

# SISSA: TODAY AND TOMORROW

Stefano Ruffo, SISSA Director





# Paolo Budinich

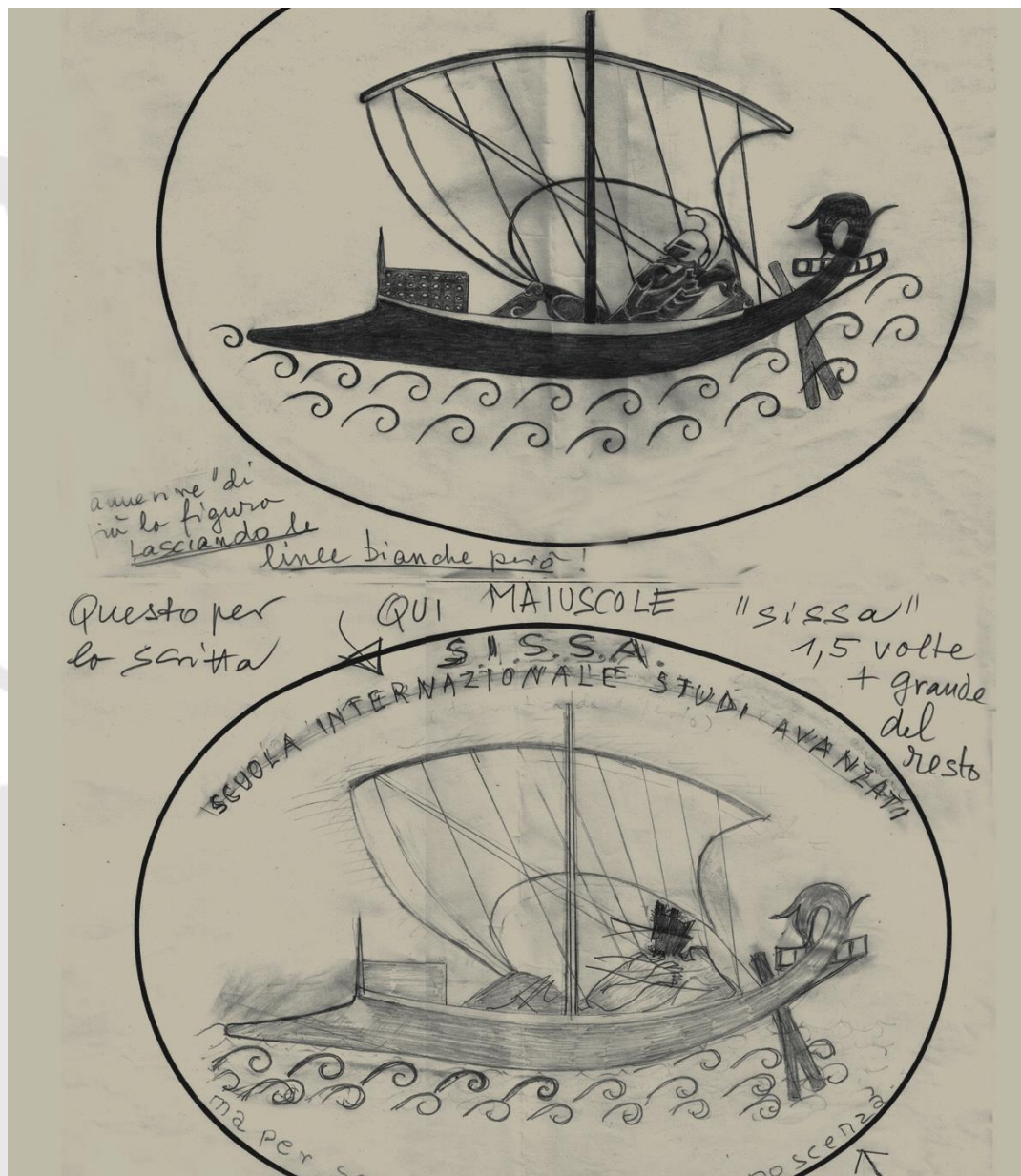
I enjoy thinking of life as a journey through a mysterious and unknown country, that we embark on with one means of transport, which I, as an islander, imagine to be like a boat.

I highly recommend you all seek, discover and spend time in this archipelago of wonders, right at the outset of your journey. I assure you it will be well worth it.

