



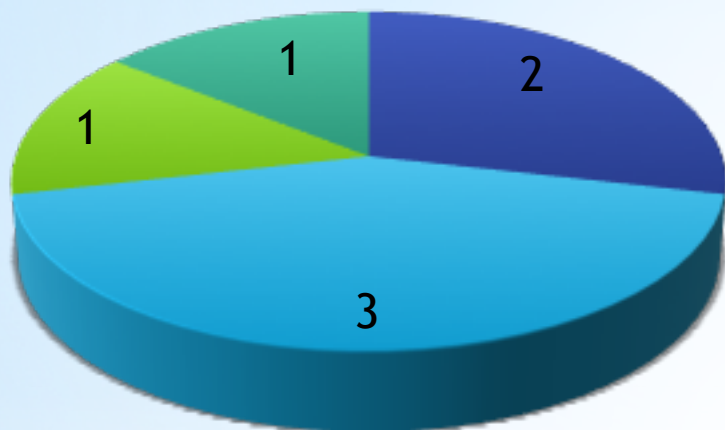
Relazione coordinatore gruppo IV al CL preventivi del 30/6/2017

Enrico Nardi

-  Info sul gruppo teorico
-  Attività delle sigle (contributi)

Anagrafica (quasi finale)

Ricercatori Dipendenti TI



- ENP (FTE 1+1)
- NEMESYS (FTE 3.85)
- QFT-HEP (FTE 1)
- TAsP (FTE 2+1)

FTE (preliminary) tot: 9.85



ENP

Exploring New Physics

R.L. Gennaro Corcella

- G. Corcella 100%
- V. Del Duca (in congedo, ETH Zurich)
- G. Pancheri (senior associate)

Iniziativa Specifica Exploring New Physics (ENP) – Nodi: LNF, RM1, RM2, NA

Responsabile Nazionale: G. D'Ambrosio (NA); Responsabile LNF: G. Corcella

Afferenti LNF: G. Corcella (FTE=1), V. Del Duca (FTE=0, ETH Zurigo),
G. Pancheri (FTE=0, senior associate)

Assegno di ricerca cofinanziato LNF/RM3 da Ottobre 2017 (selezione in corso)

Attività di ricerca su vari temi di fenomenologia dei collider:

- Test di precisione del Modello Standard e ricerche di nuova fisica a LHC, in particolare supersimmetria, produzione di bosoni pesanti Z' , Materia Oscura, modelli 331
- Calcoli ad ordine superiore per interazioni forti ed elettrodeboli: ampiezze di scattering a due loop, risommazione di gluoni soffici, frammentazione di quark pesanti, implementazione di generatori Monte Carlo per la fisica dei collider (fenomenologia del top e ioni pesanti)

Organizzazione joint workshops LNF/Rome (G.C.), Linear and Future Colliders 2017 (G.C. and G.P.), School of Analytic Computing (V.D.D.), Photon 2017 (G.P.), LNF Winter/Spring Institutes (G.C.)

Gennaro Corcella:

1. Fisica del top: determinazione dell'errore sistematico sulla massa del top dovuto alla frammentazione del quark bottom ($t \rightarrow bW$) e ad effetti di riconnessione di colore

Incertezza nell'interpretazione della misura della massa del top (generatori Monte Carlo) e definizioni teoriche quali la 'pole mass'

Collaboratori: M.Mangano (CERN), R.Franceschini (RM3)

2. Ricerche di Z' in canali non standard: decadimenti supersimmetrici o modelli leptofobici abbassano i limiti di esclusione sulla massa della Z' e richiedono nuove analisi sperimentali in stati finali con leptoni e MET. Decadimenti in LSP (neutralini) fondamentali per le ricerche di materia oscura a LHC

Collaboratori: B.Fuks (Paris), J.Araz (Concordia), M. Frank (Concordia)

3. Modelli 331 a LHC: nuova simmetria $SU(3)_C \times SU(3)_L \times U(1)_X$ predice bosoni Y di carica ± 2 e massa $\mathcal{O}(1 \text{ TeV})$, bosone pesante Z' , quark esotici di carica $-4/3$ e $5/3$

Processi $pp \rightarrow Y^{++}Y^{--}jj \rightarrow (\ell^+\ell^+)(\ell^-\ell^-)jj$ con due coppie leptoniche dello stesso segno e due jet 'forward' facilmente separabili dai fondi mediati da ZZ

