EU H2020 CSA-2015 project no. 692194

# RBI-T-WINNING

Twinning at Rudjer Bošković Institute for a step forward of the Theoretical Physics Division ThPhys@IRB

# H2020 – THE TWINNING CALL

- Spreading Excellence and Widening Participation

  Type of the action: coordination and support actions

- H2020 – TWINN-2015 for „widening countries" with aims:

  …. Significantly strengthen a defined field of research in a particular research institution by

  **creating a link** between this institution and at least two internationally leading research institutions

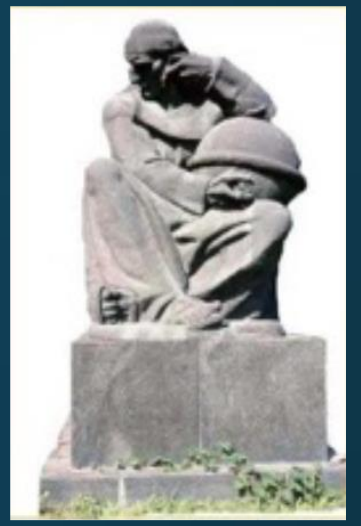
  …. Enhance the S&T capacity of the linked institutions

  …. Raise research profile of staff and of the whole institution

# RUDJER BOSKOVIC INSTITUTE

Croatia's leadind Institute in natural (physics, biology, chemistry) and biomedical sciencies, as well as in marine and environmental research

~ 550 scientists, 14 Divisions, 80 labaratories



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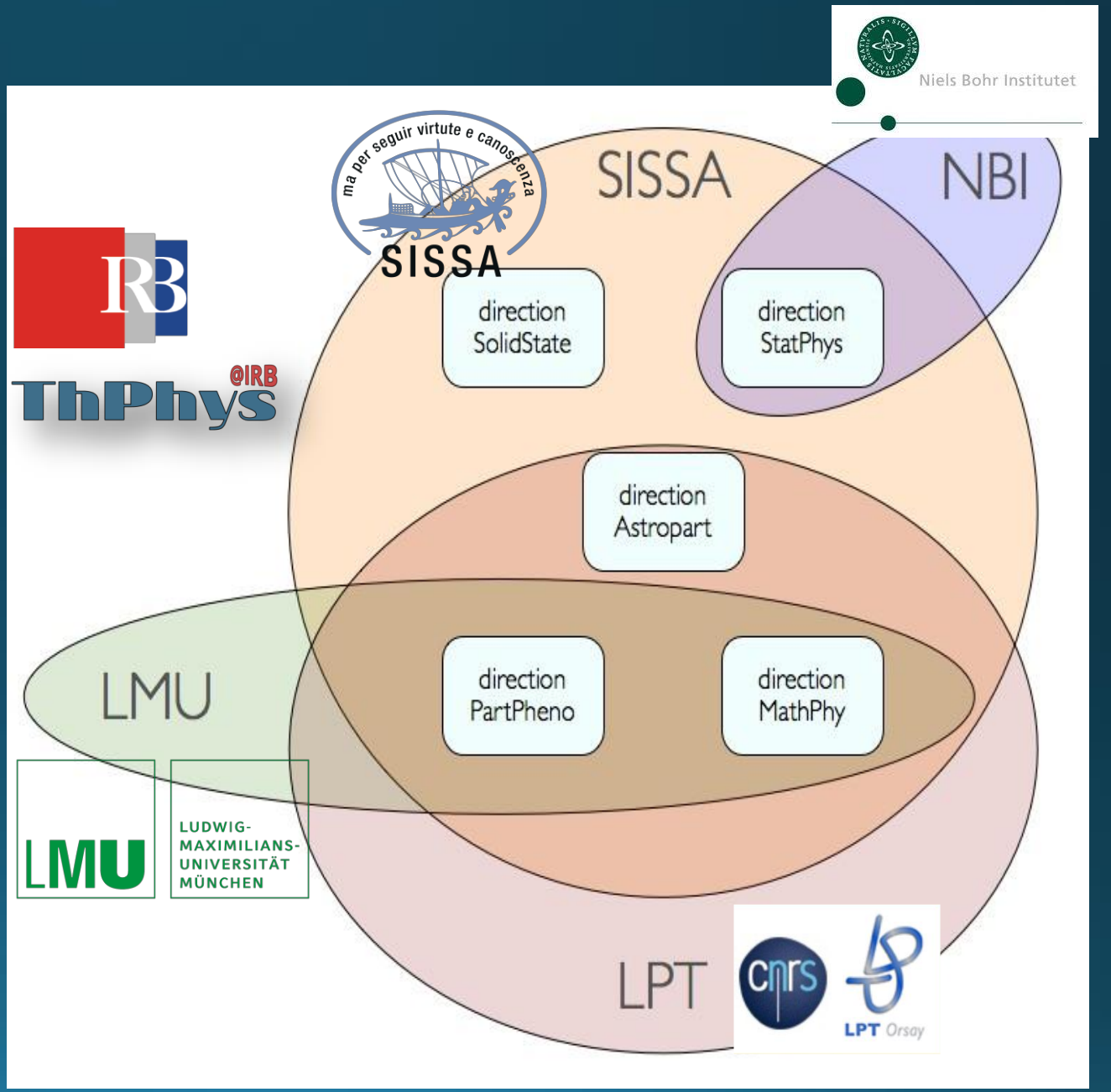
# DIVISION OF THEORETICAL PHYSICS

