

# IRAP PhD

Consortium Meeting

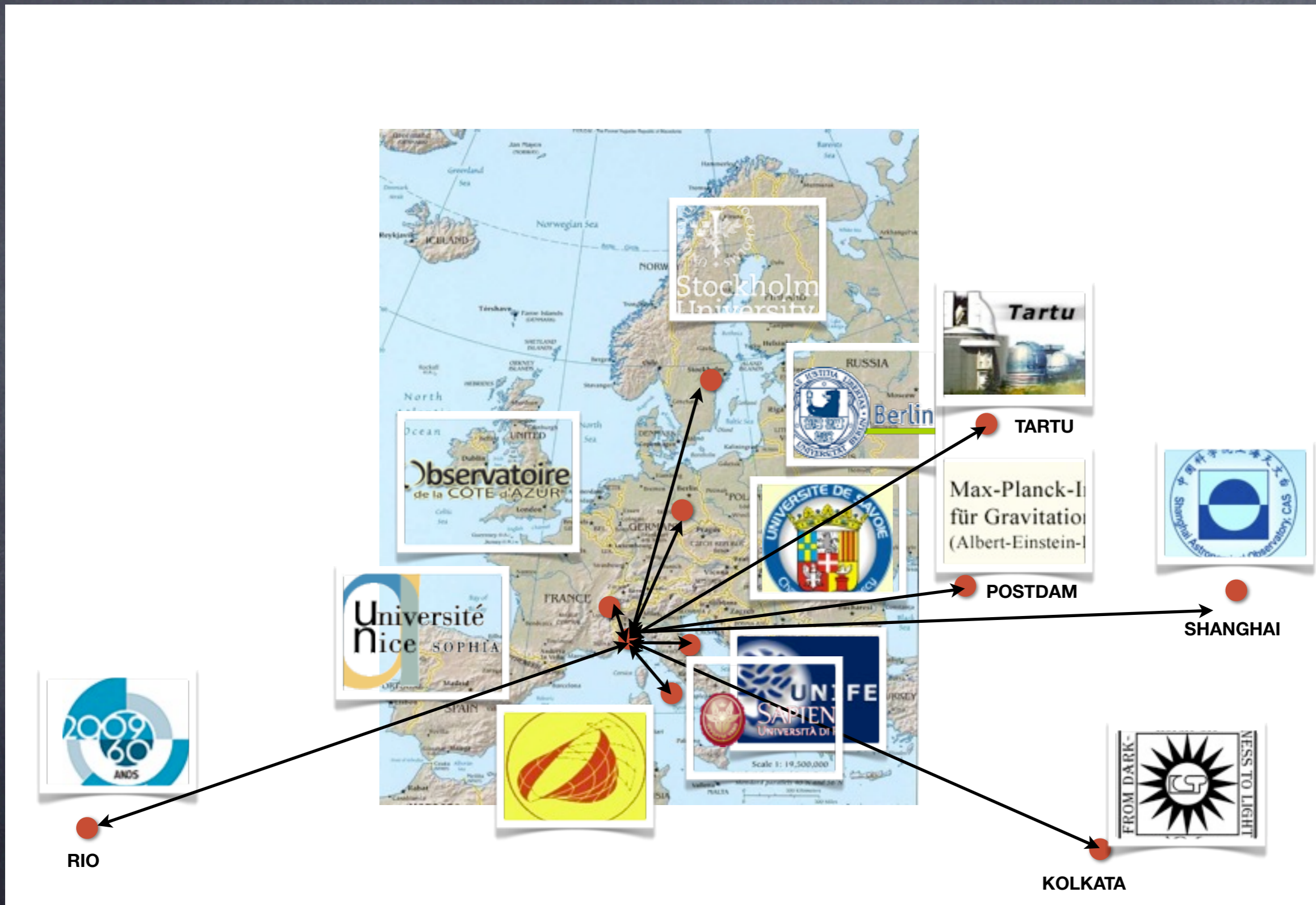
May 30 2011

University of Nice Sophia-Antipolis

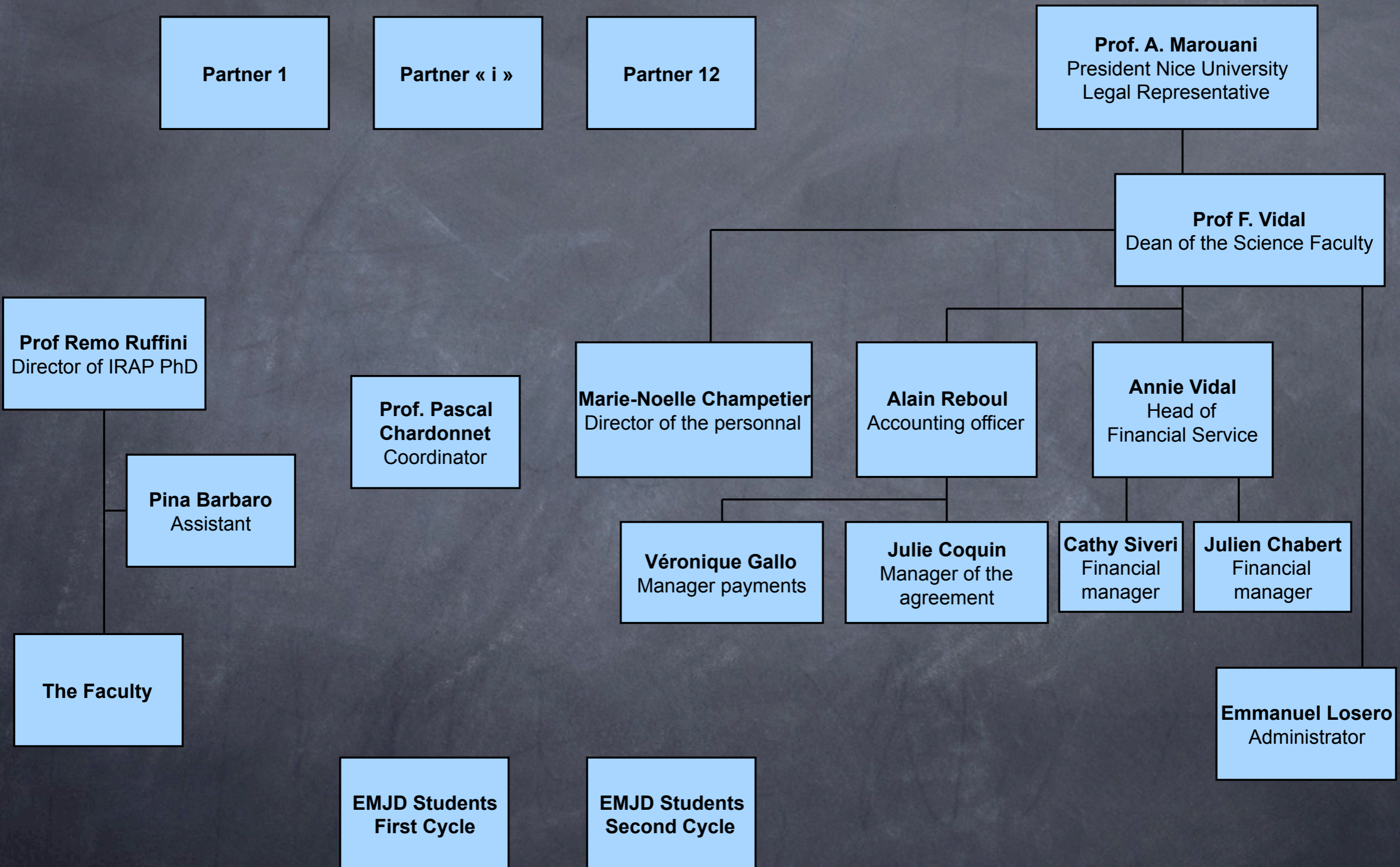
# Foundation of the IRAP PhD: Nice, 2002



# IRAP PhD Consortium



# Organization chart



# Agenda

- Graduate Students status: summary of activities
- Graduate Students admitted in the 2011 call
- Financial situation of Erasmus Mundus program
- Preparation of the new Erasmus Mundus Schools
- Preparation of the new 2012 call
- Admission of new Faculty members
- Request of Membership to the IRAP PhD
- Miscellaneous

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# Andrey BARANOV (Russian)

Supervisors: Prof. Pascal Chardonnet  
Prof. Valery Chechetkin

## Mobility :

1. **Nice, France (Lectures):** from 6th – 30th September 2010 -
2. **Pescara, Italy (Conference, Lectures):** from 1st – 13th October 2010
3. **Pescara, Italy (Conference, Lectures):** from 21st – 26th March 2011 -
4. **Les Houches France (Workshop):** from 3rd – 8th April 2011 -
5. **Nice, France (Conference, Lectures):** from 25st May – 10th June 2011



## **Research Activities**

- **Numerical computation of the explosion of a 100 solar mass star: We already made preliminary simulations of explosion of type Ia supernova to check the consistency of the code developed with theoretical model. We succeed to explode a 100 solar mass with oxygen core in the conditions of pair instabilities.**

## **Work in Progress**

**Explore all the domain of mass between 100 and 200 solar masses.**

- **Work on the radiation spectrum Meeting already registered where the research work will be presented :**
  - **IAU Symposium 279, 18-22 April 2011, Nikko, Japan**
  - **Third Galileo - Xu Guangqi meeting. Beijing (China) 12-16 October 2011**