Collaboratori: C.Corianò (Lecce), A.Costantini (Lecce), P.Frampton (Oxford)

Relazione sull'attività di ricerca

Vittorio Del Duca

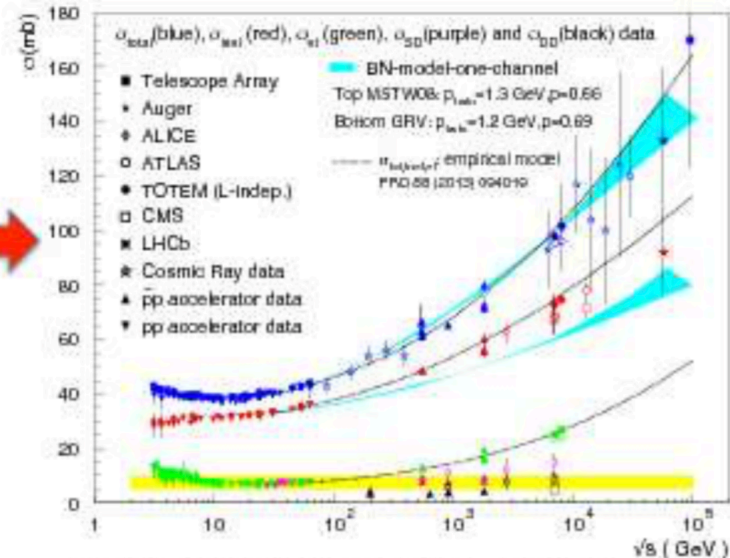
Linee di ricerca

- sviluppare un nuovo metodo di calcolo di ampiezze di scattering a due loop, e applicarlo alle correzioni di massa del top alla produzione di Higgs + 1 jet [1]
- potenziare il calcolo di ampiezze di scattering in teorie di gauge, mediante l'uso di concetti avanzati di algebra moderna [2, 3]

- [1] R. Bonciani, V. Del Duca, H. Frellesvig, J. M. Henn, F. Moriello and V. A. Smirnov, "Two-loop planar master integrals for Higgs + 3 partons with full heavy-quark mass dependence," JHEP 1612 (2016) 096 [arXiv:1609.06685 [hep-ph]]
- [2] V. Del Duca, S. Druc, J. Drummond, C. Duhr, F. Dulat, R. Marzucca, G. Papathanasiou and B. Verbeek, "Multi-Regge kinematics and the moduli space of Riemann spheres with marked points," JHEP 1608 (2016) 152 [arXiv:1606.08807 [hep-th]]
- [3] V. Del Duca, C. Duhr, R. Marzucca, B. Verbeek, "The analytic structure and the transcendental weight of the BFKL ladder at NLL accuracy, [arXiv:1705.10163 [hep-th]].

2017-2018

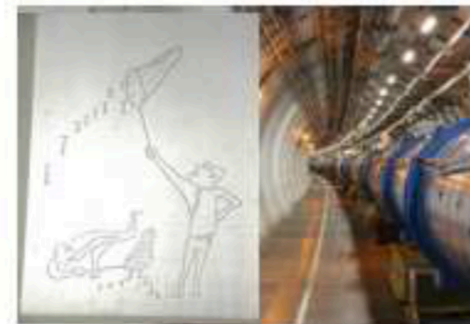
- **Ricerca** : Studi di fisica adronica nell'ambito del modello a mini-jet con risommissione di gluoni soffici a tutti gli ordini:
 - In corso
 - diffrazione a LHC,
 - la sezione d'urto differenziale elastica
 - The inelastic cross-section at LHC and survival probabilities at LHC, [arXiv:1706.00093 \(sub. PRD\)](#)
 - Production of exotic composite quarks at LHC, [arXiv:1703.06913 \(sub. PRD\)](#)
- **Storia**:
 - Touschek e Wideroe (articolo sui betatroni, in preparazione, da sottoporre all' European Physical Journal for History)
 - Storia europea dei collisionatori di particelle, sugli sviluppi iniziali (progetto per un numero speciale dedicato da sottoporre a European Physical Journal for History)



