GRUPPO IV
&
GGI
Workshops and Schools

Preventivi 2020 - Sezione di Firenze

12 Luglio 2019

Gruppo IV

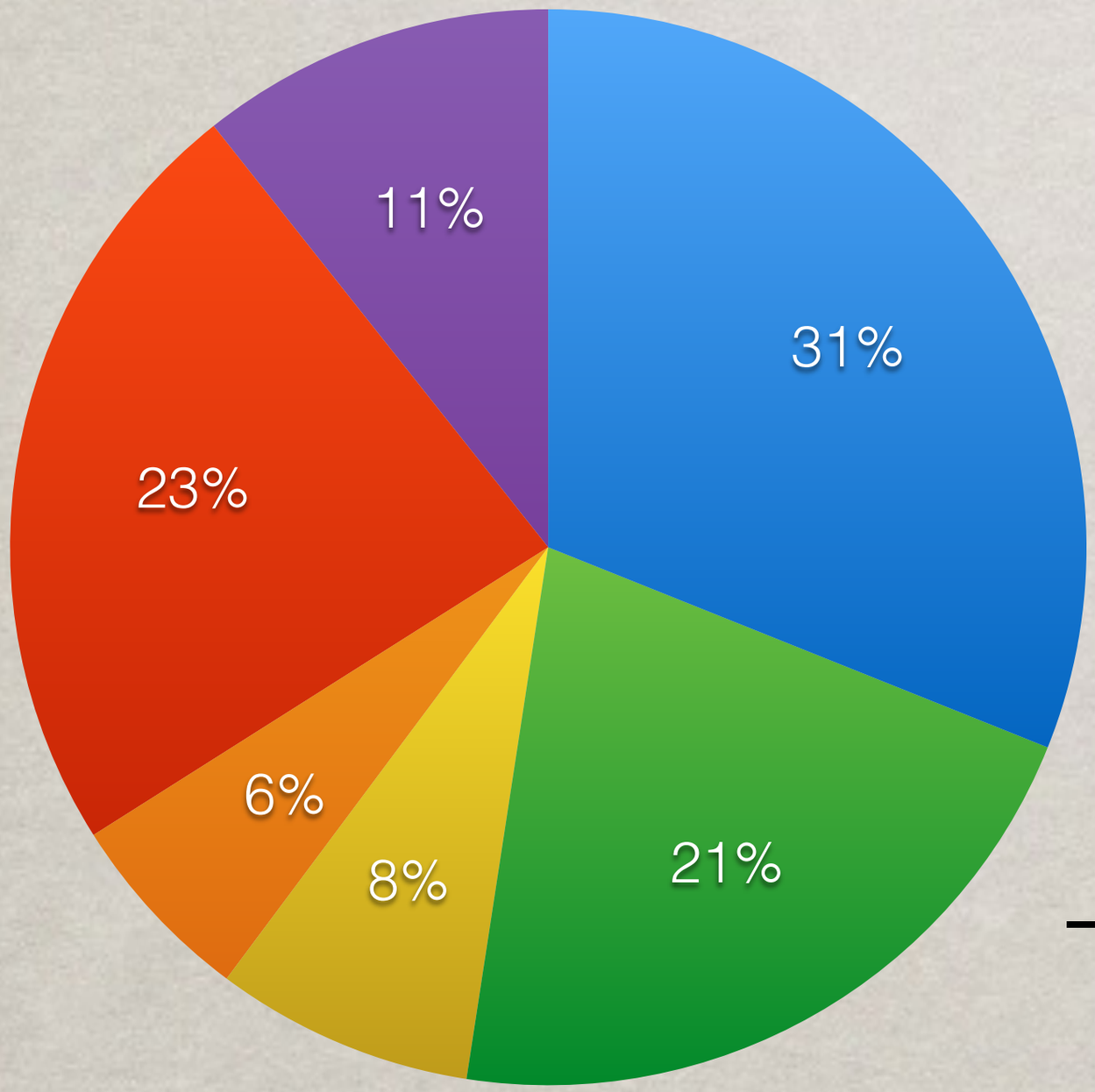
Il Gruppo IV parteciperà a 9 Iniziative Nazionali nelle 5 linee di Ricerca della Commissione IV: (nessuna novità rispetto al 2019)

Campi e Stringhe	Fenomenologia	Nucleare
Linea 1: 2	Linea 2: 2	Linea 3: 1
Metodi Matematici	**Astroparticelle**	**Mecc. Stat. e Appl.**
Linea 4: 2	Linea 5: 1	Linea 6: 1

Per un totale di: **51.5 FTE** (di cui 2 sezione Lecce, 1 SISSA, 1 sezione di PG)

+ 3 pensionati attivi

Gruppo IV



16 - Universitari staff

11 - INFN staff

12 - Dottorandi

4 - RTD A+B

5.5 - Post-Doc

3 - Altri Enti staff (50%)

Totale 51.5 FTE

SFT : "Statistical Field Theory, Low-Dimensional Systems, Integrable Models and Applications" CSN4-Linea1

Resp. Naz. : G. Mussardo (SISSA)
Sezioni: CS, FI, GE, PG, PI, TS

FTE	Resp. Locale	Partecipanti
8	A. Cappelli (100%)	P.Verrucchi (CNR 50%), F.Colomo (100%), A.Cuccoli (100%), R.Vaia (CNR 50%), L.Maffi (XXXIII Ciclo), M.C.Diamantini (sezione Perugia 100%), M.Campisi (RTDA 100%), L. Banchi (RTDB 100%)

- Quantum field theories out of equilibrium
- Entanglement
- Topological quantum field theories
- Conformal invariance, phase transitions and universality classes
- Low-dimensional quantum field theory: integrability and its breaking

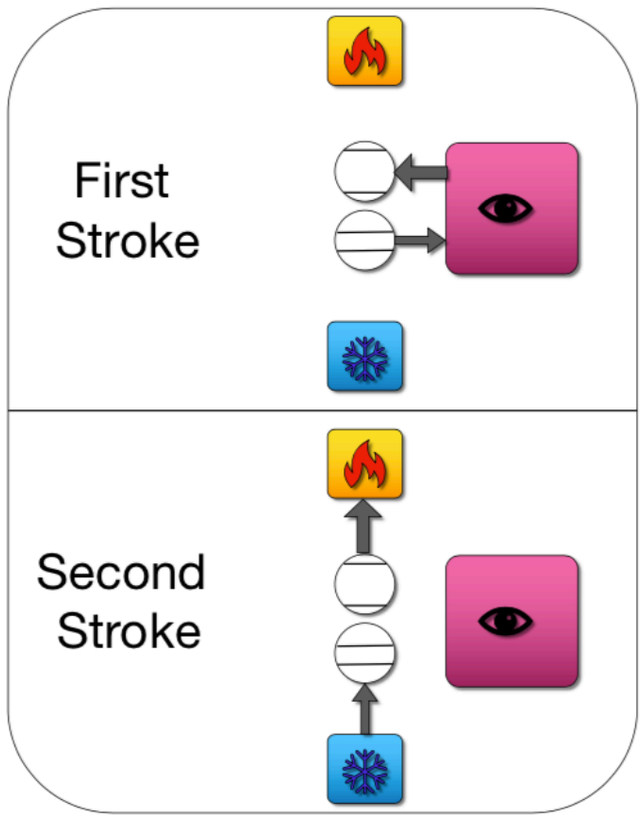
Richiesta 14 kE missioni

PHYSICAL REVIEW LETTERS **122,** 070603 (2019)

Editors' Suggestion | Featured in Physics

Quantum Measurement Cooling

Lorenzo Buffoni,[1,2] Andrea Solfanelli,[2] Paola Verrucchi,[3,2,4] Alessandro Cuccoli,[2,4] and Michele Campisi[2,4,5]



Raffreddamento tramite misure quantistiche.

In un primo stadio l'apparato di misura cede energia ad un qubit e ne riceve (in misura minore) dall'altro. In un secondo stadio il qubit che aveva ricevuto energia, la cede al corpo caldo, mentre il qubit che eveva ceduto energia, la riceve dal corpo freddo. In ogni ciclo l'apparato di misura perde energia mentre si trasferisce calore
dal corpo freddo a quello caldo.

Nel nostro lavoro [Buffoni et al, Phys. Rev. Lett. 122 070603 (2019)] abbiamo proposto il meccanismo e dimostrata la sua fattibilità con le moderne tecnologie quantistiche (ad esempio circuit QED)

GAST : "Non-perturbative dynamics in GAuge and STring theories"
CSN4-Linea1

Resp. Naz. : Gianluca Grignani (sez. di Perugia)
Sezioni: BO, CS, FI, PG, PI, PR, TN, TS

FTE	Resp. Locale	Partecipanti
8.4	D. Seminara (100%)	A.L.Cotrone (70%), F. Bigazzi (70%) P. Valtancoli (100%), S.Bonansea (XXXII Ciclo), A.Caddeo (XXXII Ciclo), (D.Billo, XXXIII Ciclo) F. Galli (Post-Doc 100%), A. Bernamonti (RTDB 100%)

Richiesta 16 kE missioni

GAST (Gauge and String Theories)

The aim of the research group GAST is to contribute with original scientific work to the understanding of some of the key dynamical issues occurring in the field-theoretic and string-theoretic models of fundamental interactions

Partecipanti: (8.40 FTE)

Domenico Seminara
[Coordinatore Locale, PA 100%]

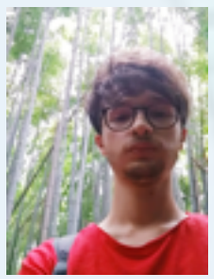
Francesco Bigazzi,
[Partecipante, PR INFN 70%]

Alice Bernamonti
[Partecipante, RTDB 100%]

Aldo Cotrone
[Partecipante, PA 70%]

Alessio Caddeo
[Partecipante, Dott. 100%]

Sara Bonansea
[Partecipante, Dott. 100%]



Davide Billo
[Partecipante, Dott. 100%]

Federico Galli
[Partecipante, Fellini Fellow 100%]
da fine Ottobre

Goals achieved in the past year

Applied Holography:

- *We have introduced* ***a novel composite QCD axion model with a precise string embedding****. Derivative and CP-odd non derivative couplings of the axion to nucleons were explicitly computed and the temperature dependence was also analyzed.*

- *We have studied the* ***low energy effective theory on domain walls (DW) in holographic model for QCD*** *with massive quarks at theta=pi. Remarkably, the model exactly reproduces all the QCD expectations*