*The Archipelago of Wonders*

# First SISSA logo

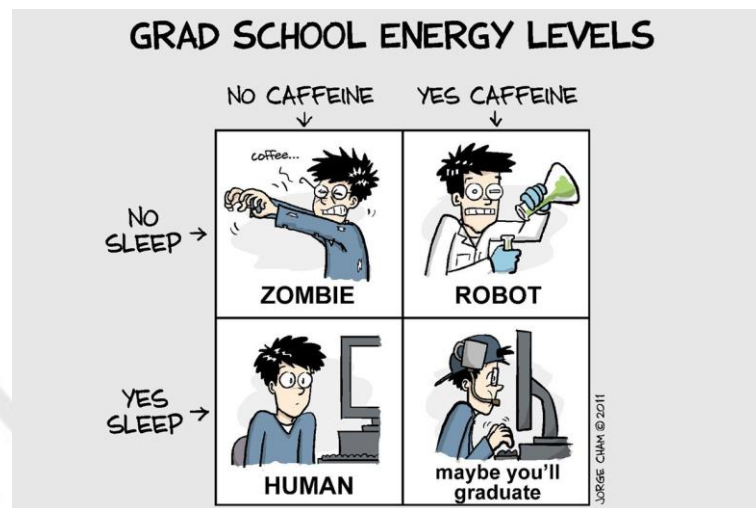
Drawned by Paolo  
Budinich



# SISSA's core

## SISSA is:

- a PhD School: Education and Research (unique high-level and intense first-year lecture courses);
- international;
- small and pretty;
- theoretical, computational and experimental;
- pleasant and tough;
- ... a big chance!



# SISSA's environment

- the world;
- the Region (... and beyond);
- the town;
- the people (students, ...);
- technology transfer;
- science outreach;
- journals





WELCOME @ SISSA

# A Community of People engaged in...





# Education

(V)  $\nabla_w \varphi = w^\mu (\partial_\mu \varphi^a + A_\mu^a{}_b \varphi^b) e_a$

\*  $= v^\nu \partial_\nu (w^\mu (\partial_\mu \varphi^a + A_\mu^a{}_b \varphi^b)) e_a + v^\nu A_\nu^a{}_c (w^\mu (\partial_\mu \varphi^c + A_\mu^c{}_d \varphi^d)) e_a$

$-(v \leftrightarrow w) - (v^\nu \partial_\nu w^\mu - w^\nu \partial_\nu v^\mu) (\partial_\mu \varphi^a + A_\mu^a{}_b \varphi^b)$

$v^\nu w^\mu \partial_\nu A_\mu^a{}_b \varphi^b e_a + v^\nu w^\mu A_\mu^a{}_b \partial_\nu \varphi^b e_a + v^\nu w^\mu A_\nu^a{}_c A_\mu^c{}_d \varphi^d e_a$

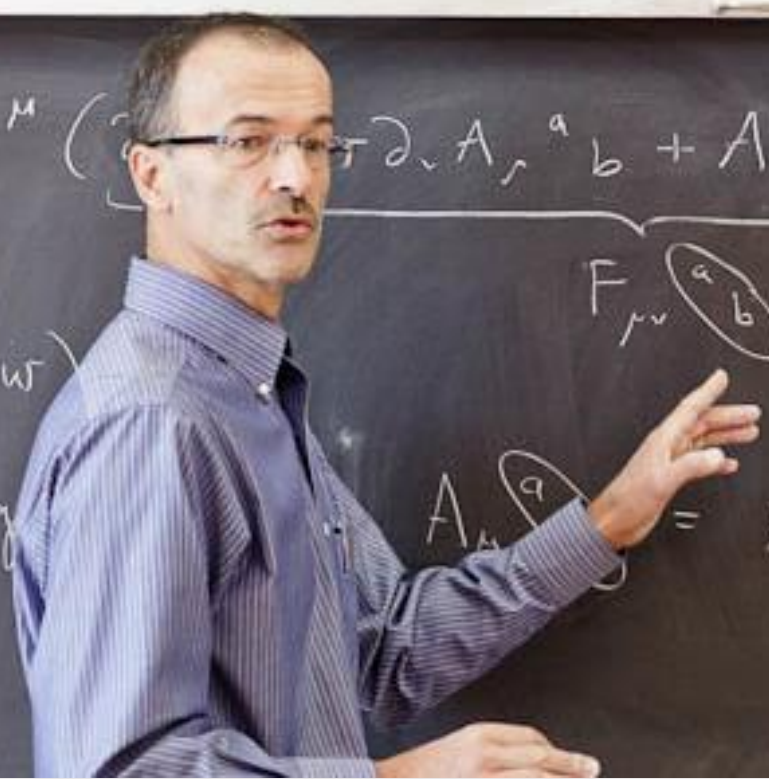
$(v \leftrightarrow w)$

$v^\nu w^\mu (\partial_\nu A_\mu^a{}_b + A_\nu^a{}_c A_\mu^c{}_b - A_\mu^a{}_c A_\nu^c{}_b) \varphi^b e_a$