# Alberto BENEDETTI (Italian)

Supervisors: Prof. Remo Ruffini

Prof. Gregory Vereshchagin

## Mobility :

1. **Nice, France (Lectures):** from 6th – 30th September 2010 -
2. **Pescara, Italy (Conference, Lectures):** from 1st – 13th October 2010
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## **Research Activities**

**Studied the exact Riemann solver in relativistic hydrodynamics. Started looking to its applications for GRBs.**

**- Examined plasma oscillations in a strong electric field, in particular the frequency of oscillations and its relation with the plasma frequency. As a result of this work a paper has been submitted for publication in Physics Letters B (January 2011) and at present it is under review.**

## **Work in Progress**

**Generalization of the study of the pairs plasma for a one dimensional and uniform system, taking into account interactions between particles and including the rate of pairs production by vacuum polarization. Maxwell equations for the electric field must be solved as well. - In order to improve our treatment, we rewrite our equations using momentum components instead of energy and angles.**

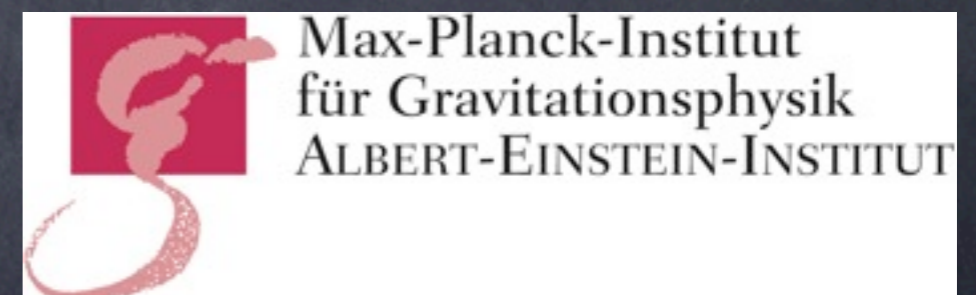
**- Improvement of the available numerical code. - Inclusion of particle degeneracy. - Generalization to higher dimensions.**

# Parikshit DUTTA (Indian)

Supervisor: Prof. Hermann Nicolai

## Mobility :

1. **Nice, France (Lectures):** from 6th – 30th September 2010 -
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3. **Pescara, Italy (Conference, Lectures):** from 21st – 26th March 2011 -
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# Research Activities

**Derivation of the DeWitt equation for the N=4 SUSY Lagrangian in 4 dimensions and also for 10 dimensions.**

**Looking at cancellation of divergences in the equations.**

## Work in Progress

**Showing the cancellation of divergent terms in DeWitt's equation.**

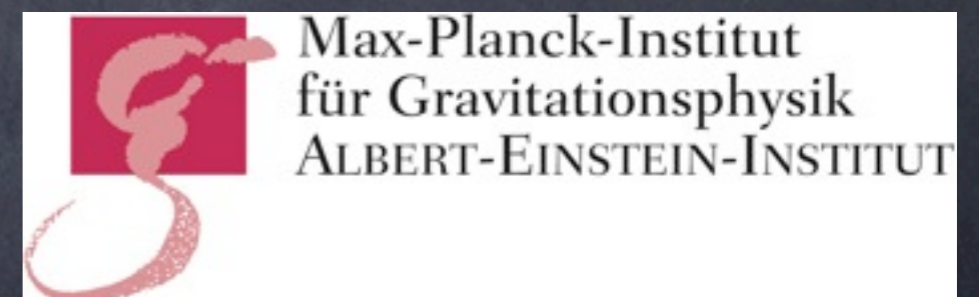
**Attempt fully non-perturbative formulation of DeWitt's equation for D=2 Wess Zumino model.**

# Philipp FLEIG (German)

Supervisor: Prof. Hermann Nicolai

## Mobility :

1. **Nice, France (Lectures):** from 6th – 30th September 2010 -
2. **TEXAS Meeting 2010** in Heidelberg
3. **CERN Winter School on Supergravity, Strings and Gauge Theory 2011**
4. **Nice, France (Conference, Lectures):** from 25st May – 10th June 2011



# Research Activities

**In a recent publication, done in collaboration with H. Nicolai and M. Köhn, we have managed to give a complete, geometric description of the billiard table mentioned above, as well as to calculate its volume. My current work is concerned with the symmetries, which arise in Arithmetic Quantum Gravity. I am working on this in collaboration with H. Nicolai and V. Belinski.**

