSERVERS AND OBSERVABLES IN BLACK HOLE SPACETIMES**

Donato BINI - CNR and ICRANet

**ACCRETIONS ON BLACK HOLES**

Sandip Kumar CHAKRABARTI  
S.N. Bose National Centre and Indian  
Centre for Space Physics

**PARTICLE PHYSICS APPLIED TO ASTROPHYSICS**

Pascal CHARDONNET  
University of Savoie and ICRANet

**GENERAL RELATIVITY**

Thibault DAMOUR  
IHES and ICRANet

**SUPERNOVAE AND GRBS**

Massimo DELLA VALLE  
Osservatorio Astronomico di Capodimonte  
and ICRANet

**LARGE SCALE STRUCTURE**

Jaan EINASTO  
Tartu Observatory and ICRANet

**TOPICS IN COSMOLOGY AND PARTICLE ASTROPHYSICS**

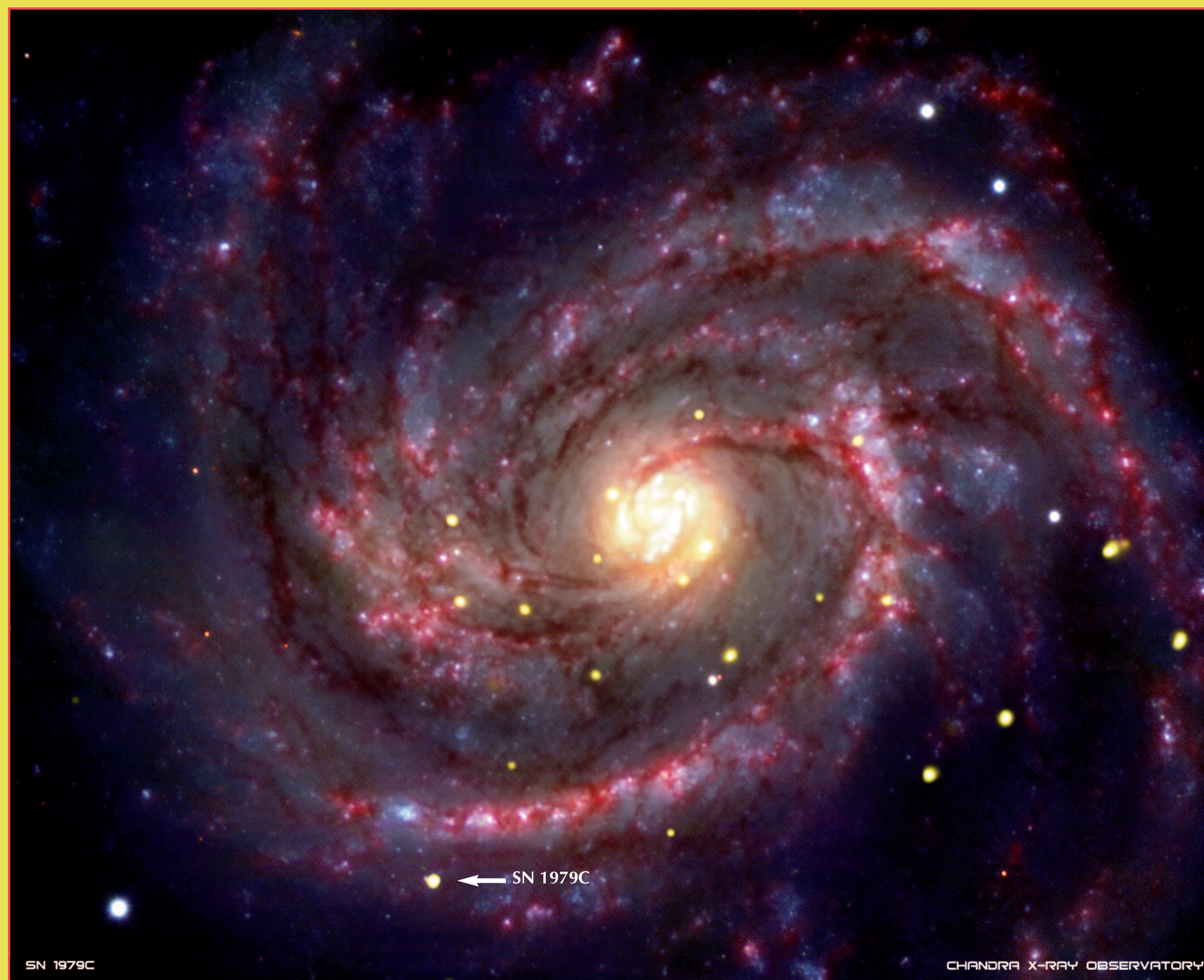
Li Zhi FANG  
University of Arizona and ICRANet