$F_{\mu\nu}^a{}_b$

$A_\mu^a{}_b = A_\mu^i T_i^a{}_b$

$e_i = \text{basis in } \mathfrak{g}$



# Research





Public engagement

Budnich

# SISSA is interdisciplinary

Physics	Mathematics	Neurosciences
Astroparticle physics	Functional analysis	Cognitive neuroscience
Astrophysics	Geometry and mathematical physics	Neurobiology
Condensed matter	Applied mathematics	Genomics
Molecular and statistical biophysics		
Statistical physics		
Theoretical particle physics		





# STATLEARN

PI: DAVIDE CREPALDI



- Lettura come esempio di apprendimento



## S-RNA-S

**Small ribonucleic acids in silico**

**2012-2017**

**Coordinatore: Giovanni Bussi (Area Fisica)**



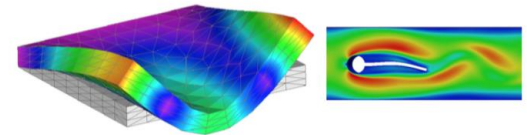
Codice genetico, e.g.  
...AAACGGUCUCGACA...



**Motivazione:** La maggior parte del genoma umano contiene istruzioni per produrre RNA non codificante, con funzioni in gran parte sconosciute

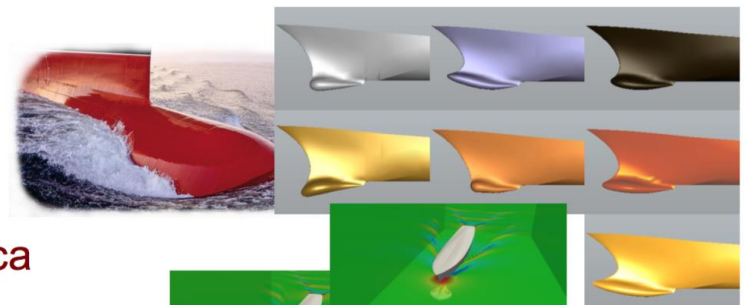


Gianluigi Rozza, SISSA, Area Matematica  
ERC CoG 2015 AROMA-CFD 2016-2021



**Modellistica Matematica, Simulazione Numerica, Ottimizzazione e controllo, Calcolo parametrico, Scienza e Ingegneria computazionale**