2016-2017

- **Ricerca**
 - Su invito : *An Introduction to the physics of the total cross-section*, [Eur.Phys.J. C77 \(2017\)](#) EPJC 2016, 150, 176 pagine
 - Fine structure of the diffraction cone: From the ISR to the LHC, [Int.J.Mod.Phys. A31 \(2016\)](#)
 - Total Cross-sections at LHC and Cosmic ray Energies, [Frascati Phys.Ser. 61 \(2016\)](#) 171
- **Storia e divulgazione**
 - Film-Documentario di 36' per LAL, Orsay: *Soixante années d'exploration de la matière avec des accélérateurs des particules*
 - Relazioni su invito
 - U. Bristol, UK: per *History of colliders*, IOP Organizzato da Institute of Physics, Cambridge U.
 - Pollau, Austria: per *History of Physics*, EPS organizzato dalla European Physical Society

Hadronic physics: total, elastic, inelastic x-sections, diffraction, All Order Soft Gluon Resummation, Survival Probabilities



History of European colliders

NEMESYS

Non Equilibrium dynamics Models and Excited
State properties of low-dimensional SYStems

R.L. Stefano Bellucci

- D. Babusci 30%
- S. Bellucci 95%
- M. Benfatto 80%
- G. Gionti 100% (Specola Vaticana)
- D. Mencarelli 40% (Dip. Ing. Informt., U. Politec. Marche)
- L. Pierantoni 40% (Dip. Ing. Informt., U. Politec. Marche)

NEMESYS-Non Equilibrium dynamics Models and Excited state properties of low-dimensional SYStems- *S. Bellucci (LNF spokesperson) Resp. Naz. Unical (gruppo CS, A. Sindona), additional nodes: RM2 (G. Stefanucci), TIFPA (S. Taioli)*

Main research issues

Spectroscopies, Electron correlations, Density Functional Theory, Modeling-Simulations and low-dimensional systems

Richiesta 2018 13,5 KE Missioni

NEMESYS new project 2017 (closing end 2019) evaluated AAA by referees

NEMESYS-Non Equilibrium dynamics Models and Excited state properties of low-dimensional SYStems- *S. Bellucci (LNF spokesperson) A. Sindona (Resp. Naz.), continued*

LNF activities in 2017

A multidisciplinary and convergence research proposal in statistical physics and many body Green's function theory. Central to its overall theme is an investigation of the striking out-of-equilibrium properties and excited-state features of many fermions and bosons in low-dimensions. These include a wide variety of systems as diverse as:

- (i) mutually interacting electrons in a honeycomb lattice potential,
- (ii) ensembles of ultra-cold atomic gases,
- (iii) magnetic and spin systems,
- (iv) quantum wires and dots.

New methods and computational strategies to unravel the fundamental excitations and corresponding relaxation dynamics of novel low dimensional materials, which are also of strategic interest for nanoelectronics and quantum computing technologies.

transport mechanisms and collective phenomena in condensed matter investigated by ab-initio and Montecarlo methods, as well as semiclassical multiscale approaches.

Quantum Field Theory effects induced by geometry and topology, i.e. defects in mesoscopic systems (but also cosmic strings), with boundary conditions. The applications are mesoscopic physics, e.g. nanotubes and graphene properties (but also cosmology, black holes physics).

Massive simulations of spectral features, dielectric screening, conductivity response and electro-mechanical properties of graphene-related and beyond-graphene materials, including interfaces and contacts with supporting substrates. Verification and validation of models by comparison of predictions with measurements taken from surface-science spectroscopies and microscopies, leading to realization of simple devices. Irreversible properties of ultracold Fermi and Bose gases, following a change of their trapping potentials. Quantum thermodynamics of such interacting many-body systems will be studied.

NEMESYS-Non Equilibrium dynamics Models and Excited state properties of low-dimensional SYStems- *S. Bellucci (LNF spokesperson), A. Sindona (Resp. Naz.), continued*

Collaborations in 2018

- GRAPHENE Flagship. **Graphene-based disruptive technologies**, GrapheneCore1, Project reference: 696656, 2016-2018, S. Bellucci.
Funded under H2020-EU.1.2. - EXCELLENT SCIENCE - Future and Emerging Technologies (FET)

- Grant ASI Italian Space Agency: 2014-2018 “**SHAPE- A New Theoretical Framework of the Microgravity-Cell Interaction**”, S. Bellucci

Italian Ministry for Health, Research Project “**Delivery and imaging of micro RNAs by multifunctional carbon nanotubes and circulating micro RNAs as innovative therapeutic and diagnostic tools for pediatric pulmonary hypertension**”, 2014-2018, S. Bellucci

Publications 2017

Evaluating CNT-Based Interconnects: A Numerical Tool to Characterize Hybrid CNT-Copper Interconnects
S Bistarelli, S Sun, L Pierantoni, S Bellucci, D Mencarelli, J Liu
IEEE Microwave Magazine 18 (4), 124-129.