**X/GAMMA-RAY INSTRUMENTATION**

Filippo FRONTERA  
University of Ferrara

**HIGH ENERGY ASTROPHYSICS: X-RAYS CLUSTERS**

Riccardo GIACCONI  
ICRANet



**OBSERVATIONS OF GAMMA-RAY BURSTS**  
Cristiano GUIDORZI  
University of Ferrara

**FORMATION OF GALAXIES**  
Yipeng JING - Shanghai Observatory

**ON THE KERR SOLUTION**  
Roy KERR - ICRANet

**RELATIVISTIC FIELD THEORY**  
Hagen KLEINERT  
Freie Universität Berlin and ICRANet

**HOLOGRAPHY, ENTROPIC GRAVITY AND COSMOLOGY**  
Li MIAO - Academia Sinica Beijing

**BOUNCING COSMOLOGY**  
Mario NOVELLO  
CBPF Brazil and ICRANet

**BKL COSMOLOGY AND HIDDEN SYMMETRIES IN GRAVITY**  
Hermann NICOLAI  
Max-Planck-Institut für Gravitationsphysik  
(Albert Einstein Institut)

**THE HIGH-ENERGY GAMMA-RAY UNIVERSE**  
Marco TAVANI  
INAF-IASF Roma and Università di Roma  
"Tor Vergata"

**SPECTRAL TIMING FROM BLACK HOLE SOURCES**  
Lev TITARCHUK - University of Ferrara

**SINGULARITIES AND GENERAL RELATIVITY**  
Kjell ROSQUIST  
Stockholm University

**BLACK HOLES AND FUNDAMENTAL PHYSICS**  
Remo RUFFINI  
SAPIENZA Università di Roma and ICRANet

**RELATIVISTIC KINETIC THEORY**  
Gregory VERESHCHAGIN  
SAPIENZA Università di Roma and ICRANet

**STRONG COUPLING QED AND ELECTRON-POSITRON PLASMA**  
She-Sheng XUE  
SAPIENZA Università di Roma and ICRANet

- The Faculty**  
Giovanni Amelino-Camelia  
SAPIENZA Università di Roma  
Vladimir Belinski  
SAPIENZA Università di Roma and ICRANet  
Carlo Luciano Bianco  
SAPIENZA Università di Roma and ICRANet  
Donato Bini  
CNR - Istit. per Applicaz. del Calcolo "M. Picone"  
Sandip Kumar Chakrabarti  
Indian Centre For Space Physics, India  
Pascal Chardonnet (Erasmus Mundus Coordinator)  
Université de Savoie  
Christian Cherubini  
Università "Campus Biomedico" di Roma  
Pierre Couillet  
Université de Nice - Sophie Antipolis  
Thibault Damour  
IHES, Bures-sur-Yvette  
Jaan Einasto  
Tartu Observatory  
Simonetta Filippi  
Univ. "Campus Biomedico" di Roma and ICRANet  
Sergio Frasca  
SAPIENZA Università di Roma  
Filippo Frontera  
Università di Ferrara  
Yipeng Jing  
Shanghai Astronomical Observatory, China  
Hagen Kleinert  
Freie Universität Berlin  
Gian Luca Lippi  
Université de Nice Sophia-Antipolis  
Francois Mignard  
Observatoire de la Côte d'Azur  
Hermann Nicolai  
Max Planck Inst. for Gravitational Physics, Potsdam  
Mario Novello  
Brazilian Centre For Physics Research, Brazil  
José Pacheco  
Observatoire de la Côte d'Azur  
Kjell Rosquist  
Stockholm University  
Remo Ruffini (Director)  
SAPIENZA Università di Roma and ICRANet  
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Observatoire de la Côte d'Azur  
Gregory Vereshchagin  
SAPIENZA Università di Roma and ICRANet  
Xue She Sheng  
SAPIENZA Università di Roma and ICRANet

**The Host Institution for the call of 2011-2012** is the Université de Nice-Sophia Antipolis; Grand Château 28 Avenue Valrose 21 B.P. 2135 - 06103 NICE CEDEX 2

**Applications and Fellowships:**  
In 2011-2012, nine positions will be available.  
In the call of February 28, 2011, within the ERASMUS MUNDUS program, full economical support is provided. See <http://www.irap-phd.org>

In the call of September 30, 2011 nine additional fellowships will be available: six with full financial support.  
See <http://www.icra.it> and <http://www.icranet.org>

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