**Fluidodinamica numerica e accoppiamenti in multifisica (strutture, mezzi porosi, trasmissione del calore)**

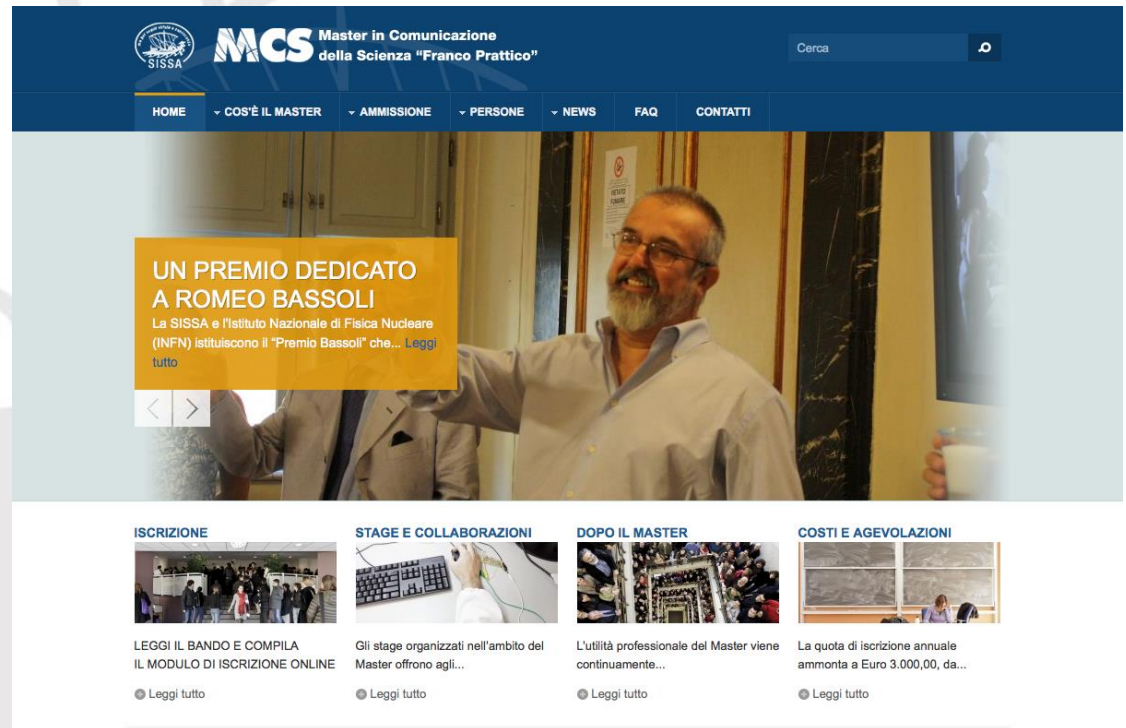


-MCS, more than 250 scientific journalists, press officers, museum curators, ...

-Science Outreach

-EU projects

- Interdisciplinary Laboratory for Natural and Humanistic Sciences



The screenshot shows the homepage of the MCS (Master in Comunicazione della Scienza "Franco Prattico") website. The header is dark blue with the SISSA logo and the MCS name. A search bar is on the right. The main navigation menu includes HOME, COS'È IL MASTER, AMMISSIONE, PERSONE, NEWS, FAQ, and CONTATTI. The main content area features a large image of a man with a beard and glasses, with a yellow text box overlaid that reads "UN PREMIO DEDICATO A ROMEO BASSOLI" and "La SISSA e l'Istituto Nazionale di Fisica Nucleare (INFN) istituiscono il 'Premio Bassoli' che... Leggi tutto". Below this are four columns of featured content: "ISCRIZIONE" with a photo of a group of people and the text "LEGGI IL BANDO E COMPILA IL MODULO DI ISCRIZIONE ONLINE"; "STAGE E COLLABORAZIONI" with a photo of a person at a computer and the text "Gli stage organizzati nell'ambito del Master offrono agli..."; "DOPO IL MASTER" with a photo of a group of people and the text "L'utilità professionale del Master viene continuamente..."; and "COSTI E AGEVOLAZIONI" with a photo of a person at a desk and the text "La quota di iscrizione annuale ammonta a Euro 3.000,00, da...". Each column has a "Leggi tutto" link.

# SISSA in numbers (forecast 2016)

- 60 Permanent Professors
- 20 Researchers
- 120 Post-docs
- 280 PhD Students
- 100 Technical and administrative Staff

# PhDs

- Mathematical Analysis, Modelling and Applications
- Geometry and Mathematical Physics
- Astrophysics
- Astroparticle Physics
- Theoretical Particle Physics
- Theory and Numerical Simulation of Condensed Matter
- Statistical Physics
- Physics and Chemistry of Biological Systems
- Neurobiology
- Functional and Structural Genomics
- Joint PhD Program in Molecular Biology (JUMBO)
- Cognitive Neuroscience