Enhanced Tunable Microstrip Attenuator Based on Few Layer Graphene Flakes
M Yasir, S Bistarelli, A Cataldo, M Bozzi, L Perregrini, S Bellucci
IEEE Microwave and Wireless Components Letters 27 (4), 332-334

Characterization of a Poly-4-Vinylpyridine-Supported CuPd Bimetallic Catalyst for Sonogashira Coupling Reactions, C Evangelisiti, A Balerna, R Psaro, G Fusini, A Carpita, M Benfatto

NEMESYS-Non Equilibrium dynamics Models and Excited state properties of low-dimensional SYStems- *S. Bellucci (LNF spokesperson), A. Sindona (Resp. Naz.), continued*
Publications 2017 (continued)

Modeling, Fabrication, and Characterization of Large Carbon Nanotube Interconnects With Negative Temperature Coefficient of the Resistance

A Maffucci, F Micciulla, AE Cataldo, G Miano, S Bellucci

IEEE Transactions on Components, Packaging and Manufacturing Technology 7 (4) 485-493

Carbon nanotube interconnects with negative temperature coefficient of the resistance

A Maffucci, G Miano, F Micciulla, A Cataldo, S Bellucci, Applied Computational Electromagnetics Society Symposium-Italy (ACES), 2017 International, Pages 1-2

Resistivity and low-frequency noise characteristics of epoxy-carbon composites

S Pralgauskaitė, J Matukas, M Tretjak, J Macutkevicius, J Banys, A Selskis, ...

Journal of Applied Physics 121 (11), 114303

Modelling Of Real-time Physical And Bio-nanosensors For Medical Applications And Ecological Monitoring, Y Shunin, D Fink, A Kiv, A Mansharipova, R Muhamediyev, Y Zhukovskii,

Lobanova-Shunina, N Burlutskaya, V Gopeyenko, S Bellucci

Physics, Chemistry And Application Of Nanostructures: Reviews And Short Notes To Nanomeeting 2017, Pages 220-223

Electroactive Polymer Based Conducting, Magnetic, and Luminescent Triple Composites

AV Kukhta, AG Paddubskaya, PP Kuzhir, SA Maksimenko, SA Vorobyova, S Bellucci, P K Khanna

Advances in Science and Technology 97, 24-29

NEMESYS-Non Equilibrium dynamics Models and Excited state properties of low-dimensional SYStems- *S. Bellucci (LNF spokesperson), A. Sindona (Resp. Naz.),*
[Publications 2017 \(continued\)](#)

Coherent structural trapping through wave packet dispersion during photoinduced spin state switching. Lemke HT, Kjær KS, Hartsock R, van Driel TB, Chollet M, Glowia JM, Song S, Zhu D, Pace E, Matar SF, Nielsen MM, Benfatto M, Gaffney KJ, Collet E, Cammarata M., Nat Commun. 2017 May 24;8:15342

[Talks in 2017](#)

- 2017 EuCAP, Paris, France, 19-24 March S. Bellucci: "**Graphene-based Tunable Microstrip Attenuators and Patch Antenna**".
- NATO ARW Detection CBRN- Nanostructures Materials“ 14-17 August 2017 in Kiev , Ukraine
- S. Bellucci: "**Development of Biosensors using Carbon Nanotubes and Few Layered Graphene**".
- International Semiconductor Conference (CAS 2017), Sinaia, Romania, 11-14 October 2017, S. Bellucci: "**Graphene-based Tunable Microstrip Attenuators and Patch Antenna**".
- Univ Cosenza, February 23, 2017, S. Bellucci: "**Ballistic nano-detectors based upon the Ratchet effect on patterned graphene**".
- CNR Bologna, 4 April 2017, S. Bellucci, "**Electromagnetic shielding in the Graphene Flagship**"
- LNF, INSPYRE 16 February, S. Bellucci, A. Cataldo, F. Micciulla, S. Bistarelli, : "**Bionanotechnologies**"
- FORESEEN Meeting – Institut Langevin Paris 21 April 2017, S. Bellucci, "**Nanoengineering at INFN**"
- **NEXT Nanotechnology Group**