Quantum information and Quantum Gravity:

- *We have explored the* ***role of Quantum complexity in Quantum Gravity and Holography****. There are two main proposals for the gravitational observables which would be dual to the complexity, complexity=volume or complexity=action. We have investigated these two different proposals when the AdS vacuum is perturbed by a scalar excitations*

- *We have studied the* ***shape dependence of the entanglement entropy*** *for hyper-scaling violating geometries*

Boundary and Defects in QFT:

- *We have investigated how the* ***presence of a defect*** *of codimension one* ***changes the expectation value of a circular Wilson loop****: an intricate net of phase transitions emerges in the strong coupling regime.*

HEPCube : High Energy Particle Physics Phenomenolgy - CSN4 Linea2

Resp. Naz. : Paride Paradisi (sez. di Padova)
Sezioni: FI, PD

FTE	Resp. Locale	Partecipanti
8.0 +0.5	Stefania De Curtis (100%)	P. Ciafaloni (Lecce 100%), R.Casalbuoni (50%), D. Dominici (100%), M. Redi (100%), A.Tesi (100%), L. Delle Rose (100%), G.Panico (RTDA 100%), R.Lopez Delgado (post-doc 100%)

★ **Estensioni del Modello Standard:**

— Modelli con Higgs composto psuedo-bosone di Goldstone di un settore forte
— Settori di Higgs estesi: fenomenologia ai collider e implicazioni cosmologiche
— Dark Matter composta: fenomenologia di settori "dark" fortemente accoppiati
— Test del Modello Standard e sue estensioni da misure di precisione di osservabili EW e del settore di Higgs

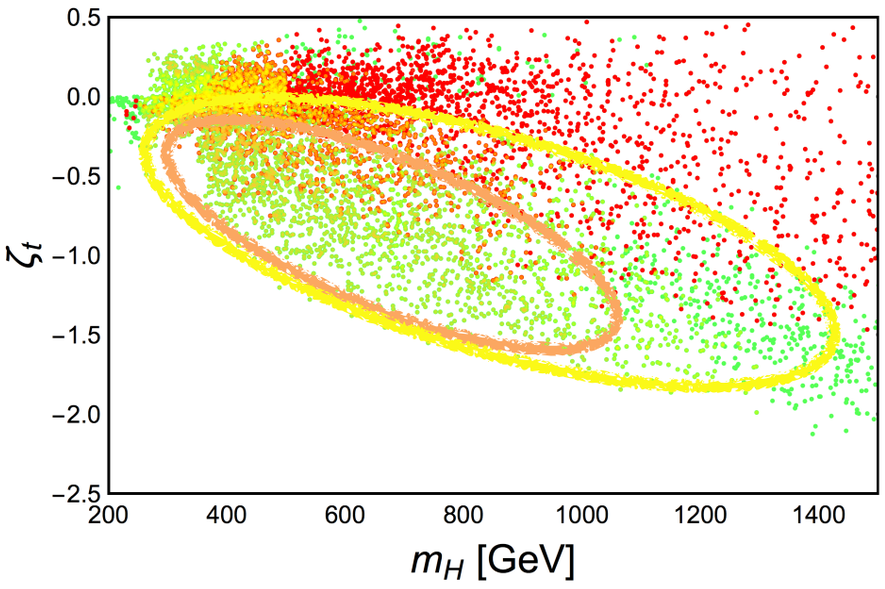
Richiesta 16 kE missioni

Phenomenology of (non-minimal) Composite Higgs Models

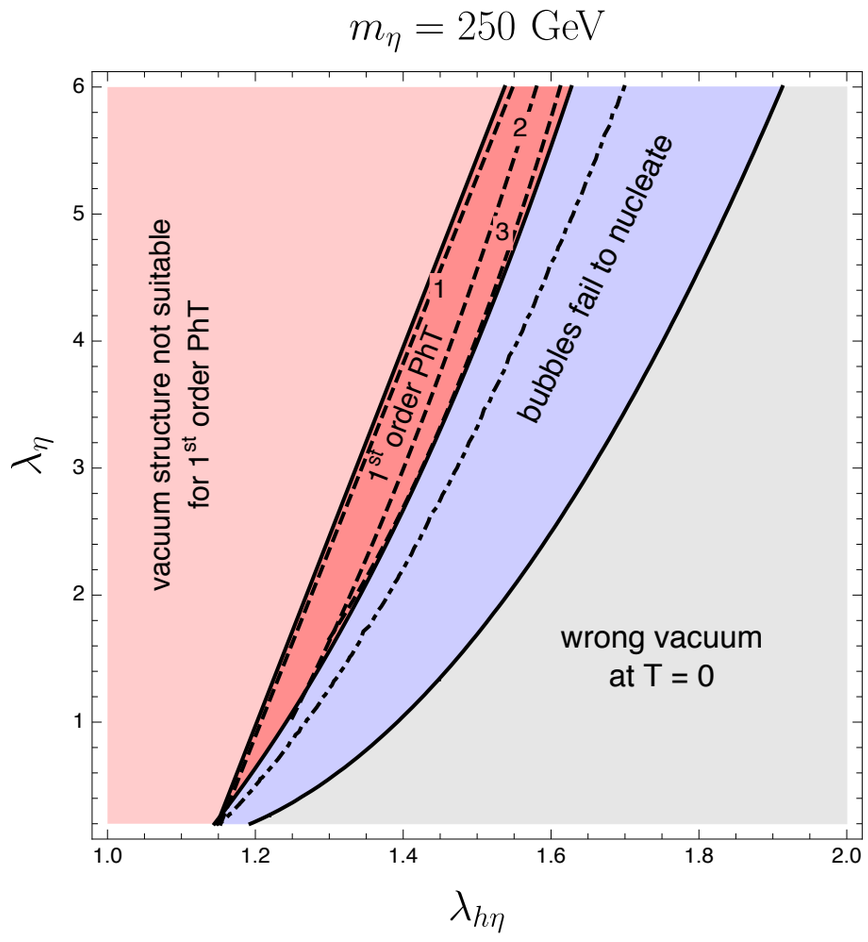
The physics of the early Universe in next-to-minimal Composite Higgs Models and the interplay with collider phenomenology

Collider phenomenology

- LHC signals of extended pseudo-goldstone boson sectors
- HL-LHC and HE-LHC reach on new states from the new sector



[De Curtis, Delle Rose, Moretti, Tesi, Yagyu, Report for the WG3 of the HL-LHC and Perspectives at the HE-LHC, CERN-LPCC -018-05]



Cosmological implications

- Studies of electroweak phase transitions
- Characterization of the stochastic background of gravitational waves and sensitivity reach of future space-based interferometers
- Implications for baryogenesis at the electroweak scale

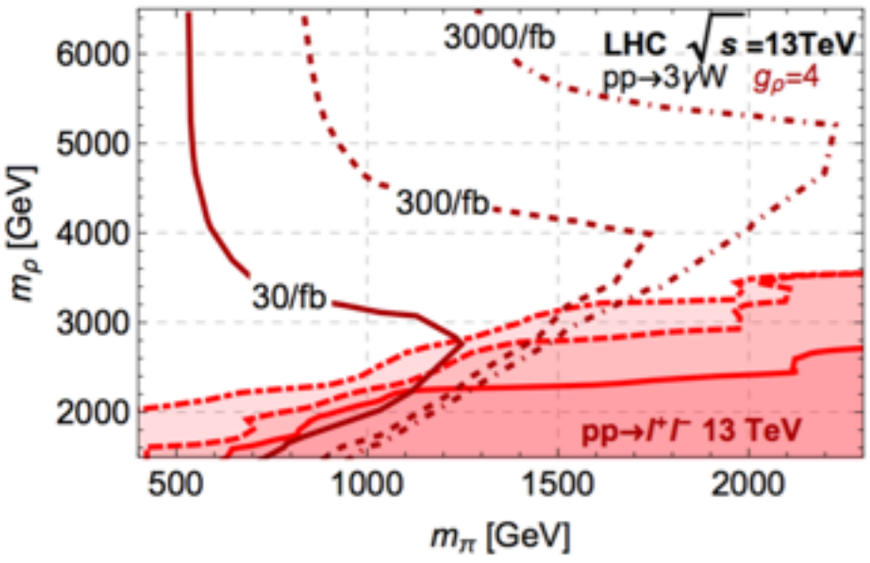
[De Curtis, Delle Rose, Panico - Composite Dynamics in the Early Universe - in preparation]

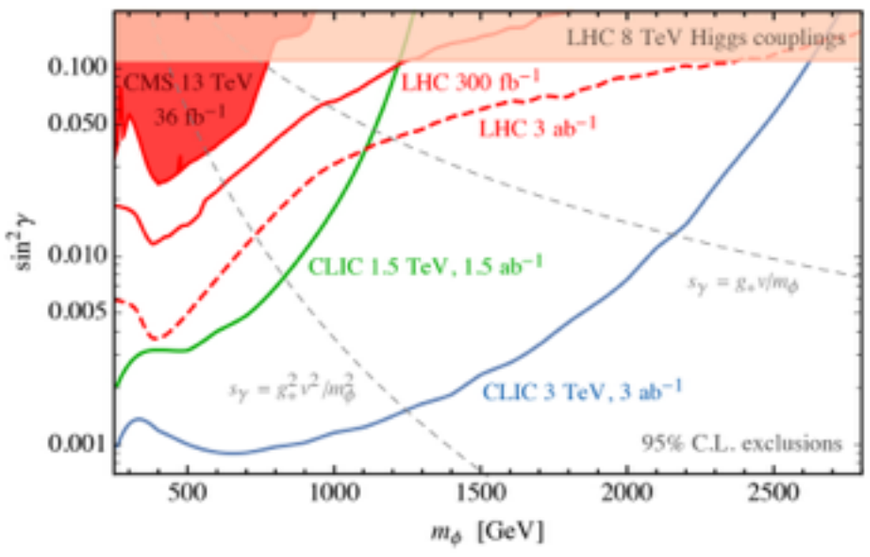
Phenomenology of (strongly coupled) dark sectors

We have mainly studied new sectors with QCD-like dynamics. These sectors have Dark Matter candidates and collider signals, since they are connected to the SM via electroweak and Higgs portal interactions

Collider phenomenology

- LHC signals of vector resonances and pseudo-goldstone bosons
- Future collider reach on new states from the new sector (hadron/lepton colliders)