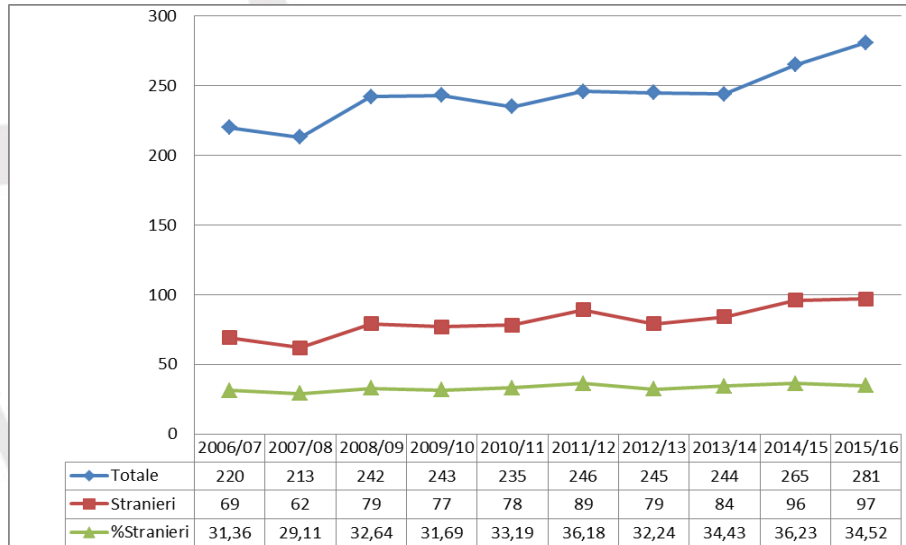


# SISSA's Masters

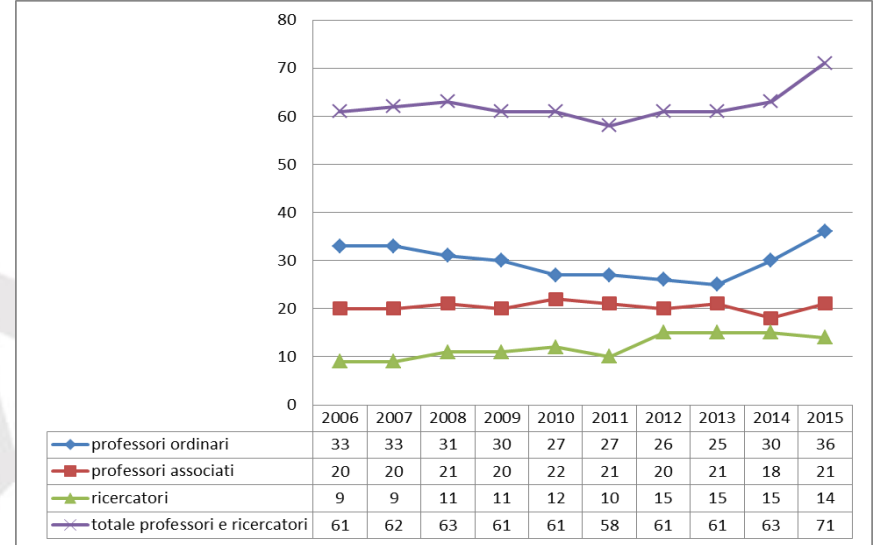
- LM (Master) in Mathematics SISSA-Trieste University.
- Master in High Performance Computing (HPC), ICTP+SISSA.
- LM (Master) in Complex Systems, ICTP+SISSA+Torino Polytechnics+Paris VI, VII, XI, ENS-Cachan.
- Curriculum in Neuroscience SISSA+Trieste University
- Curricula in Neuroscience and Physics, SISSA+Trento University
- Fast Track to a PhD in Condensed Matter Theory (2016)