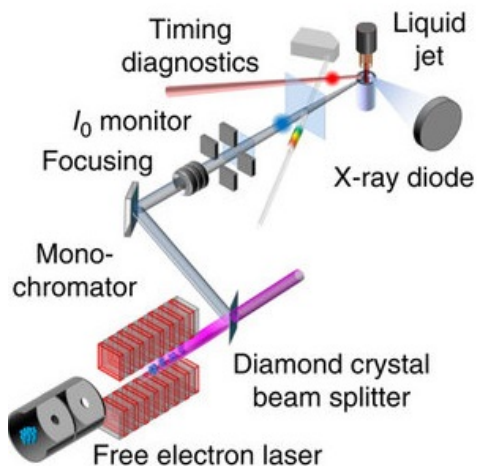
* Condensed matter activity

involved person : M. Benfatto

Collaboration with: E. Pace, A. Balerna (LNF) - G. Chillemi, N. Sanna, C. Padrin (Cineca) - I. Davoli (Universita' Tor Vergata) - M. Pedio (CNR-TASC - Trieste) - P. Frank, R. Sarangi, B. Hedman, K. Hodgson (SSRL and Stanford University) - M. Cammarata, L. Balducci (Universita' di Rennes- CNRS)

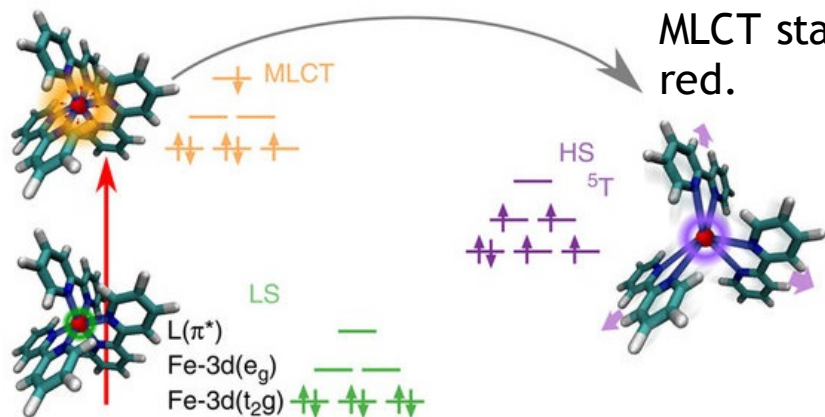
Develop of theoretical methods for the interpretation of the X-Ray Absorption Spectrum (XAS) from core levels - use of molecular dynamic simulations to look to the XAS data - develop of a new version of the MXAN program (this has been proposed in the literature since 2001 from the condensed matter theory group of Frascati) to get structural information from low energy part of XAS spectrum.

applications to biological, bio-inorganic materials, solvation spheres of transition metals in liquids and transient XAS data at sub-femtosecond time domain (FEL experiments).



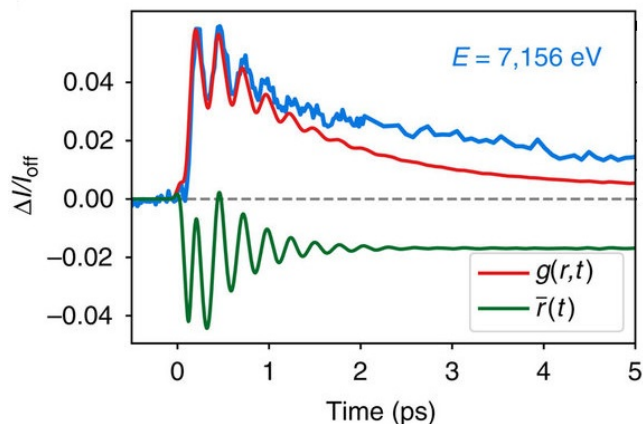
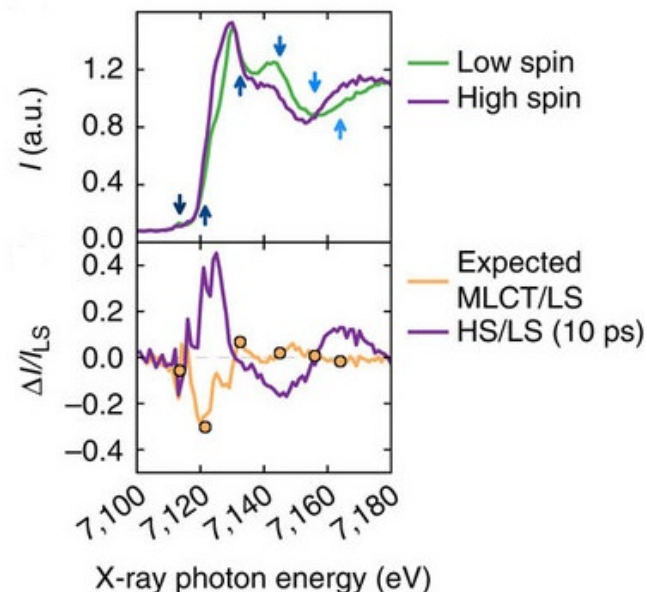
Experiment set-up LCLS FEL - 25 fs time resolution