[Barducci, De Curtis, Redi, Tesi, JHEP08(2018)017]

[Buttazzo, Redigolo, Sala, Tesi, JHEP11(2018)144]

[Di Luzio, Grober, Panico, JHEP1901(2019)011]

Dark Matter and cosmological implications

- Study of DM candidates: dark baryons, colored DM, gluequark, dark nuclei
- Phenomenological aspects of DM bound state formation for relic density calculations
- Impact of bound state formation in indirect detection signals
- Studies of phase transitions in connection with new mechanisms for DM production

[Gross, Mitridate, Redi, Smirnov, Strumia PRD99 (2019) 016024] [Contino, Mitridate, Podo, Redi, JHEP02(2019)187] [Redi, Tesi, JHEP04(2019)108]

Electroweak Precision Meaurements

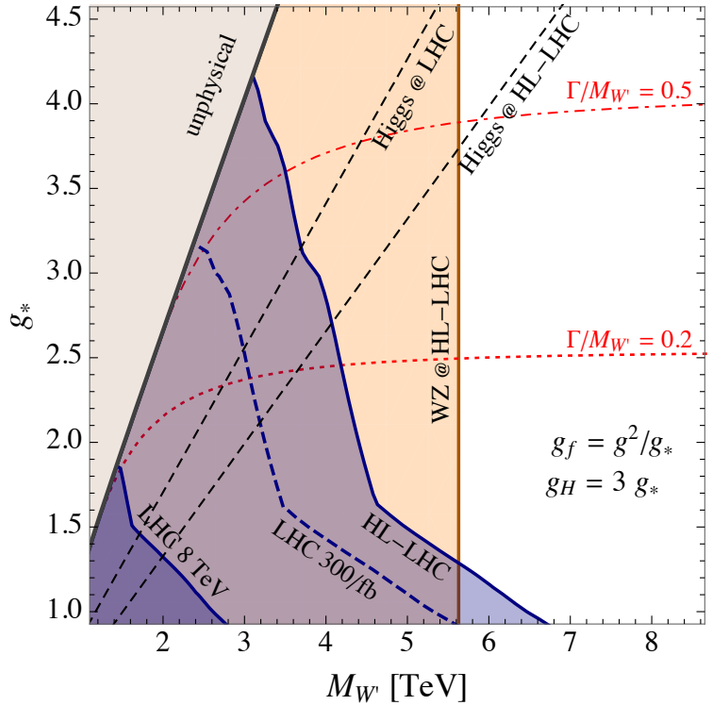
Test of the Standard Model and its possible extensions
through the exploitation of precision measurements of electroweak observables and of the Higgs

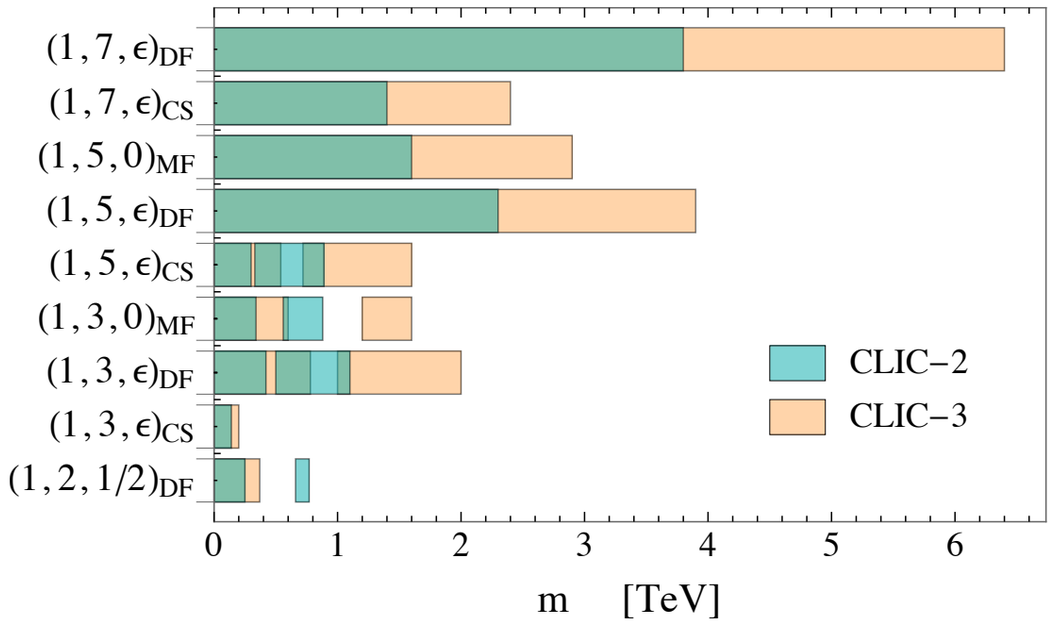
Application and development of the Effective Field Theory formalism

- Model-independent parametrization of new-physics effects [Panico, Riva, Wulzer, Phys. Lett. B776 (2018)]
- Identification of the most sensitive channels and observables [Franceschini, Panico, Pomarol, Riva, Wulzer, JHEP1802(2018)111]

Tests of explicit BSM scenarios

- Models with strongly-coupled new physics
- Models with new EW multiplets (minimal dark matter) [Di Luzio, Grober, Panico, JHEP1901(2019)011]





Development of advanced analysis techniques

- Application and development of Machine Learning techniques (Neural Networks) for the optimization of the sensitivity

Panico, Beyond SM Theory - plenary talk EPS - HEP2019]

QFT@COLLIDERS : "Quantum Field Theories at Colliders" CSN4-Linea2

Resp. Naz. : Fulvio Piccinini (sez. di Pavia) —> Carlo Oleari (MIB)
Sezioni: BO, CS, FI, MIB, PV

FTE	Resp. Locale	Partecipanti
4	S. Catani (100%)	D.Colferai (100%), P.K.Dhani (Post.Doc 100%), L.Cieri (Post.Doc 100%)

High-precision QCD: theory and phenomenology at high-energy colliders

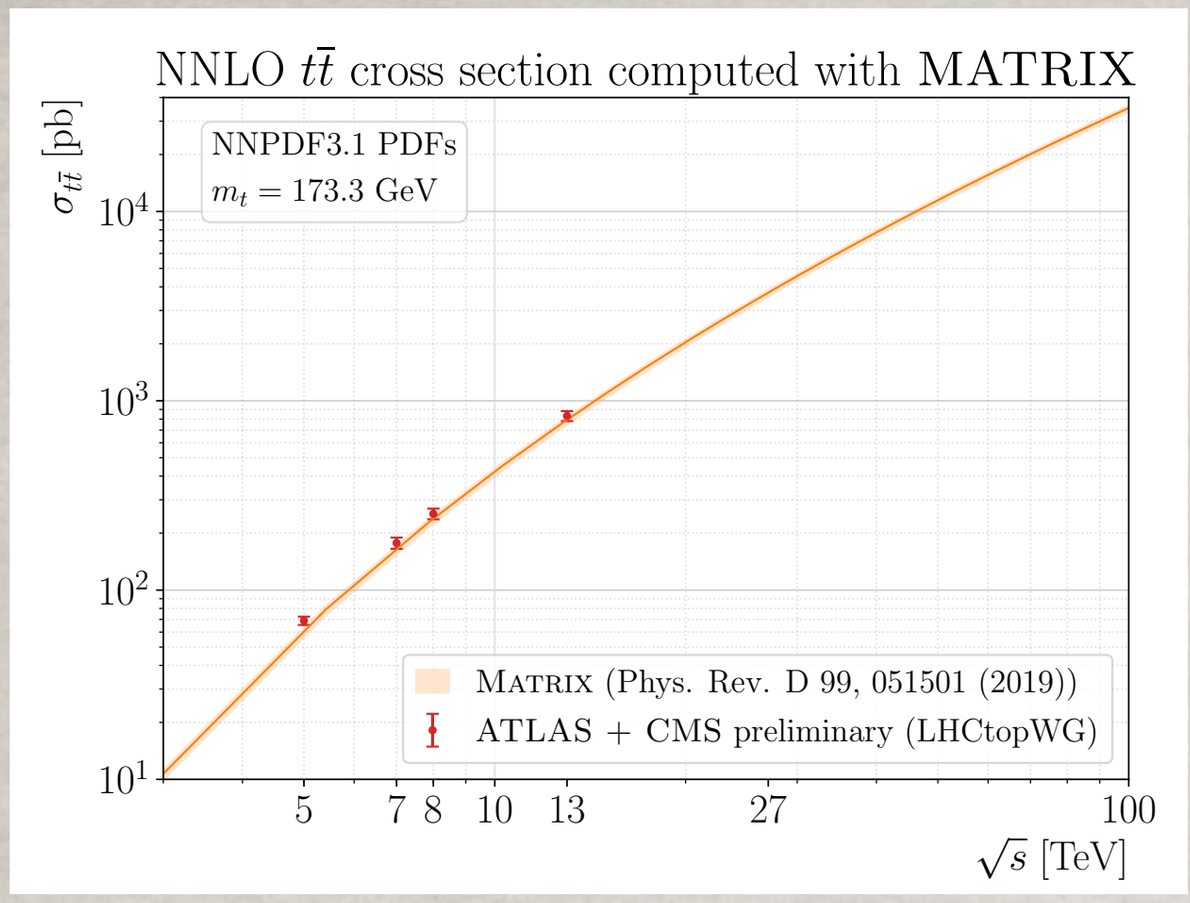
* NNLO QCD predictions for top-quark pair production at LHC energies (see plot 1 from ref. [1])
* Higgs boson pair production by bottom quark annihilation at the LHC: approximated NNLO QCD results (see plot 2 from ref. [2])
* Single Higgs boson production at the LHC in N^3LO QCD

alcune pubblicazioni recenti:

[1] S.Catani, S.Devoto, M.Grazzini, S.Kallweit, J.Mazzitelli and H.Sargsyan, "Top-quark pair hadroproduction at next-to-next-to-leading order in QCD," Phys. Rev. D 99 (2019) 051501

[2] A.H.Ajjath, P.Banerjee, A.Chakraborty, P.K.Dhani, P.Mukherjee, N.Rana and V.Ravindran, "Higgs pair production from bottom quark annihilation to NNLO in QCD," JHEP 1905 (2019) 030

[3] L.Cieri, X.Chen, T.Gehrmann, E.W.N.Glover and A.Huss, "Higgs boson production at the LHC using the q_T subtraction formalism at N^3LO QCD," JHEP 1902 (2019) 096