## Work in Progress

**Finding a modular realisation of the Weyl group for non-simply laced algebras**

**Investigating the properties of  $E_n$  Laplace-Beltrami operators**

**Extending these considerations to  $E_{10}$  and beyond its Cartan subalgebra**

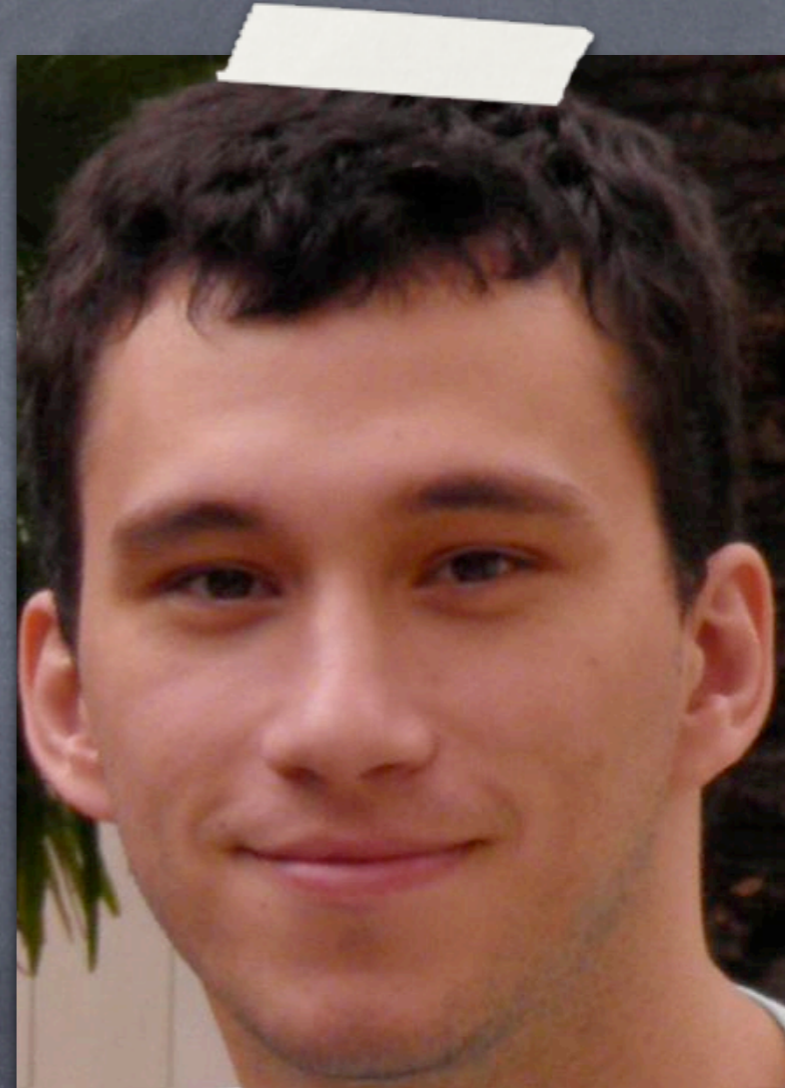
# Bernardo FRAGA (Brazilian)

Supervisors: Prof. Remo Ruffini

Prof. Massimo della Valle

## Mobility :

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# Research Activities

**We study the theory of galaxy formation, both observational and numerical analysis, and try to obtain the properties of the Dark Matter particle. Also we study a new way of determining Supernova rates.**

## Work in Progress

- Either extend the possible mass range for the neutrino or propose a new candidate for dark matter, and study its interactions;**
- Study the decoupling properties of such a particle;**
- Try to fit this particle to reproduce the properties of clusters of galaxies and of the center of our galaxy**
- Determine the rate of distant supernova using gravitational lensing**



# Christine GRUBER (Austrian)

Supervisor: Prof. Hagen Kleinert

## Mobility :

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# Research Activities

**Numerical computation of the motion of spacetime near a singularity following the BKN equations**

**Numerical computation of two black holes in orbit round each other**

## Work in Progress

**Next step will be the calculation of a movie showing the orbital motion of two black holes around each other followed by a merging of the two into a single Kerr solution and a burst of gravitational radiation**

# Vincenzo LICCARDO (Italian)

Supervisor: Prof. Filippo Frontera

## Mobility :

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# **Research Activities**

**In the first part of this period Vincenzo Liccardo studied the features of the X-ray facility of Ferrara (LARIX) and its properties, giving attention to the production of X-rays and to the properties of the X-ray tubes. He studied the principle of the Laue diffraction in transmission configuration and the properties and performances of the detectors to be used for our goals.**

**Moreover, he focused on the scientific case related to the study of X-rays coming from compact astrophysical sources, in particular their temporal and spectral signals, and the astrophysical mechanisms of X-rays emission processes.**