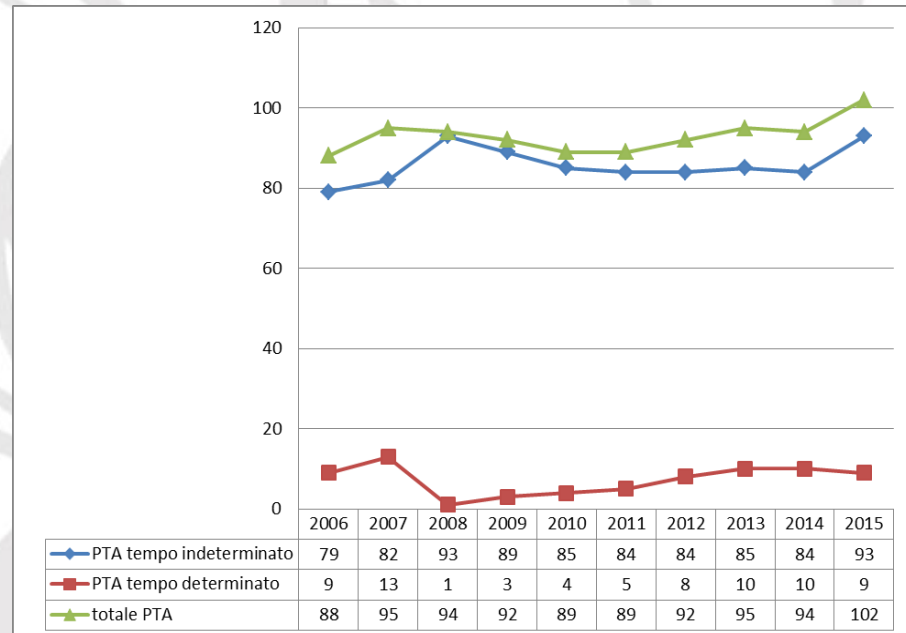
### Phd Students 2006/07-2015/16



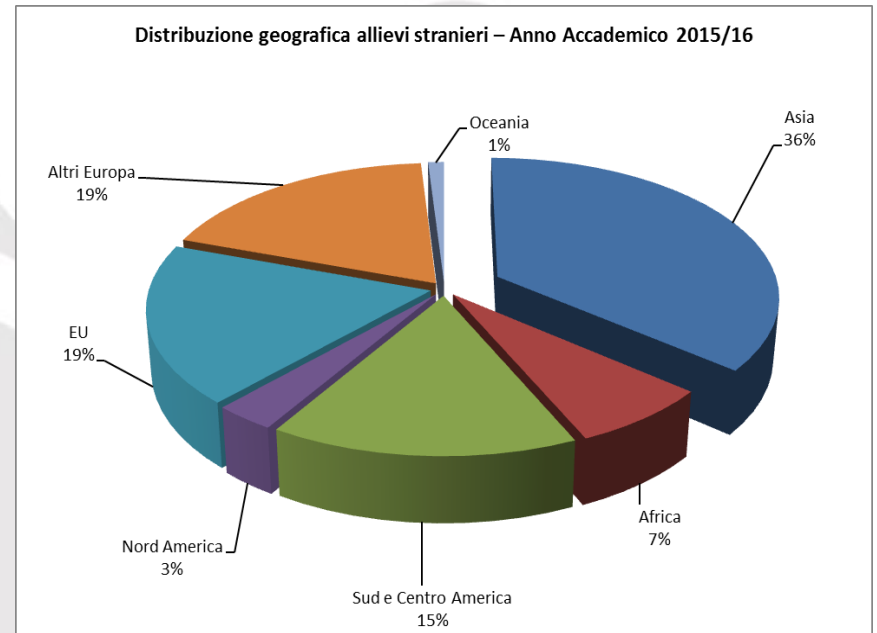
### Professor and researcher 2006-2015 al 31 dicembre 2015



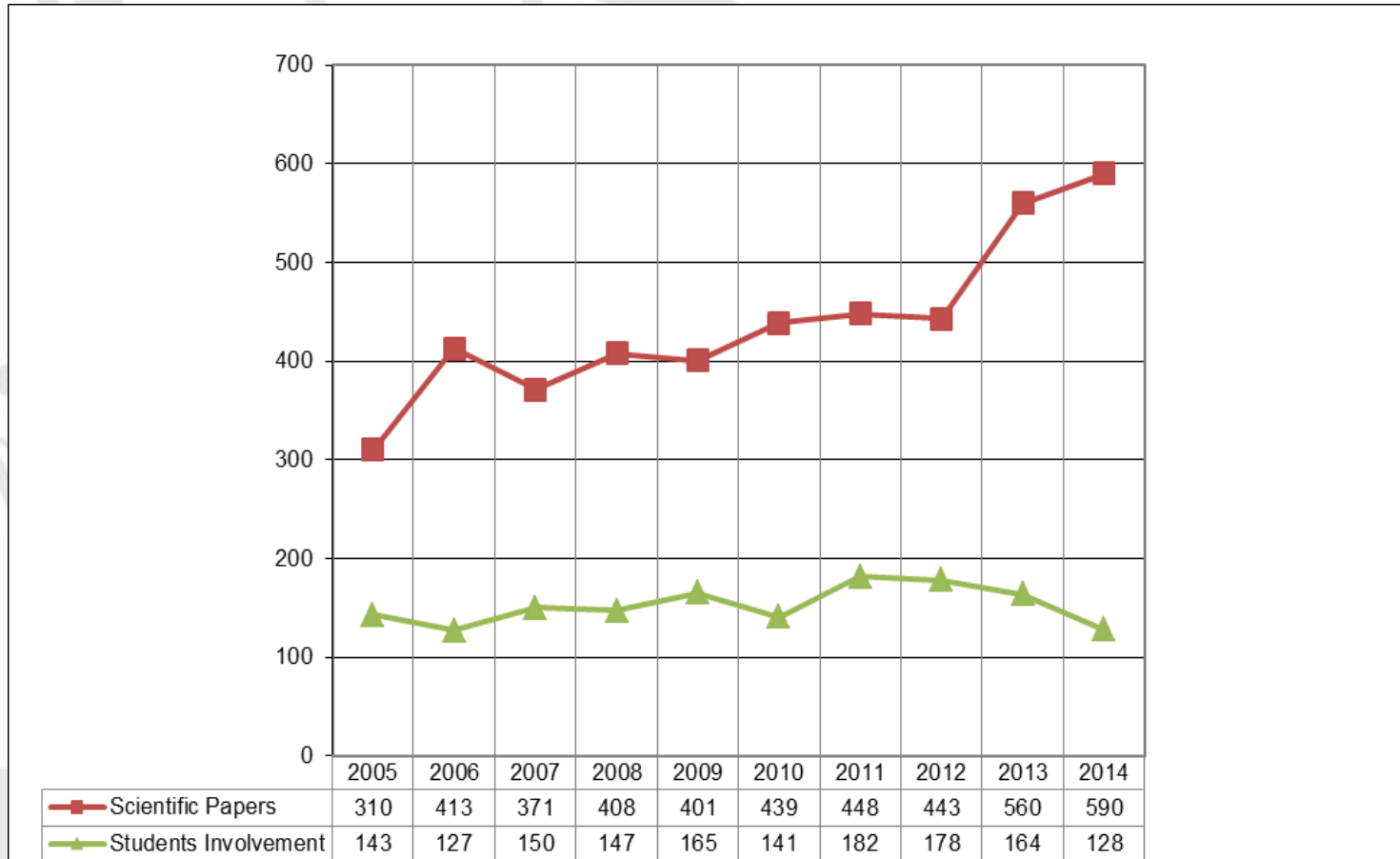
### Technical and Administrative Staff 2006-2015