PLOT1:

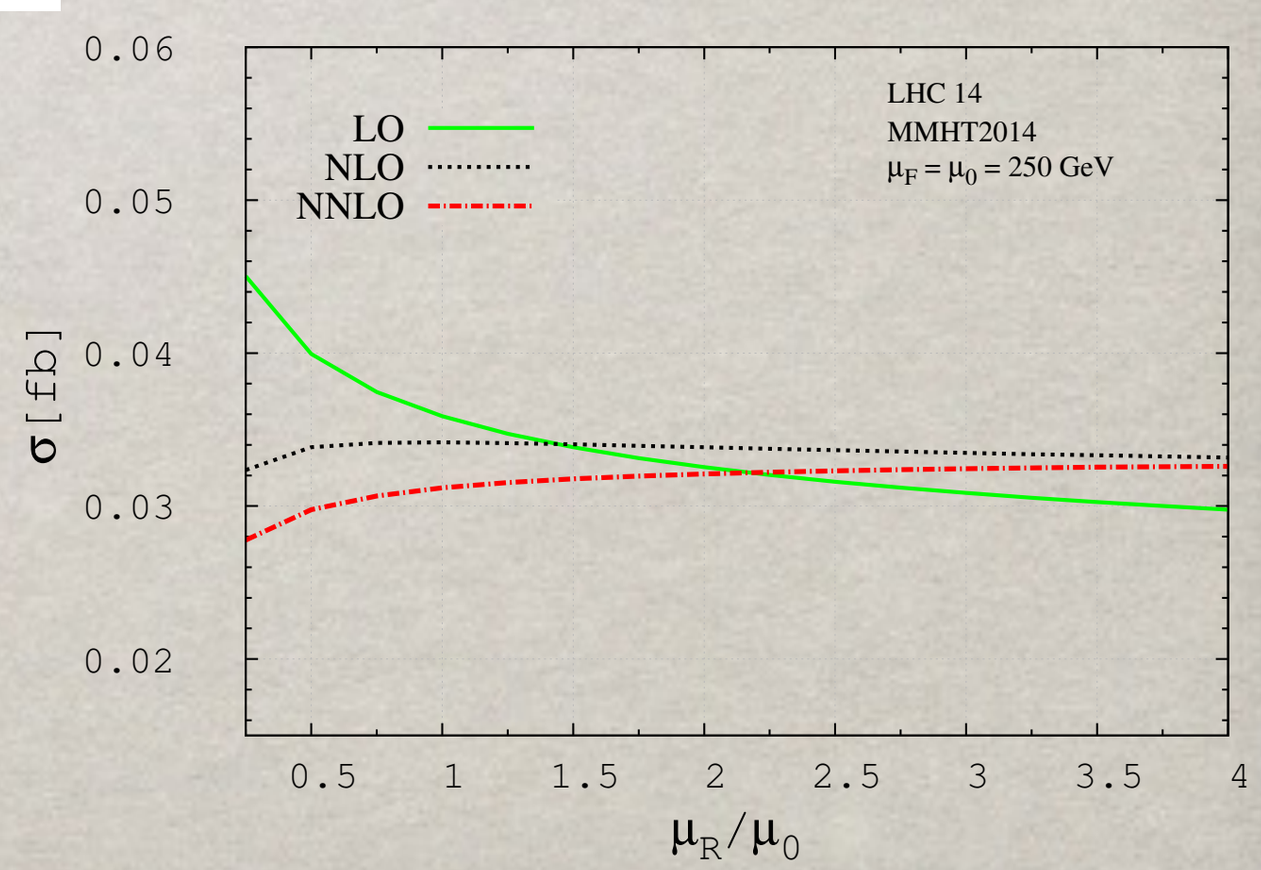
Top-quark production in proton-proton collisions at different energies

NNLO QCD predictions for the total cross section and comparison with LHC data from ATLAS and CMS

PLOT2:

Higgs boson pair production through bottom-quark annihilation at the LHC

Approximated (soft+virtual) NNLO QCD prediction for the total cross section as a function of the renormalization scale μR (μ0 = 2 mH = 250 GeV)



Richiesta 9kE missioni

SIM: "Strongly Interacting Matter at high temperature and density"
CSN4-Linea3

Resp. Naz. : Francesco Becattini (sez. di Firenze)
Sezioni: CT, FI, TO,LNS

FTE	Resp. Locale	Partecipanti
4.9	F. Becattini (100%)	L.Del Zanna (30%), A. Cotrone (30%), F. Bigazzi (30%), M.P. Lombardo (100%), M. Buzzegoli (XXXII Ciclo), D. Rindori (XXXIII Ciclo)

• Teoria: effetti quantistici nella fluidodinamica relativistica; correzioni dissipative per lo spin nei fluidi relativistici; equilibrio termodinamico in relatività generale; determinazione dei coefficienti di trasporto per il plasma di QCD con metodi olografici

• Fenomenologia: uso della polarizzazione misurata nel plasma di QCD nelle collisioni nucleari di altissima energia per la determinazione delle condizioni iniziali di vorticità e accelerazione e campo elettromagnetico

• Lattice QCD: studio delle fasi di QCD nel piano temperatura-potenziale chimico barionico. Analisi del comportamento delle simmetrie anomale nello spettro e studio della classe di universalita' della transizione nel limite chirale partendo da masse finite dei quarks

Richiesta 10kE missioni

Pubblicazioni dell'ultimo anno:

- F. Becattini and D. Rindori, *Extensivity, entropy current, area law and Unruh effect*, Phys. Rev. D 99, no. 12, 125011 (2019)
- F. Becattini, M. Buzzegoli and E. Grossi, *Reworking the Zubarev's approach to non-equilibrium quantum statistical mechanics*, Particles 2, no. 2, 197 (2019)
- F. Becattini, W. Florkowski and E. Speranza, S*pin tensor and its role in non-equilibrium Thermodynamics*, Phys. Lett. B 789, 419 (2019)
- M. Buzzegoli and F. Becattini, *General thermodynamic equilibrium with axial chemical potential for the free Dirac field,* JHEP 1812, 002 (2018)
- F. Bigazzi, A. Caddeo, A. L. Cotrone, P. Di Vecchia and A. Marzolla, *The Holographic QCD Axion,*' arXiv:1906.12117 [hep-th].
- F. Bigazzi, A. L. Cotrone, M. Järvinen and E. Kiritsis, *Non-derivative Axionic Couplings to Nucleons at large and small N*, arXiv:1906.12132 [hep-ph].
- A. Y. Kotov, M. P. Lombardo and A. M. Trunin*, Fate of the eta' in the quark gluon plasma*, Phys. Lett. B 794 (2019) 83
- F. Burger, E. M. Ilgenfritz, M. P. Lombardo and A. Trunin, *Chiral observables and topology in hot QCD with two families of quarks*,' Phys. Rev. D 98 (2018) no.9, 094501.

Altre attività

- NA60+ Collaboration and M. P. Lombardo*, Study of hard and electromagnetic processes at CERN-SPS energies: an investigation of the high mB region of the QCD phase diagram with NA60+*," arXiv:1812.07948 [nucl-ex].
- F. Antinori, A. Dainese, P. Giubellino, V. Greco, M. P. Lombardo and E.Scomparin, Proceedings, 27th International Conference on Ultrarelativistic Nucleus-Nucleus Collisions (Quark Matter 2018) : Venice, Italy, May 14-19, 2018," Nucl. Phys. A 982 (2019)
- Libro Springer Lecture Notes Physics Strongly Interacting Matter under Rotation, Curatori F. Becattini, J.F. Liao, M. Lisa in uscita nel 2020
- Workshop organizzato nel 2020 ECT* Trento: *Spin and hydrodynamics in relativistic nuclear collisions*
- Nuovo grant Europeo con Strong 2020 basato a Firenze (50K), responsabile M. P. Lombardo, con un workshop a Trento nel 2019 nell'ambito del progetto COST-THOR 2020 sulle tematiche di NA60+
- Attività di outreach con fumetto per la COST Action THOR (M. P. Lombardo)
- Contributo al progetto PRACE (M. P. Lombardo)

GeoSym-QFT: "Non-Commutative GEOmetry, Poisson Geometry and their SYMmetries in Quantum Field Theory" CSN4-Linea4

Resp. Naz. : Fedele Lizzi (sez. di Napoli)
Sezioni: FI, NA, PI, PV, SA

FTE	Resp. Locale	Partecipanti
4.0+1.0	M. Tarlini (100%)	F.Bonechi (100%), R.Giachetti (50%), G.Pettini (100%), A. Barducci (50%), E. Viviani (XXXIV Ciclo, 100%)

- Homotopical methods in topological Quantum Field Theory
- Shifted Poisson stacks: mathematical structures that encode quotients that are not regular
- Complete integrable systems: Toric structures and bihamiltonian systems
- Dirac operator and two body relativistic wave equations: covariant quantization of the systems for the scalar-scalar, fermion-scalar and fermion-fermion cases
- Carroll and Galilei symmetries in vector SUSY models
- Transport in optical lattices and Classical phase transitions

References:

F. Bonechi, A. Cattaneo, R. Iraso, M. Zabzine: "Observables in the equivariant A-model" arXiv:1807.08659

F. Bonechi, N. Ciccoli, C. Laurent-Gengoux, P. Xu: "Shifted Poisson structures on differentiable stacks" arXiv: 1803.06685

F. Bonechi, J. Qiu, M. Tarlini: "Multiplicative integrable models from Poisson-Nijenhuis structures", Journal of Symplectic Geometry, vol 16, 1167-1208 (2018)

F. Bonechi, J. Qiu, M. Tarlini: "Generalized Kahler structure on CP^2 and elliptic functions" in preparation

R. Giachetti, E. Sorace: "Two body relativistic wave equations" Annals of Physics, vol 401, 202-223 (2019)

A. Barducci, R. Casalbuoni, J. Gomis: "Vector SUSY models with Carroll or Galilei invariance", Physical Review D vol 99, Num 045016 (2019)

G. Pettini, M. Gori, R. Franzosi, C. Clementi, M. Pettini: "On the origin of phase transitions in the absence of symmetry-breaking", Physica A - Statistical Mechanics and its Applications, vol 516, 376-392 (2019)

S. Martinez-Garaot, G. Pettini, M. Modugno: "Nonlinear mixing of Bogoliubov modes in a bosonic Josephson junction", Physical Review A, vol 98, Num 043624 (2018)