ThPhys @IRB

- 14 researchers + 14 postdocs/students
  (2 FP7 projects, FETOPEN, 5 Croatian national found. projects)
- generation change – many new job openings (currently 4)
- research directions – Particle Physics and Cosmology Group
  - Group for Mathematical and Theoretical physics
  - Group for Condensed Matter and Statistical Physics

# PROJECT RBI-T-WINNING

- Budget: 1 M€ , 3 years ( ~ 200 k€ OH)
- Actions: lectures, conferences, visits
- RBI + four partners in consortium
- project of
  the whole Theoretical Particle Division
  - collective effort
- Work Package leaders (5) +
  Project Manager +
  Head of the Division +
  Coordinator – F. Nesti
  (from this year K.Passek-Kumericki)



# CONSORTIUM

## International School of Advanced Studies - Trieste


- Scuola Internazionale di Studi Avanzati (SISSA) (from 1978)
- One of the two Italian "excellence schools" (~250 PhD students)
- Highly qualified teaching, interdisciplinarity, internationalization.
- Astroparticle physics, Astrophysics, Condensed Matter, Mathematical physics.

## Laboratoire de Physique Théorique d'Orsay


- LPT - Joint center of Centre National de la Recherche Scientifique and Université Paris-Sud
- Internationally recognised research, coordinated several EU projects
- Particle physics, cosmology and gravitation, mathematical physics