## **Work in Progress**

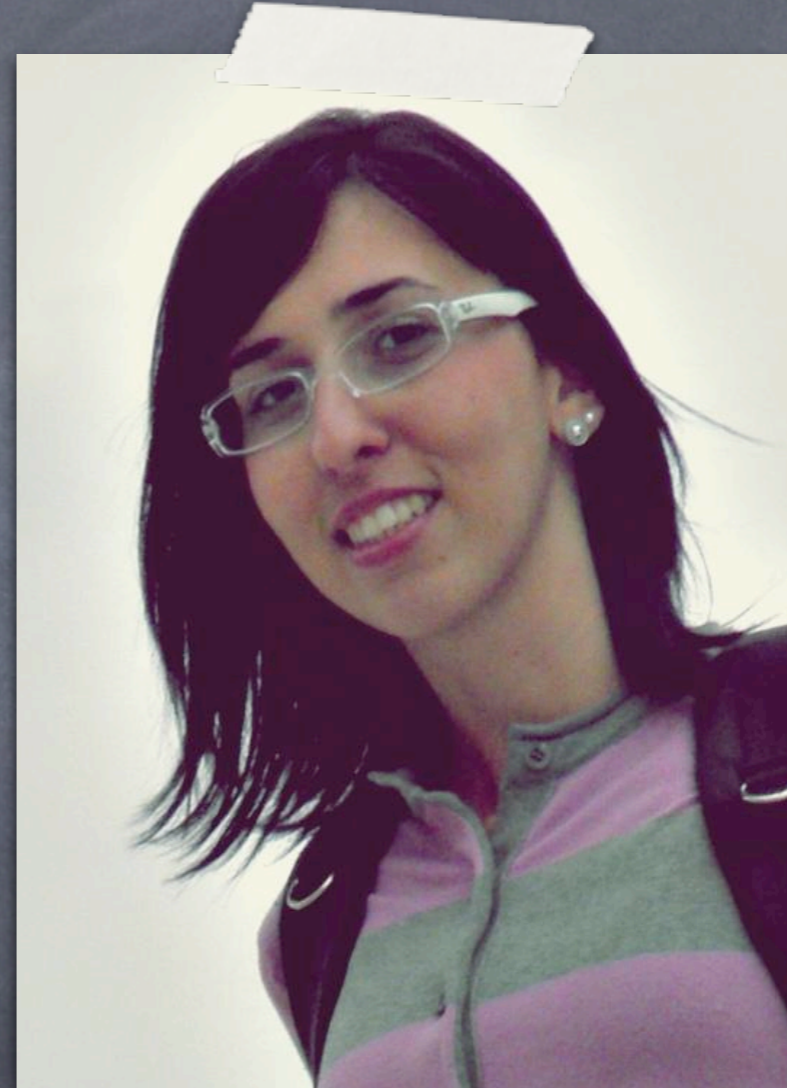
**First he will contribute to the assembly of a new prototype of focusing Laue lens, made of 20 crystals and 6 m focal length, using a new technological procedure with respect to past built experiments in the same facility. The results will be presented next August at the SPIE conference.**

# Sheyse MARTINS (Brazilian)

Supervisors: Prof. Remo Ruffini  
Prof. Jorge Rueda

## Mobility :

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# Research Activities

**A self-consistent theory of neutron stars including Fermi-Dirac statistics, weak, strong as well as electromagnetic interactions in the framework of general relativity is formulated. The properties of neutron star equilibrium configurations are calculated and the consequence of the inclusion of the electromagnetic interactions on the process of gravitational collapse to a black hole is studied in detail.**

## Work in Progress

**The observation of the late X-ray emission of the Gamma-Ray Bursts (GRBs) associated to Supernova explosions within the so-called GRB-Supernova connection problem has evidenced the possibility of witnessing the thermal evolution of neo-neutron stars: neutron stars just formed in the Supernova event with expected very large temperatures of tens of billion degrees. Therefore, we are exploring the effects of very large temperatures on the equation of state of nuclear matter at high densities important for neutron stars as well as on the different emission mechanisms leading to the cooling of such newly-born neutron stars.**

# Ana PENACCHIONI (Argentinian)

Supervisor: Prof. Remo Ruffini

## Mobility :

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# Research Activities

**I am learning to reduce the data of many satellites like Fermi, Swift and BATSE, and then build their light curves and spectra through specific tools and codes. Then, by means of theoretical models and applying all the knowledge of physics I have, I try to explain the observed behavior and arrive to any conclusion.**

**There are currently many models which are the leading ones and most of the scientists use for their research work, but at the same time there are many controversies about which is the one to use.**

# Work in Progress

**The main objective of my work is to reach their complete understanding so that I can make my own way through this field, taking the best part of each one and merging them in a single improved approach.**