Richiesta 8 kE missioni

DynSysMath: "Dal caos microscopico ai sistemi macroscopici: nuovi aspetti dinamici" CSN4-Linea4

Resp. Naz. : Fausto Borgonovi (sez. di Pavia)
Sezioni: CT, FI,MI, PV, RMI

FTE	Resp. Locale	Partecipanti
4.9	L. Casetti (100%)	P. Di Cintio (50%), D. Fanelli (30%), S. Lepri (50%), S.Ruffo (100%), P. Politi (50%), R. Livi (60%), A. Mossa (Doc. Scuola 50%)

Complex Dynamical Behaviour in Many-Particle Systems

Highlights:

1. **Dynamical freezing of relaxation to equilibrium**
[Iubini, Chirondojan, Oppo, Politi, Politi, Phys. Rev. Lett. 122, 084102 (2019)]

2. **Violent relaxation in the Hamiltonian mean field model: I. Cold collapse and effective dissipation**
[Giachetti, Casetti, *J. Stat. Mech.* (2019) 043201]

Richiesta 15 kE missioni

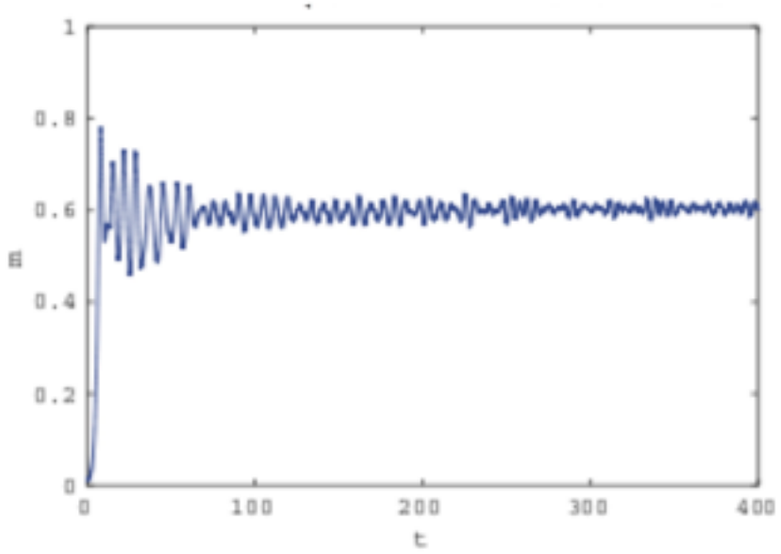
In N-body systems with long-range interactions mean-field effects dominate over binary interactions (collisions), so that relaxation to thermal equilibrium occurs on time scales that grow with N, diverging in the limit. However, a much faster and completely non-collisional relaxation process, referred to as violent relaxation, sets in when starting from generic initial conditions: collective oscillations develop and damp out on timescales not depending on the system's size.

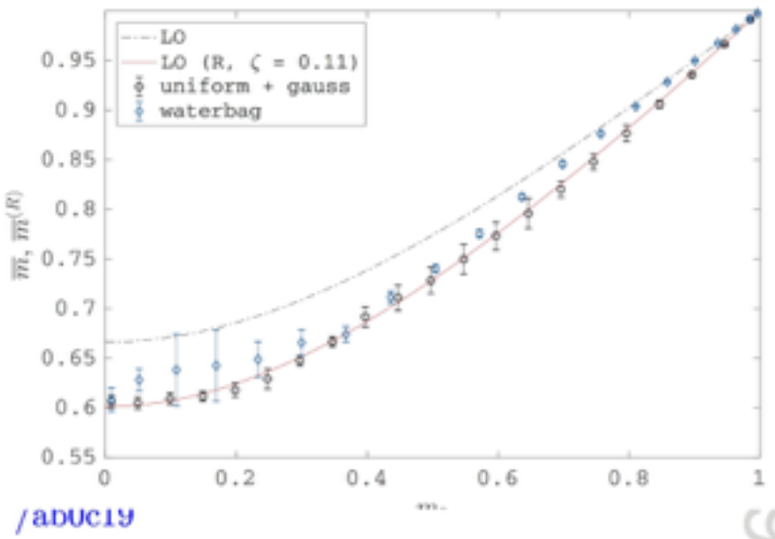
Journal of Statistical Mechanics: Theory and Experiment
An IOP and SISSA journal

PAPER: Classical statistical mechanics, equilibrium and non-equilibrium

Violent relaxation in the Hamiltonian mean field model: I. Cold collapse and effective dissipation

Guido Giachetti[1,4] and Lapo Casetti[1,2,3]



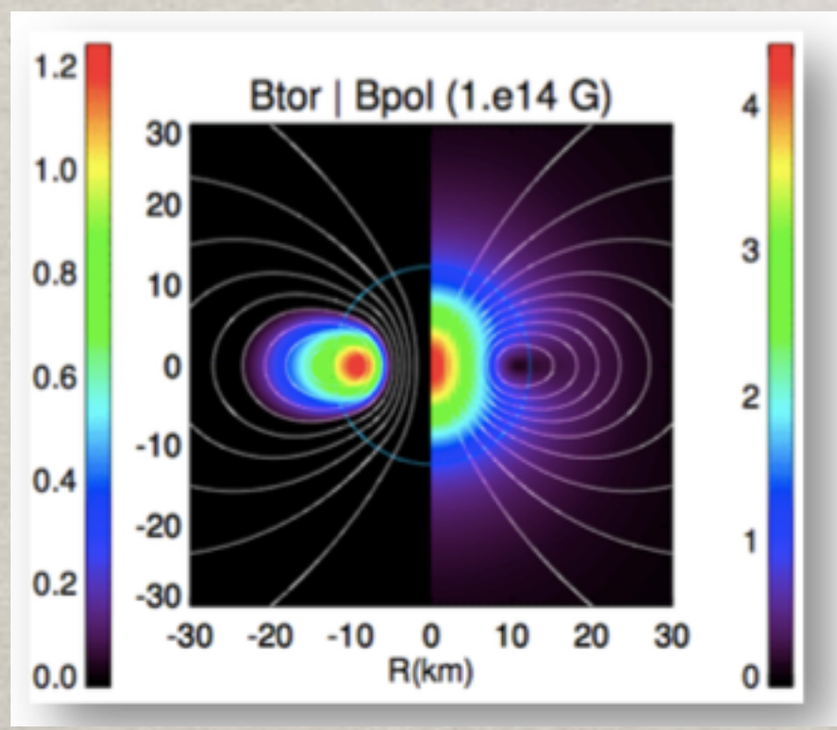


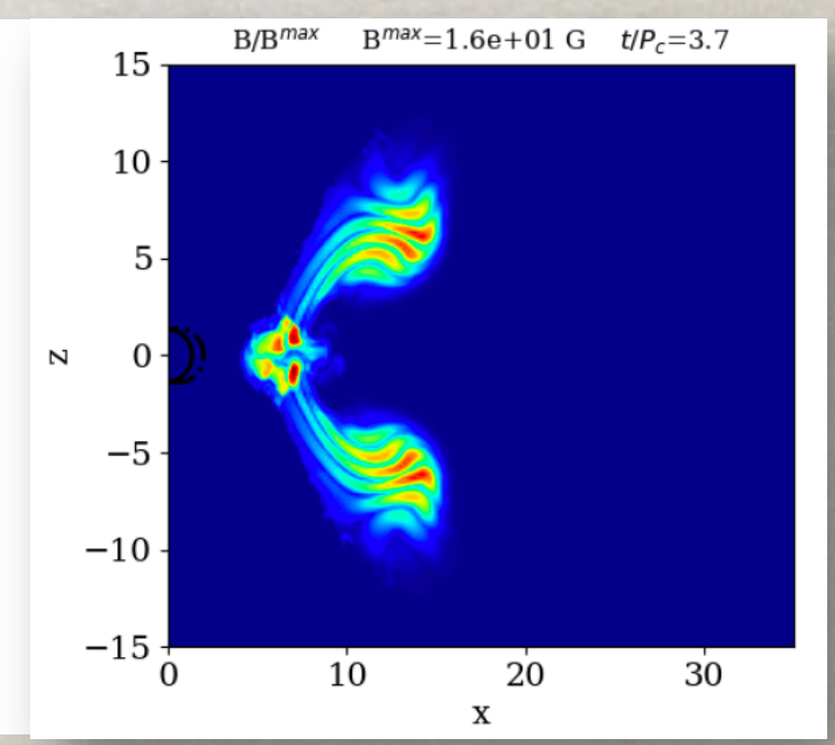
TEONGRAV: "TEoria delle ONde GRAVitazionali" CSN4 -Linea5

Resp. Naz. : Leonardo Gualtieri (sez. di Roma1)
Sezioni: **FI, RM1, MIB, NA,TN**

FTE	Resp. Locale	Partecipanti
3,2	L. Del Zanna (RU 70%)	N. Bucciantini (INAF 50%), N. Tomei (dott. XXXIV ciclo, 100%), J. Soldateschi (dott. XXXIV ciclo, 100%)

Struttura e dinamica di stelle di neutroni magnetizzate





Temi di ricerca dell'unità di Firenze

1) Struttura di stelle di neutroni fortemente magnetizzate in relatività generale

Pili A. G.; Bucciantini N.; Del Zanna L., *General relativistic models for rotating magnetized neutron stars in conformally flat space-time,* Mon. Not. R. Astr. Soc. 470, 2469, 2017

2) Dischi e accrescimento attorno a buchi neri

Bugli M., Guilet J., Mueller E., Del Zanna L., Bucciantini N., Montero P.J., *Papaloizou-Pringle instability suppression by the magnetorotational instability in relativistic accretion discs*, Mon. Not. R. Astr. Soc. 475, 108, 2018

3) Plasmi relativistici: azione di dinamo ed effetti dissipativi

Del Zanna L., Bucciantini N., *Covariant and 3 + 1 equations for dynamo-chiral general relativistic magnetohydrodynamics*, Mon. Not. R. Astr. Soc. 479, 657, 2018

4) Tecniche numeriche per le simulazioni GRMHD

Mignone A., Mattia G., Bodo G., Del Zanna L., *A constrained transport method for the solution of the resistive relativistic MHD equations*, Mon. Not. R. Astr. Soc. 486, 4252, 2019