# CONSORTIUM

## Ludwig-Maximilians-Universitaet - Munich

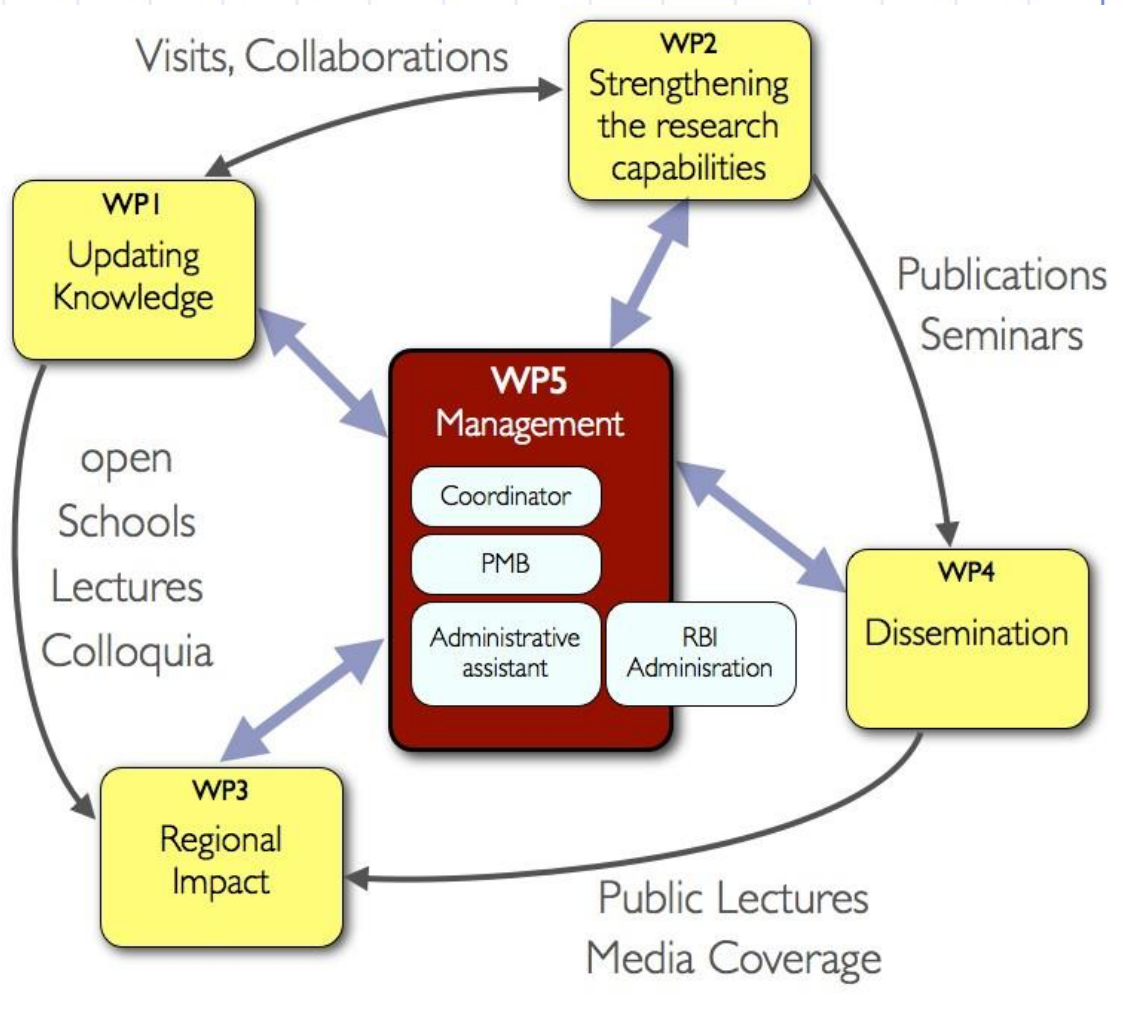

- LMU, XV century - one of Europe's and world most prestigious universities (34 Nobel).
- Munich Universe Cluster, LMU, TUM and several Max-Planck institutes
- We twin with **Arnold Sommerfeld Center**, hosting prof. D. Lust, Chair of Mathematical Physics, and prof. G. Dvali, Chair of Theoretical Elementary Particle Physics

## Niels Bohr Institute - Copenhagen


- A world famous institute in theoretical physics.
- we connect with **Center for Models of Life**, world recognized to be on the forefront of theoretical and mathematical biology.
- For instance, models for genetic regulation, evolution and ecosystem dynamics based on methods of theoretical physics.

# PROJECT WORKPLAN

1. **WP1 Updating knowledge**
   - T1.1 Organising educative events in Croatia
   - T1.2 Attending educative events
2. **WP2 Improving research profile**
   - T2.1 Organising research events
   - T2.2 Supporting and promoting collaborations
   - T2.3 Attending conferences
   - T2.4 Developing mutual research ideas and discuss future DTP research strategy
3. **WP3 Regional Impact**
   - T3.1 Outreach to students.
   - T3.2 Feedback on local community
4. **WP4 Dissemination**
   - T4.1 Publications
   - T4.2 Presentations
   - T4.3 Outreach
5. **WP5 Management**



# DRAWBACKS ?!

- support for invitation of students  is not allowed
- most of the actions are targeted to the main RBI node
- difficult to invite other (non-node) speakers or lecturers
- no  money for PhD students and postdocs

# LECTURES @ RBI

**SISSA experts (32h)**

- Selected topics of SM and BSM (A. Romanino 4h)
- Salucci 4h (Dark Matter in galaxies theory and observations)
- Lapi 4h (Structure formation)
- Danese 2h (Cosmology and high redshift probes, supermassive black hole phenomenology).
- Dirac operator (Dabrowski) (4h)
- Vector bundles and applications to topological quantum field theory (U. Bruzzo) (4h)
- Noncommutative Geometry and the Standard model (K. van Dungen) (4h)
- Solid state - Topics in Numerical Modelling of Materials (S. De Gironcoli) (6h, 3 lectures)

**LPT experts (38h)**

- Strong and weak interactions in the SM (A. Abada, S. Descotes-Genon or D. Becirevic)
- Extensions of the Standard Model (A. Abada and/or D. Becirevic)
- Flavour physics in the quark sector (S. Descotes-Genon and/or D. Becirevic)
- Flavour physics in the lepton sector, neutrino in particle physics and cosmology (A. Abada)
- QCD in the nonperturbative regime (D. Becirevic and/or S. Descotes-Genon)
- Selected topics in perturbative QCD (S. Wallon)
- Selected topics of Noncommutative geometry, algebraic methods and differential calculus (JC Wallet, M. Dubois-Violet)

**LMU experts (22h)**

- **RBI Institute colloquium (G. Dvali):**
- EFT methods at the LHC (G. Buchalla) → O. Cata
- Lectures on Conformal Field Theory (R. Blumenhagen) (6h)
- Lectures on Scattering amplitudes in SYM using the Grassmannian formulation and the amplituhedron (L. Ferro) (6h)
- **RBI Institute colloquium, D. Lüst**
- Black-brane solutions in gauged supergravity (M. Haack), (2h)