after the initial photoexcitation of the LS state into an MLCT state, [Fe(bpy)₃] decays towards the HS state - Fe in red.



Changes between the LS and HS XANES spectra. Arrows indicate photon energies for which high time resolution data have been measured.

The HS/LS spectra change ratio (magenta line, measured at 10 ps) and the expected ratio between MLCT and LS state (orange solid line)



Comparison between the experimental data at 7156 eV (blue) and calculated signal for a $g(r,t)$ distance distribution (red) - below the average $r(t)$ of the $g(r,t)$ distribution (green)

* Publications in 2017

- C. Evangelisti et al. *ChemPhysChem* 10.1002/cphc.201700215
- H.T. Lemke et al. *Nature Communications* **8**, 15342 (2017)
- M. Benfatto et al. '*MXAN and Molecular Dynamics: a new way to look to XANES (X-Ray Absorption Near Edge Structure) energy region*' in *Multiple Scattering Theory for Spectroscopies - Springer Proceedings in Physics* - Edited by D. Sebilliau, K. Hatada and H. Ebert - (2017)
- M. Benfatto, G. Chillemi and E. Pace '*MXAN: a method for the quantitative structural analysis of the XANES (X-Ray Absorption Near Edge Structure) energy region*' invited contribution to the first edition of *International Tables for Crystallography: Volume I, X-ray Absorption Spectroscopy and Related Techniques* - (2017)

QFT-HEP

Quantum Field Theory for High Energy Physics

R.L. Maria Paola Lombardo

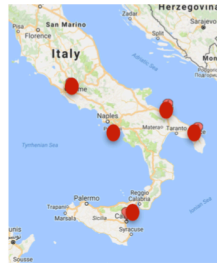
- M. P. Lombardo 100%

QFT-HEP

Maria Paola Lombardo

QFT-HEP:

Bari (resp. naz. Fulvia de Fazio),
Catania, **LNF**, Lecce, Napoli



Theory Network:

Center for Mathematics and Theoretical Physics:

Physics and Math Departments of Sapienza, TorVergata,
Roma3, and **LNF**.

LNF role: Member of the Scientific Comm.,
Coordination of the CMTP-INFN activities



Interface Particle/Nuclear Physics

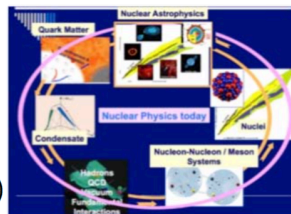
Editor

An Advanced
Course in
Computational
Nuclear Physics

Bridging the Scales from Quarks to
Neutron Stars

Springer

Worked on NUPECC
LRP 2017
(slide from A. Bracco)



Research Focus

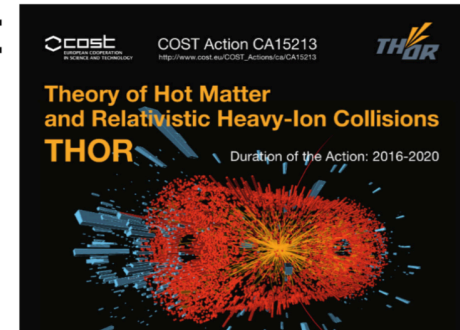
*Strong interactions within and
without the standard model*

EU Network:

LNF role:

-Representing Italy in
Management Comm.

-Member of the
Scientific Mission Comm.