### Distribuzione geografica allievi stranieri – Anno Accademico 2015/16

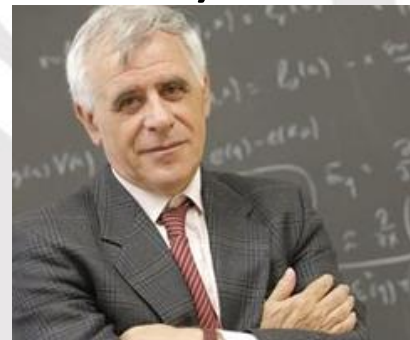
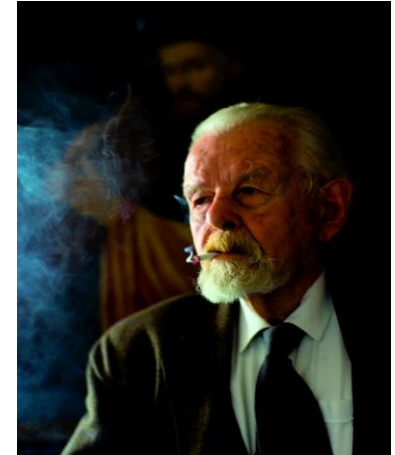


# Published Papers with relevant IF 2005-2014



# Sissa Directors

- Paolo Budinich (1978-1986)
- Daniele Amati (1986-2001)
- Edoardo Boncinelli (2001-2004)
- Stefano Fantoni (2004-2010)
- Guido Martinelli (2010-2015)



# Entertainment



# Opportunities



**For young families**



# Community





# Exceptional success rate in getting grants

## **Awarded Research 2011-16**

- 19+1 European Research Council (ERC)
- >30 FP7 / H2020 grants
- 2 Human Science Frontier Program (HSFP)
- 23+4 National Research Projects (PRIN+FIRB)

# Ranking ANVUR 2004-2010

- First in Mathematics among all universities
- First in Neurosciences among all universities
- First in Physics among the Departments of medium size
- Second classified among 25 small Universities