# SCHOOLS & WORKSHOPS

finished or ongoing projects


1. **WP1 Updating knowledge**
   - T1.1.1 SCHOOL multi-topic Y2 @RBI
   - T1.1.2 SCHOOL statist phys Y1 @ RBI
   - T1.2.1 Grand series of lectures @RBI Y1-Y2
   - T1.2.2 Attending lectures abroad Y1-Y2
   - T1.2.3 SCHOOL statist phys @ NBI
   - T1.2.4 SCHOOL QCD @ orsay
2. **WP2 Improving research profile**
   - T2.1.1 WORKSHOP phenomen. Y1 @ORS
   - T2.1.2 WORKSHOP QCD Y3 @RBI
   - T2.1.3 CONFERENCE astroparticle Y3
   - T2.1.4 CONFERENCE solidstate Y3 @RBI
   - T2.1.5 CONFERENCE mathphys Y1 @SISSA
   - T2.1.6 CONFERENCE mathphys Y3
   - T2.2 Supporting collaborations (visits)
   - T2.3 Attending conferences
   - T2.4 Mutual research ideas

Ruđer Bošković Institute
Division of Theoretical Physics

ThPhyS @IRB

H2020 CSA Twinning
Grant No: 692194

# FIRST ZAGREB SCHOOL ON THEORETICAL PHYSICS

**Ruđer Bošković Institute, Zagreb, Croatia**
**June 26 - July 07, 2017**

*A full immersion in phenomenology of particle physics and cosmology for PhD students and young postdocs.*

**WEEK 1 (JUNE 26 - JUNE 30)**
**PARTICLE PHENOMENOLOGY, COSMOLOGY**

**SPEAKERS and TOPICS:**

**C. Baccigalupi (SISSA, Trieste):** ***Early universe and CMB***

**S. Descotes-Genon (LPT, Orsay):** ***Flavour Physics***

**P. Gondolo (University of Utah):** ***Dark Matter***

**F. Sannino (CERN; CP3-Origins; DIAS):** ***Beyond the Standard Model***

**G. Senjanović (GSSI, L'Aquila; ICTP, Trieste):** ***Standard Model; Theory of Neutrino masses***

**P. Ullio (SISSA, Trieste):** ***Cosmic Rays***

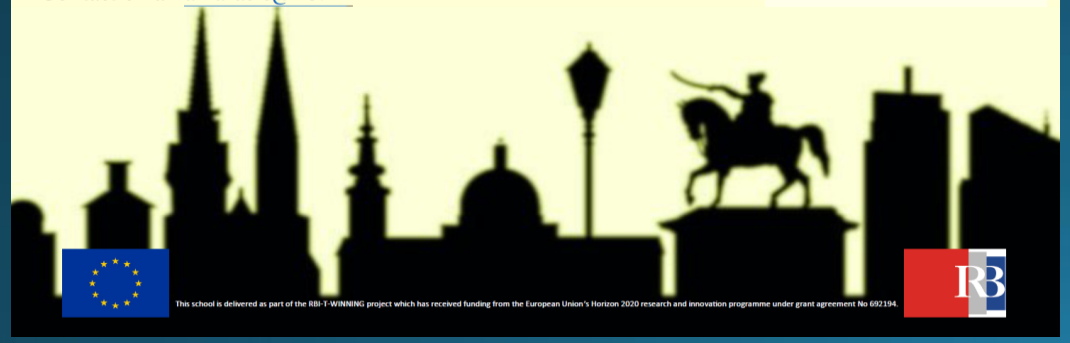
**M. Viel (SISSA, Trieste):** ***Structure formation***

**S. Wallon (LPT, Orsay):** ***Perturbative QCD***

*Limited support available upon request, deadline* ***May 15, 2017****.*
*Registration at http://thphys.irb.hr/school2017.*
*Contact email amaracic@irb.hr.*

Organising Committee:

Oleg Antipin (RBI)
Damir Bećirević (LPT Orsay)
Larisa Jonke (RBI)
Predrag Lazić (RBI)
Fabrizio Nesti
(RBI; University of Trieste)
Paolo Salucci (SISSA)



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June 26 - July 07, 2017

**WEEK 2 (JULY 4 - JULY 7)**
**MATHEMATICAL PHYSICS, CONDENSED MATTER**

**SPEAKERS:**

S. de Gironcoli (SISSA, Trieste)

M. Haack (LMU, Munich)

E. Kucukbenli (SISSA, Trieste)

F. Pellegrini (SISSA, Trieste)

R. Percacci (SISSA, Trieste)

I. Sachs (LMU, Munich)

S. Solodukhin (LMPT, University of Tours)

E. Tonni (SISSA, Trieste)

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# Current Trends in Flavor Physics


## ENJOY !

29-31 March 2017 - Institut Henri Poincaré, Paris

GDR INTENSITY FRONTIER