Theory Computing @ INFN

Computational theoretical physics at INFN: status and perspectives (2018-2020)

R. Alfieri, B. Alles, S. Arezzini, S. Bernuzzi, L. Biferale, G. Boffetta*, C. Bonati, G. Brancato, C.M. Carloni Calame, M. Caselle, P. Cea, A. Ciampa, M. Colpi, L. Cosmai*, L. Coraggio, G. de Divitiis, M. D'Elia*, R. De Pietri*, E. De Santis, C. Destri, G. Di Carlo, P. Dimopoulos, F. Di Renzo, A. Drago*, P. Faccioli, R. Frezzotti*, A. Gamba, A. Gargano, B. Giacomazzo, L. Giusti*, G. Gonnella, N. Itaco*, A. Kievsy, G. La Penna, A. Lanotte*, W. Leidemann, M. Liguori*, M.P. Lombardo*, A. Lovato, V. Lubicz, L.E. Marcucci, E. Marinari, G. Martinelli*, A. Mazzino, E. Meggiolaro, V. Minicozzi, S. Morante*, P. Natoli*, F. Negro, M. Nicodemi*, P. Olla, G. Orlandini, M. Panero*, P.S. Paolucci*, A. Papa*, G. Parisi*, F. Pederiva*, A. Pelissetto, M. Pepe, F. Piccinini*, F. Rapuano, G.C. Rossi, G. Salina, F. Sanfilippo, S.F. Schifano*, R. Schneider, S. Simula*, A. Sindona*, F. Stellato, N. Tantalo, C. Tarantino, G. Tiana, R. Tripiccion*, P. Vicini*, M. Viel, M. Viviani*, T. Vladikas, M. Zamparo

* *Conveners*

(Dated: April 26, 2017)

LNF role: convenor

Previous proposal: 12 Mio from CIPE



2016-June 2017 Activity

Two faces of strong interactions at high Temperature

Cosmology

Time from Big Bang

Axions

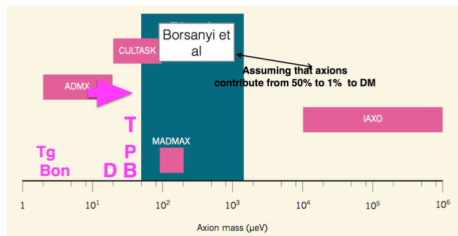
Axions exposed

Nature **539**, 40–41 (03 November 2016), MpL (news&views)

Topology (and axion's properties) from lattice QCD with a dynamical charm
NPA, in press, F. Burger, E.-M. Ilgenfritz, MpL, M. Mueller-Preussker, A. Trunin

Lower limits on the axion mass assuming that axions make 100% of DM:

Tg: This work, gluonic; Bon: Bonati et al.; D: DIGA, B: Borsanyi et al., P: Petreczky et al., T: this work, fermionic



Updated from Nature N&V

Nature plot updated with our new results

Particle and nuclear physics

Temperature

QGP & HI physics

Heavy-flavor production and medium properties in high-energy nuclear collisions

Eur.Phys.J. A53 (2017) no.5, 93

Spectral functions from anisotropic lattice QCD

Nucl.Phys. A956 (2016) 717, G. Aarts et al

Heavy ions at the Future Circular Collider

CERN Yellow Report (2017) no.3, A. Dainese et al.

Topological susceptibility from lattice QCD

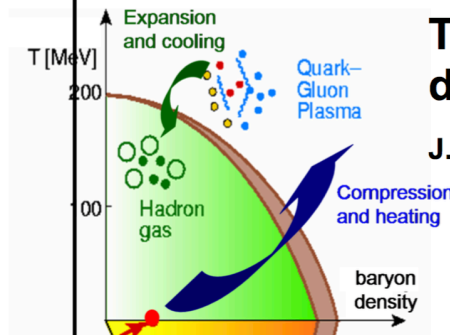
J.Phys.Conf.Ser. 668 (2016) no.1, F.Burger et al

Towards the QGP EoS with dynamical strange and charm

J.Phys.Conf.Ser. 668 (2016) no.1, F. Burger et al.

Heavy-flavour and quarkonium production in the LHC era

Eur.Phys.J. C76 (2016) no.3, A Andronic et al



nuclei ($n_B=0.14/\text{fm}^3$)

Richieste ai servizi LNF 2018

Al momento nessuna.

Chiederei la disponibilita' a valutare possibili (piccole) richieste piu' avanti.