# Vineeth VALSAN (Indian)

Supervisor: Prof. Filippo Frontera

## Mobility :

1. **Nice, France (Lectures): from 6th – 30th September 2010 -**
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## **Research Activities**

**The main goal of the thesis is the study of a broad band (1-600 keV) multi-optics telescope configuration for unprecedented observations of Galactic and extragalactic objects. While at energies below 70/100 keV, the technology for building focusing optics (based on multilayers) is already mature (a NASA mission, NUSTAR, is scheduled to be launched in one year time, while a JAXA mission with focusing optics up to 70 keV is in progress), focusing optics at higher energies are still lacking**

## **Work in Progress**

**He will participate to the assembling of a Laue lens prototype made of 20 crystals, by estimating the mosaic crystal parameters, correcting for the effect of diverging beam. He will present results of this activity at the next SPIE Optical Engineering and Applications Conference to be held in the last week of August 2011 in San Diego (Ca, USA).**

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- Miscellaneous

## • Category A

1. Jonas PEREIRA  
(Brazil) M
2. David FRENCH  
(USA) M
3. Shabnam IYYANI  
(India) F
4. Martiros KHURSHUDYAN  
(Armenia) M
5. Yuanbin WU  
(China) M

## • Category B

1. Antonia KARAMATKOS  
(Greece) F
2. Daniele GREGORIS  
(Italy) M
3. Marcio FERREIRA  
(Portugal) M

## • Western Balkans and Turkey Window

1. Husne DERELI  
(Turkey) F

# Administration

- Acceptance letter: already sent
- Convention d'accueil: to be signed in Prefecture.
- Close contact with them via email.
- Next Week: send to the students for VISA procedure
- Preparation of employment contracts and student card, social security.
- Welcome in Nice: September 1 2011

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Education, Audiovisual and Culture Executive Agency

Erasmus Mundus and External Cooperation

Edition 2011  
New Agreement  
will be signed  
and send  
to Brussels

**SPECIFIC GRANT AGREEMENT  
FOR AN ACTION Nr 2011 - 1640 / 001 - 001 - EMJD  
within the  
FRAMEWORK PARTNERSHIP AGREEMENT  
Nr 2010-0011**

This specific grant agreement ("the agreement") is concluded between:

the Education, Audiovisual and Culture Executive Agency ("the Agency"), acting under powers delegated by the Commission of the European Union, and represented by Mr. José GUTIERREZ, Authorising Officer by sub-delegation for Erasmus Mundus and External Cooperation,

of the one part,

and

**UNIVERSITE DE NICE SOPHIA ANTIPOLIS ,**

AVENUE VALROSE, 28  
Grand Château  
2135  
F - 06103 NICE CEDEX 02

("the partner"), represented for the purposes of signature of this agreement by **Albert MAROUANI**

of the other part.

The following annexes form an integral part of the agreement:

- Annex I: List of doctoral candidates selected to participate in the Erasmus Mundus Joint Doctorate Programme**
- Annex II: Estimated budget for the action**
- Annex III: Progress report and further pre-financing request form**
- Annex IV: Final report form**
- Annex V: Administrative and Financial Handbook**
- Annex VI: Minimum Insurance Requirements**

The terms set out in the conditions shall take precedence over those in the Annexes.

# Budget for Edition 2011

## Annex II: Estimated Budget for the Action

Framework Partnership Agreement:  
Title:

**2010-0011**  
**International Relativistic Astrophysics**  
**Doctorate Program**

Type of fellowship	Number of candidates	Unit cost per candidates (in €)			EU grant proposed (in €)
		Contribution to travel, installation, etc.	Participation Costs	Living Allowance	
EM Cat A EMJD	5	7.500 €	21.600 €	100.800 €	649.500 €
EM Cat B EMJD	3	3.000 €	21.600 €	100.800 €	376.200 €
Western Balkans and Turkey Window	1	7.500 €	21.600 €	100.800 €	129.900 €
<b>Running cost contribution</b>					50.000 €
<b>TOTAL</b>					<b>1.205.600 €</b>



# Queries

- 1. Is it possible to use the 3000 euros grant for any international meeting outside Europe ?**
- 2. Is possible to incorporate inside mobility the international meetings?**

# Budget for Edition 2010

**Annex II:** Table indicating the composition of the envisaged grant amount proposed in the framework of the Erasmus Mundus Joint Doctorate Programme Category A & Category B Fellowship selection for the Academic Year 2010-2011