Richiesta 8kE missioni

PLEXNET "Physics of Complex Networks" CSN4-Linea6

Resp. Naz. : Franco Bagnoli (sez. di Firenze)
Sezioni: BO,CS,CT,FI,PD,PG

FTE	Resp. Locale	Partecipanti *sezione Lecce
6,1	F. Bagnoli (100%)	D. Fanelli (70%), R. Livi (40%), L.Lenzini (XXXII Ciclo), S. Nicoletti (XXXII Ciclo), A.Ihusan (XXXIII Ciclo), Pennetta (100%)* — da inserire S.Olmi, S.Luccioli, A.Torcini (CNR)

Attività svolta 2019 (linee principali)

— Control of complex networks, stabilisation of cycles and fixed points.
— Control of stochastic discrete systems.
— Trap competition in directed networks.
— Self-organisation and percolation phenomena
— Inverse problems by means of heterogenous mean-field approach
— Reconstruction of activity on networks from observed patterns
— Pattern formation in networks

Attività prevista 2020

— Application to urban networks of trap competition in directed networks.
— Control of complex networks
— Control of stochastic and deterministic discrete systems
— Applications of percolation-like phenomena to computer networks

Richiesta
10 kE
missioni

Percolation, in its most general interpretation, refers to the **"flow" of something (a physical agent, data or information) in a network**, possibly accompanied by some nonlinear dynamical processes on the network nodes. Originated in the domain of theoretical and matter physics, **it has many applications** in epidemiology, sociology and, of course, **computer and Internet sciences.**

future internet

Review

Percolation and Internet Science

Franco Bagnoli [1,2,*], Emanuele Bellini [3], Emanuele Massaro [4,5] and Raúl Rechtman [6]

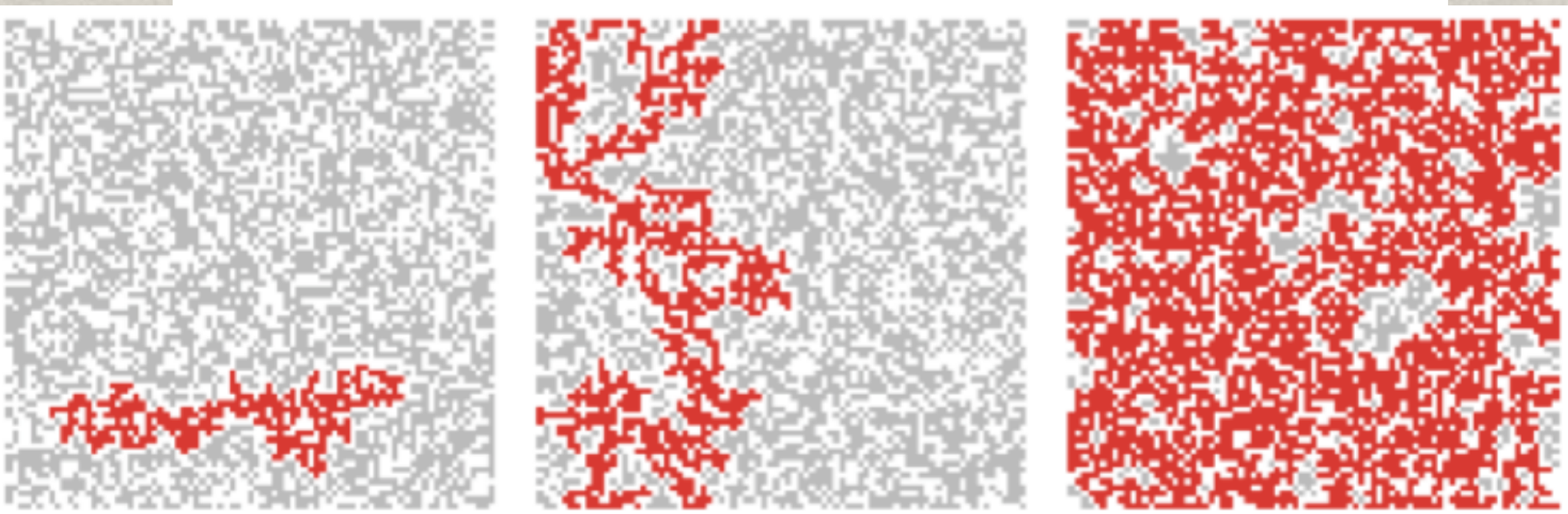


Figure 1. Typical patterns of the percolation model, where the largest component is marked in red: **(Left)** $p < p_c$; **(Middle)** $p = p_c$, notice the appearance of a percolating cluster; and **(Right)** $p > p_c$.

RICHIESTE INVITI OSPITI GRUPPO IV
FONDI FAI DIRETTORE 2020

- **GEOSYM_QFT :** Maxim Zabzine (Uppsala University) 0.8kE, Alberto Cattaneo (Universitat Zurich) 1.4kE, Jian Qiu (University of Uppsala) 0.8kE => **TOT 3.0kE**

- **PLEXNET** : **?** Timoteo Carletti, Università di Namur (Belgio), 1.5 KE, Raul Rechtman, UNAM (Mexico), 1.5 KE => **TOT 3.0kE**

- **DYNSYSMATH** : => Shamik Gupta, Ramakrishna Mission Vivekananda University (India),1.5 kE => **TOT 1.5kE**

- **SFT** : A. Pronko (PDMI-Steklov, San Pietroburgo) 2kE, A. Sportiello (CNRS Parigi) 1kE => **TOT 3.0kE**

- **GAST :** C. Nunez (Swansea UK) 1.5KE => **TOT 1.5kE**

- **HEPCube :** F. Sala, CNRS Parigi 1kE, J. Smirnov (CP3 Odense) 1kE => **TOT 2.0kE**

- **SIM:** Kharzeev (Stonybrook) => **TOT 2.0kE**

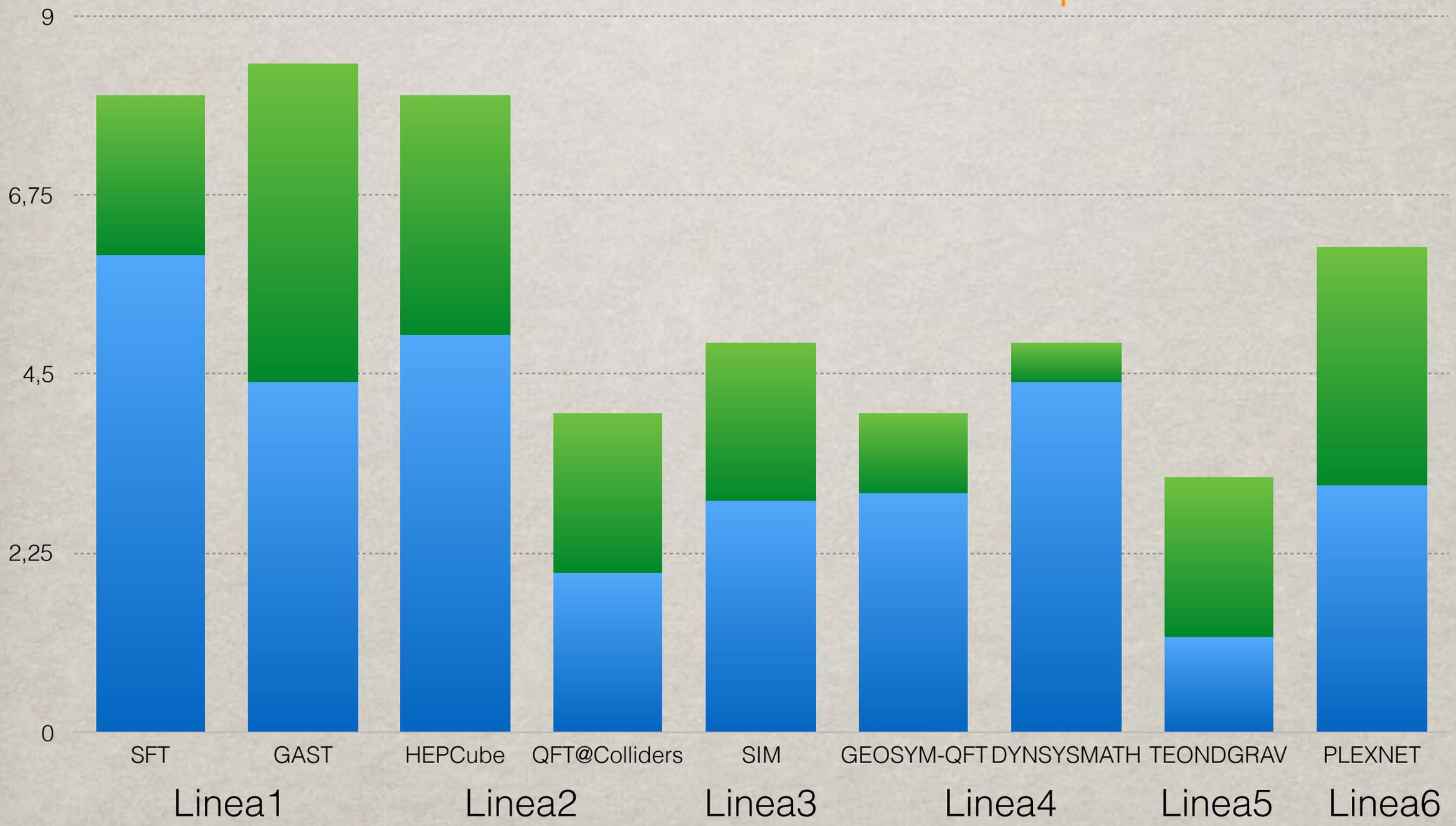
Richieste preliminari da confermare e/o integrare ordine di grandezza 16 kE

51.5 FTE Gruppo4 - 2020

30 strutturati + 2 RTDB

12 dott. + 2 RTDA + 5.5 Post-Doc

+ 3 pensionati attivi non inseriti



RIEPILOGO RICHIESTE GRUPPO IV (kE)

	Missioni	Ospiti	Semin.	Cons.	Invent.	Licenze SW	Manut.	Pubbl.
DotaIV	11	9	10	5	10	2	1	0
DotaIV_GGI	5	60						
DotaIV_Schools		70	50					
SFT	14							
GAST	16							
HEPCube	16							
QFT@Colliders	9							
SIM	10							
GEOSYM_QFT	8							
DYNSYSMATH	15							
TEONGRAV	8							
PLEXNET	10							
Fondo Direttore		16						

Galileo Galilei Institute for Theoretical Physics

Arcetri Florence

Centro Nazionale INFN di Studi Avanzati

The *Galileo Galilei Institute* runs long-term programs, Workshops, Conferences and organizes Schools for graduate students and young researchers.