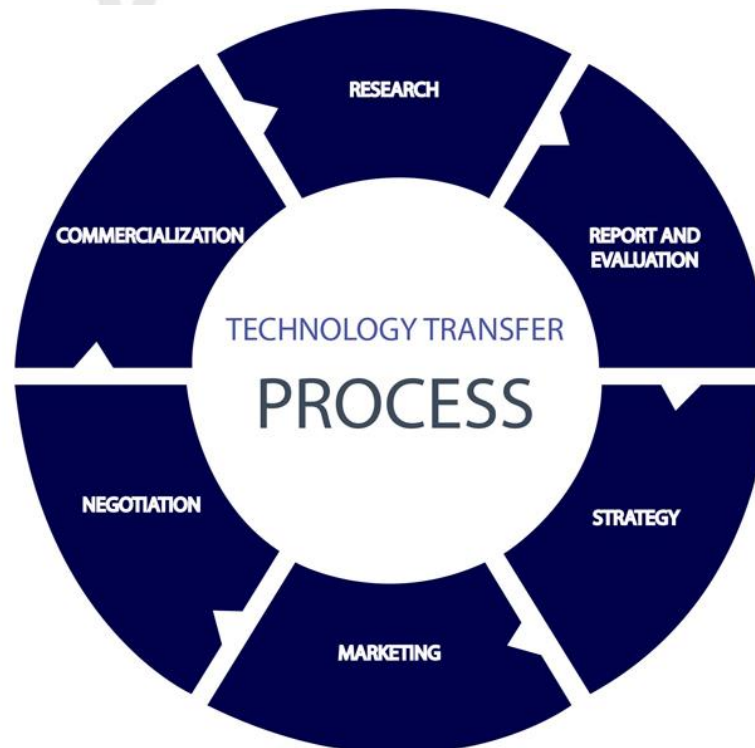
# International agreements

- 283 currently active scientific agreements with Universities and Research Institutions all over the world (Recent: Sharif (Tehran) , Weizmann (Rehovot), ...)



# Technology transfer

- 6 patents
- 3 spin off (Glance vision, Lay Line Genomics, Promoscience)



# Newest developments

## **Jumbo**

A new PhD in Molecular Biology in collaboration with the Universities of Trieste and Udine, and ICGEB

## **High Performance Computing**

For science and technology (ICTP and SISSA)

# Mechatronics Laboratory (Trieste-Udine)





UNITED UNIVERSITIES OF APPLIED SCIENCES



#### MHPC

The Master in High-Performance Computing (MHPC) is a high-level degree program that aims to train students to solve complex problems with HPC techniques.

#### WHY

Set in a stimulating research environment, the MHPC is an innovative, hands-on training and education program to prepare students for exciting careers in the fast-growing field of HPC.

#### THE TARGET

The master is intended for people with strong interest in advanced programming for scientific computing, software optimization and management of computing platforms.

[READ ALL](#)

#### ABOUT MHPC

The International Master in High Performance Computing takes a hands-on approach to the education and training of future HPC specialists...

[READ ALL](#)

#### HOW TO APPLY

The ideal student for the MHPC has a strong interest in information technology problems driven by scientific research or industrial needs...

[READ ALL](#)

#### INDUSTRY INVOLVEMENT

The program features a strict connection with industry, both local and worldwide. The MHPC aims to fulfill the demand for professional experience...

#### CAREER PROSPECTS

MHPC provides skills useful both in the academic and in the industrial field, like technical and software development. The master fulfills the need of...





# **Sissa Medialab**

## **in house company on Science Communication**

- **Electronic Journals (JHEP, JSTAT, JCAP, JINST, JCOM)**
- **Public engagement**
- **Training in science communication**

# SISSA ALUMNI

- Gianfrancesco Giudice – physics – Fermilab, Austin, CERN, Solvay Chair,
- Luciana Bianchi-physics-, Johns Hopkins “Dolomiti” group, NASA, Hubble,
- Davide Marenduzzo-physics -Edinburgh, YSP of IUPAP-C2 in Statistical Physics,
- Giulia Galli –physics – Chicago U. and Argonne, UC Davis, Livermore Science and Technology Award, APS and AAAS fellow, MICCoM Director
- Andrea Malchiodi – mathematics – Scuola Normale, Miranda and Caccioppoli prizes, sctional speaker ICM Seoul 2014, ...
- Susanna Terracini – mathematics – Torino, ERC grant 2014-19, European Women in Mathematics, ANVUR, ...
- Yasser Roudi – neuroscience – Sharif, UCL, Nordita, Trondheim, 2015 Kandel prize and “ten world talents” (Science, 2015), ...
- Paola Catapano – science communication– SISSA MCS, CERN communication services, “Newton” and “Tuttoscienze of La Stampa, ...

# SISSA's future

- Maintain high level research and educational standards;
- Attract the brightest minds and free thinkers;
- Develop interdisciplinary research;
- Continue its role in exploratory projects;
- Contribute to the creation of a Regional network of Universities and Research Centers: dissemination of excellence (“swarming”)