**Framework Partnership Agreement:** 2010-0011  
**Title:** International Relativistic Astrophysics Doctorate Program

**Duration of the EMJD Programme:** 36  
**Type of EMJD Programme:** Laboratory based

Type	N of candidates	Unit cost per candidates (in €)	Community grant proposed (in €)
Erasmus Mundus Cat A EMJD fellowships with employment contract	6	129.900	779.400
Erasmus Mundus Cat A EMJD fellowships with stipend	0	0	0
Erasmus Mundus Cat B EMJD fellowships with employment contract	4	125.400	501.600
Erasmus Mundus Cat B EMJD fellowships with stipend	0	0	0
Running cost contribution			50 000
<b>TOTAL</b>			<b>1.331.000€</b>

## *Convention Astrophysics Expenses*

Student	Sum	Types of expenditure
Baranov	3 651,10	<b>Students fees</b>
Benedetti	166,30	
Penacchioni	3 500,00	
Martins	3 851,30	
Valsan	3 500,00	
Fraga	3 843,92	
Gruber	305,86	
Fleig	316,97	
Dutta	3 756,84	
<b>SUM</b>	<b>22 892,29</b>	
Frontera	122,00	<b>Professors</b>
Amato	122,00	
Bianco	74,99	
Palmkvist	209,14	
Farinelli	286,75	
Della Valle	780,20	
Chakrabarti	1 514,47	
Chardonnet	2 460,26	
Kobayashi	243,55	
<b>SUM</b>	<b>5 813,36</b>	

Printer Brother (UGAP)	485,92	<b>Management fees</b>
Consumables (Europa)	677,65	
Office supplies (Fiducial)	90,71	
Icranet refund	10 811,45	
Article PhD positions (Nature)	5 266,20	
Mirabeau hotel (September courses Nice)	395,40	
<b>SUM</b>	<b>17 727,33</b>	
University of Ferrara	12 000,00	<b>Universities (operating expenses)</b>
Max Planck Institute of Potsdam	12 000,00	
University of Berlin	6 000,00	
University of Roma	24 000,00	
University of Savoy	6 000,00	
<b>SUM</b>	<b>60 000,00</b>	
	<b>106 432,98</b>	

On 05/24/2011

Being assigned to the Office of International Projects Erasmus Mundus, **Mr Emmanuel Losero** deals with the "EMJD International Relativistic Astrophysics" in taking care of orders, mission's orders and refunds or bills payment as well as verifying that the students are paid every month and by maintaining the budget. This project is under the supervision of the Faculty of Science directed by the Professor Vidal.

At the accounting office, **Mrs. Julie Coquin** is responsible for collecting EACEA revenue in order to place the dates of opening and closing of the agreement. She manages the "project builder", that is to say that she organizes the credits in 2 parts: one part "operating costs" and one "payroll" in accordance with the convention established by the EACEA.

She also establishes thresholds limiting expenditures and the financial center where the credits are.

On the other hand, Emmanuel Losero closely works with the Finance department of the Faculty of Sciences, led by **Mrs. Annie Vidal**, through Mrs. Cathy Siveri who checks the expenses, then Mrs. Veronica Gallo from accounting agency makes payments.

Finally, **Julien Chabert** saves providers records on the software "SIFAC" so that banking informations could be stored in the database.

The Accounting office also performs the grants' payment.

**Pina Barbaro** is in close contact with the students for Bank account, Social security problem, booking rooms in Nice

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# Schools of last year

- 1. Nice, France (Lectures): from 6th – 30th September 2010 -**
- 2. Pescara, Italy (Conference, Lectures): from 1st – 13th October 2010**
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# Propositions for next year

- 1. Nice, France (Lectures): from 1th – 30th September 2011**
- 2. Les Houches France (Workshop): from 2st – 7th October 2011 -**
- 3. 3rd Galileo-Xu Guangqi Meeting : October 11-15, 2011  
Beijing, China**
- 4. Les Houches April 15 - May 5, 2012**
- 5. 13 th Marcel Grossmann Meeting in Stockholm University**



# Evaluation of the students

- Publications
- Acknowledgement of EAC Executive Agency Erasmus Mundus
- Active participation of International meetings
- Evaluation of the participation in the EM schools

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# New Erasmus Mundus Call 2012

Deadline  
February 28, 2012

# Guideline

- Website: [www.icranet.org](http://www.icranet.org)
- Website: [www.irap-phd.org](http://www.irap-phd.org)
- Poster
- Mailing lists
- Adverts: CERN, Nature, Science

# Queries

- Number of Grants ?
- Same groups: Cat A, Cat B, Western Balkans and Turkey Window ?