The GGI activity is concerned with developing hypotheses, models and physics theories to explain the results of experiments and open up new scenarios for physics.

The main theoretical physics research areas are:

- theory of quantum fields and strings
- phenomenology of the standard model and beyond
- astro/cosmo-particle physics
- statistical field theory and complex systems
- nuclear and hadronic physics

UNIVERSITÀ DEGLI STUDI FIRENZE

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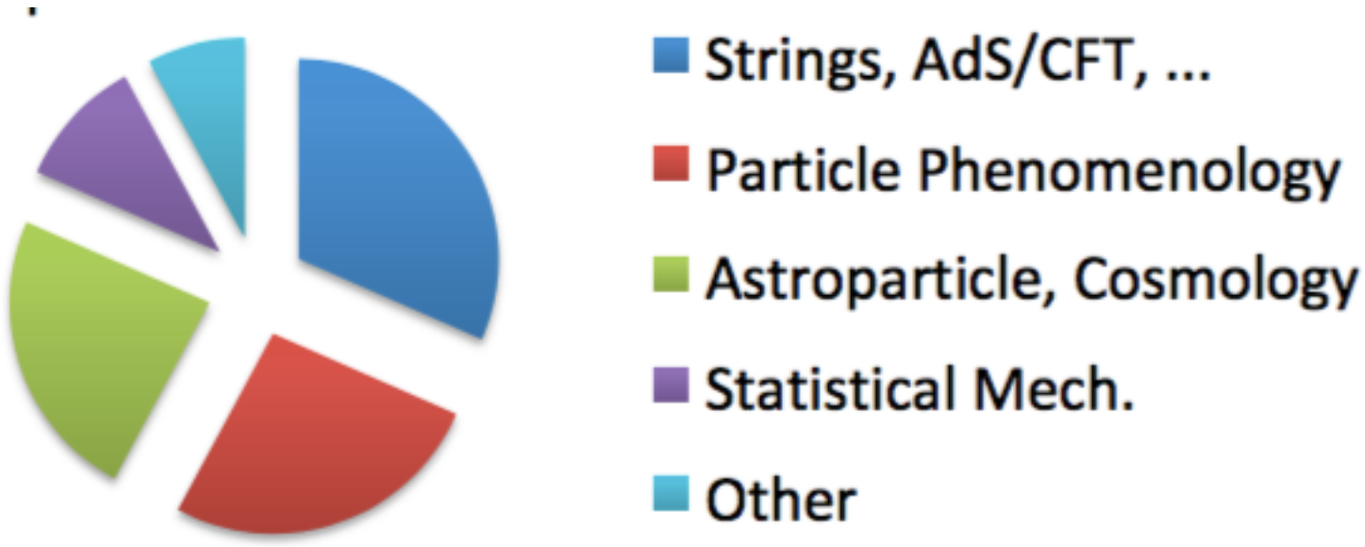
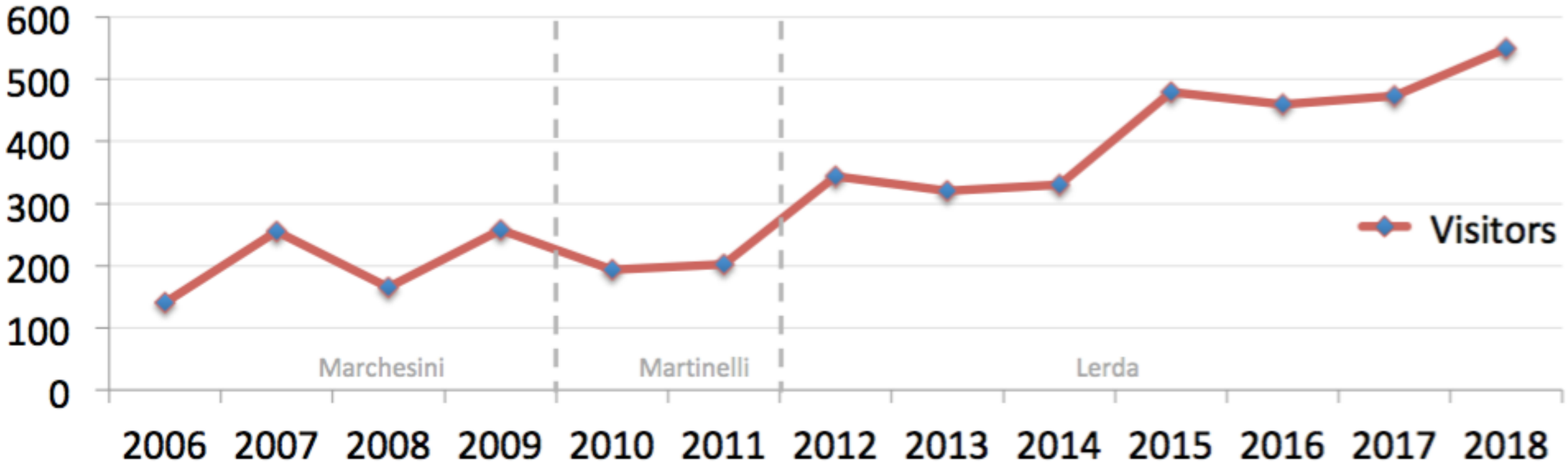
SIMONS FOUNDATION

IL COLLEGIO GALILEO

www.ggi.infn.it GGI - Largo Enrico Fermi, 2 50125 Firenze Italy

☑ Workshops' Participants





The Galileo Galilei Institute For Theoretical Physics

Centro Nazionale di Studi Avanzati dell'Istituto Nazionale di Fisica Nucleare

Arcetri, Firenze

Workshop 2019

Mar, 26 2019 - May, 10 2019	**String Theory from a Worldsheet Perspective**
May, 20 2019 - Jul, 12 2019	**Breakdown Of Ergodicity In Isolated Quantum Systems: From Glassiness To Localization**
Aug, 26 2019 - Oct, 11 2019	**Next Frontiers in the Search for Dark Matter**

running now

Workshop 2020

Mar, 30 2020 - May, 08 2020	**Emergent Geometries from Strings and Quantum Fields**
May, 18 2020 - Jul, 03 2020	**Gravitational scattering, inspiral, and radiation**
Aug, 24 2020 - Oct, 16 2020	**Topological properties of gauge theories and their applications to high-energy and condensed-matter physics**

The Galileo Galilei Institute For Theoretical Physics

Centro Nazionale di Studi Avanzati dell'Istituto Nazionale di Fisica Nucleare

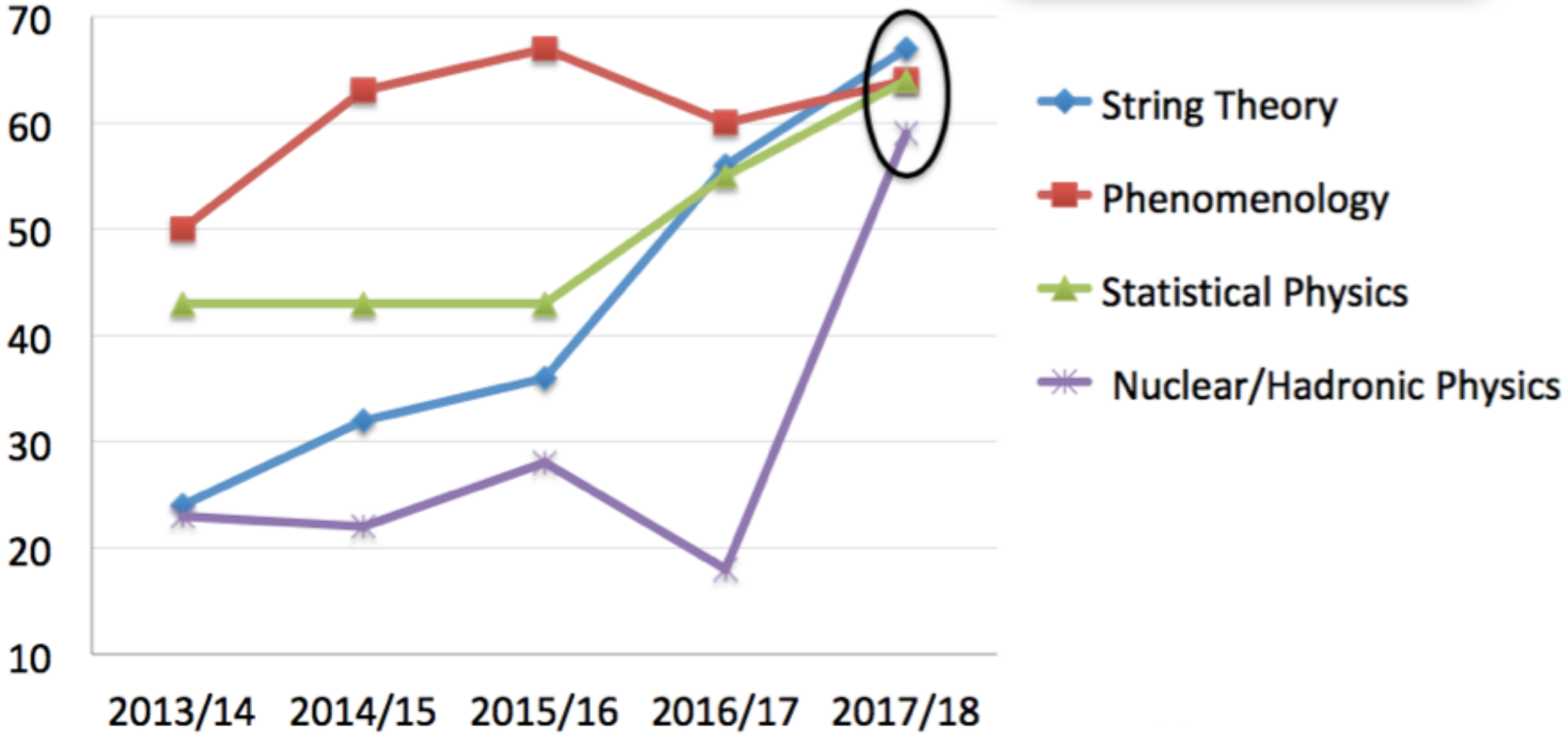
Arcetri, Firenze

SIMONS FOUNDATION

Altri eventi 2019:

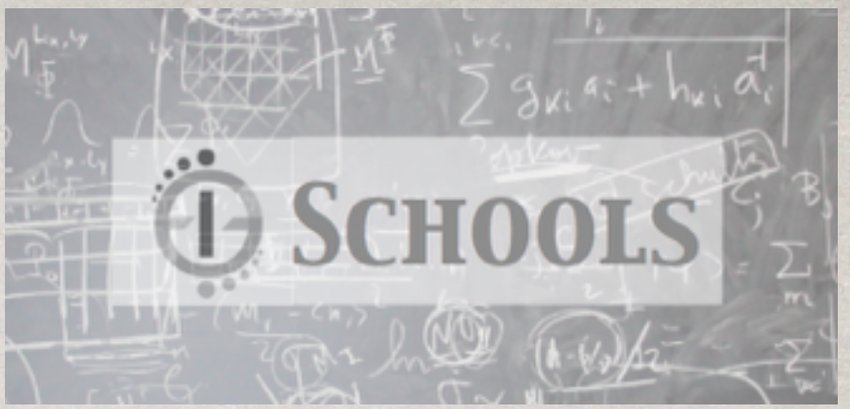
Feb, 20 2019 - Feb, 22 2019	Conference	**43rd LQP "Foundations and Constructive Aspects of QFT"**
Mar, 25 2019 - Mar, 29 2019	Training Week	**Review Lectures on World-Sheet Aspects of String Theory**
Apr, 15 2019 - Apr, 18 2019	Focus Week	**String Theory from a Worldsheet Perspective**
May, 02 2019 - May, 02 2019	Conference	**Award ceremony of the Galileo Galilei medal**
May, 06 2019 - May, 10 2019	Conference	**String Field Theory and String Perturbation Theory**
May, 13 2019 - May, 15 2019	Mini School	**Charting Fundamental Interactions: from Freedom to Safety**
Jun, 03 2019 - Jun, 07 2019	Conference	**Ergodicity breaking in Quantum Physics**
Jul, 01 2019 - Jul, 05 2019	Focus Week	**Glassy aspects of classical and quantum computation**
Sep, 23 2019 - Sep, 27 2019	Conference	**Next Frontiers in the Search for Dark Matter**
Oct, 13 2019 - Oct, 27 2019	Mini Workshop	**Beyond the Standard Model: historical-critical perspectives**

☑ Schools' Participants



New School: Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation March 11-22, 2019

Scuole di Dottorato al GGI
Attività 2018/2019



- **LACES 2018** (26 Nov - 14 Dic 2018)

organizzatori: D.Cassani (INFN Padova), C. Maccaferri (Torino University), S. Pasquetti (Milano Bicocca University)

- **GGI Lectures on the Theory of Fundamental Interactions 2019** (7-25 Gennaio 2019)

organizzatori: B. Bellazzini (IPhT CEA-Saclay), M. Cirelli (LPTHE CNRS Jussieu, Paris), S. De Curtis (INFN & University, Florence), F. Maltoni (Bologna Univ. & L ouabain Univ.), M. Redi (INFN & University, Florence), R.Torre (INFN Genova & CERN). E. Trincherini (SNS & INFN, Pisa)

- **SFT 2019 - Lectures on Statistical Field Theory** (4-15 Febbraio 2019)

organizzatori: P. Calabrese (SISSA,Trieste), A. Cappelli (INFN, Florence), F. Colomo (INFN, Florence), F. Essler (University of Oxford), G. Mussardo (SISSA, Trieste).

- **Frontiers in Nuclear and Hadronic Physics** (26 Feb - 9 Mar 2019)

organizzatori: F. Becattini (University of Firenze) I. Bombaci (University of Pisa) A. Bonaccorso (INFN - Pisa), M. Colonna (INFN - LNS), M. Nardi (INFN-Torino), G. Salmè (INFN - Roma1), Elena Santopinto (INFN - Genova), Enrico Vigezzi (INFN - Milano)

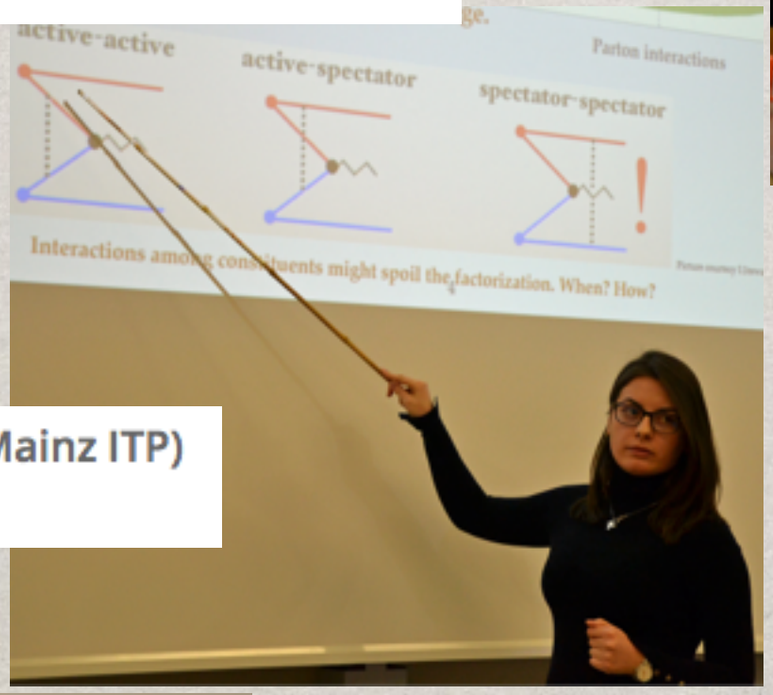
- **Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation**
(11-22 Marzo 2019)

organizzatori: N. Bartolo (Padova), N. Fornengo (Torino), D. Grasso (Pisa), L. Gualtieri (Roma 1), E. Lisi (Bari), G. Miele (Napoli)

STUDENTS' SEMINARS

on a voluntary basis

[14:30-14:50] Jan H. Kwapisz (University of Warsaw)
Asymptotic safety and Conformal Standard Model



[15:10-15:30] John Tamanas (UC Santa Cruz)
What your GGI Coffee Mug says about You

[16:20-16:40] Bianka Meçaj (Mainz ITP)
Glauber Gluons

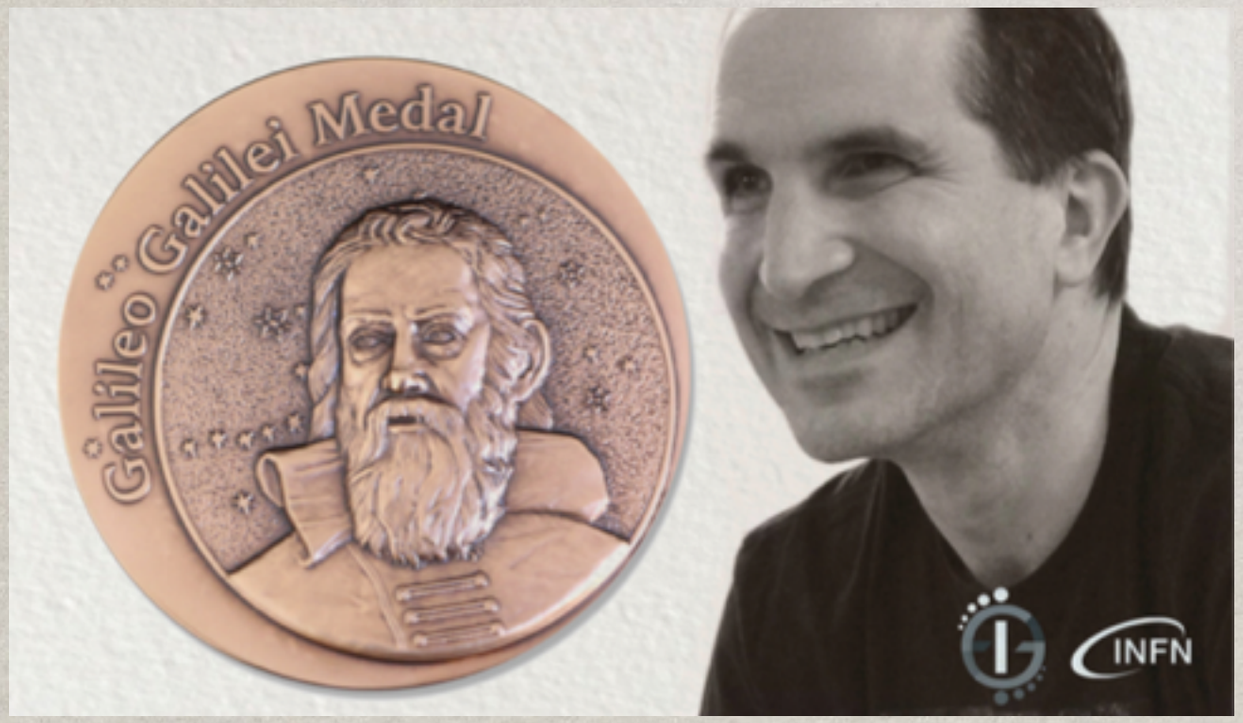
[16:00-16:20] Carissa Cesarotti (Harvard University)
Searching for New Physics in CMS Open Data

[14:50-15:10] Shu-Yu Ho (Tohoku University, Japan)
Relaxing the Cosmological Moduli Problem by Low-scale Inflation

Juan Martin Maldacena vince la Medaglia Galileo Galilei 2019

Il premio **Medaglia Galileo Galilei** è stato istituito nel 2018 dall'INFN in occasione della trasformazione del GGI in Centro Nazionale di Studi Avanzati dell'INFN, in partnership con l'Università di Firenze.

La medaglia viene assegnata a uno o al massimo tre scienziati che nei 25 anni precedenti alla data del premio hanno conseguito rilevanti risultati nel campo della fisica teorica delle interazioni fondamentali tra particelle elementari, inclusa la gravità e i fenomeni nucleari.



Il premio
Medaglia Galileo Galilei 2019
è stato assegnato al fisico
Juan Martin Maldacena
"Per le sue idee pionieristiche nella fisica teorica, e in particolare, per la scoperta della dualità tra gravità e teoria quantistica dei campi, con implicazioni di vasta portata"

La medaglia Galileo è stata realizzata dal famoso laboratorio fiorentino Picchiani&Barlacchi

il GGI ha ospitato alla Villa il Gioiello, la cerimonia del premio Medaglia Galileo Galilei