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# Our Faculty

## Observatoire de la Côte d'Azur

J. Pacheco  
F. Mignard  
F. Vakili

## University of Nice Sophia-Antipolis

P. Coulet  
G.L. Lippi  
V. Belinski

## University of Roma La Sapienza

R. Ruffini  
G. Amelino Camelia  
S. Frasca

## International Center for Relativistic

Astrophysics Network  
G. Vereshagin  
S.S. Xue  
C. Bianco

## University of Savoie

P. Chardonnet

## University of Stockholm

J. Rosquist

## Freie University of Berlin

H. Kleinert

## Albert Einstein Institute

H. Nicolai

## University of Ferrara

F. Frontera

## Tartu Observatory

J. Einasto

## Brazilian Centre for Theoretical Physics

M. Novello

## Indian Center for Space Physics

S. Chakraborti

## Shanghai Astronomical Observatory

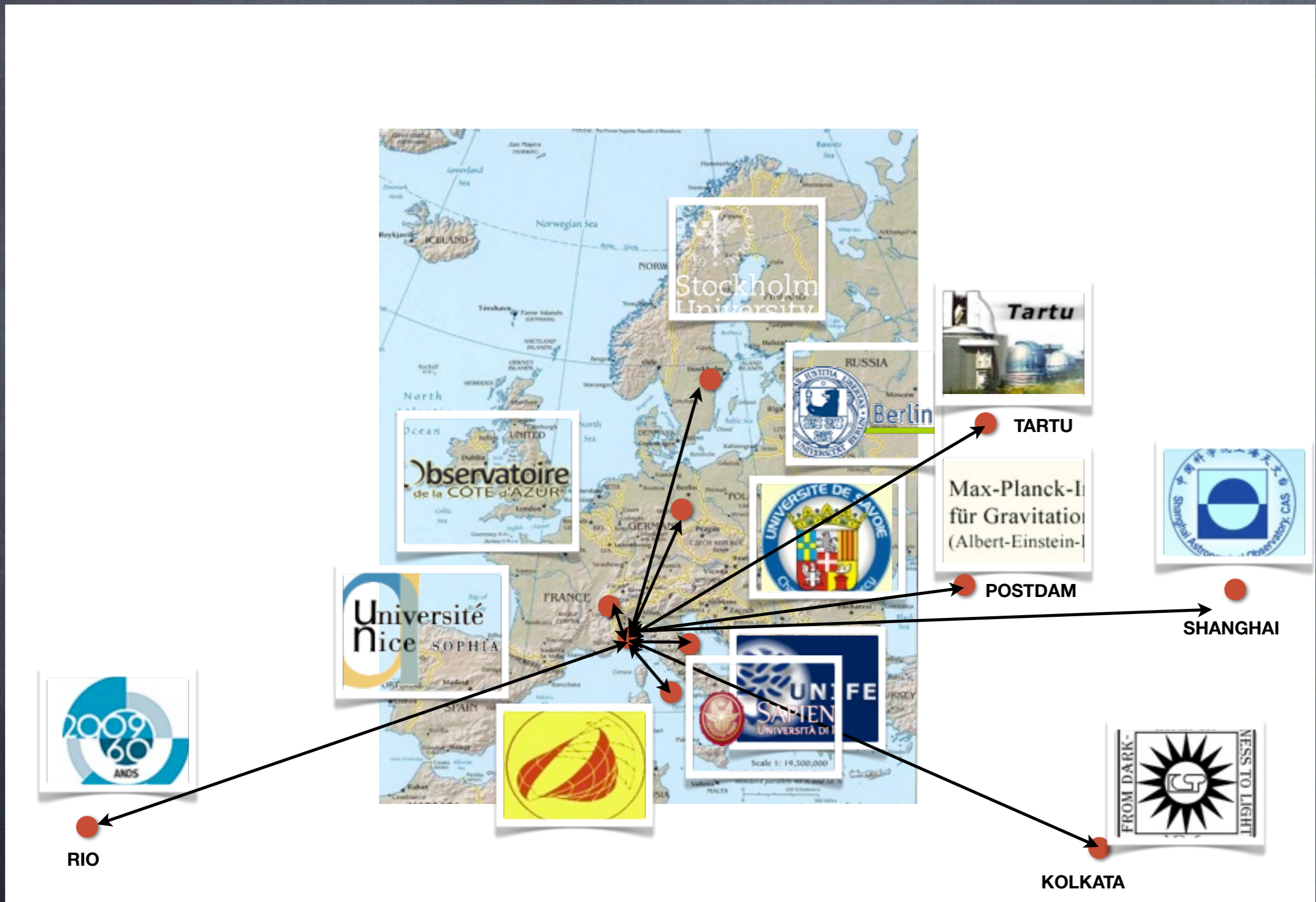
J. Yipeng

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# IRAP PhD Consortium



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- Next Report for Brussels: september 2011
- Our Next Consortium Meeting
- Conclusions

**Thank You**