*Ringrazio, anche da parte del Direttore CMTP, i Laboratori per l'ospitalita' ,
e la Segreteria della DR , in particolare Lia Sabatini, per l'ottima collaborazione
durante il Programma di Ricerca Intensivo
Mathematics and Physics at the CrossRoads che si e' svolto nel 2016.*

TAsP

Theoretical Astroparticle Physics

R.L. Enrico Nardi

- E. Nardi 100%
- F. Bjorkeroth 100% (INFN Postdoc, Oct. 2017)
- A. Ghoshal 100% (Ph.D. Student, RM3)
- C.D.Ruiz Carvajal 50% (Ph. D. Student, U. Antioquia)

TAsP-LNF: Argomenti di Ricerca

Well established lines of research:

- Cosmological matter/antimatter asymmetry (Leptogenesis)
- Dark Matter (models & properties – Asymmetric DM)
- Neutrinos (Majorana, Dirac, models for masses and mixings)
- Lepton Flavor, Lepton Flavor Violation in theories BSM

New research paths:

- **Axions (astrophysical/cosmological implications)**
- **Dark Photons (how to exploit at best PADME)**

Approaching Axion physics: focus on two “hot topics”

1. In which region of parameter space do preferred axion models live ?
2. What is the origin of the (global & anomalous) Peccei-Quinn Symmetry ?

Answer to question 1:

PRL 118, 031801 (2017) PHYSICAL REVIEW LETTERS week ending 20 JANUARY 2017

Redefining the Axion Window

Luca Di Luzio,^{1,*} Federico Mescia,^{2,†} and Enrico Nardi^{3,‡}

Phys.Rev.Lett. Editors' Suggestions

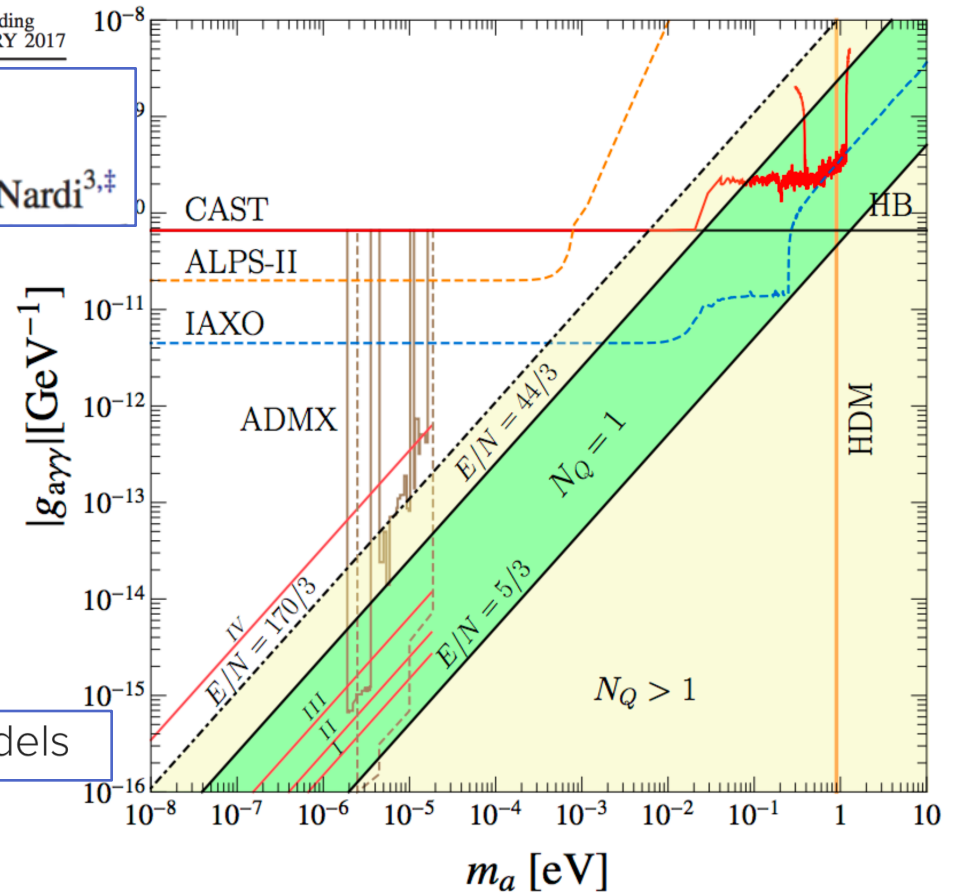
Longer writeup:

Di Luzio, Mescia, Nardi

[arXiv:1705.05370](https://arxiv.org/abs/1705.05370)

Submitted to PRD

DE12209 - Window for preferred axion models



A study intended to help focusing experimental searches

ARTICLES

PUBLISHED ONLINE: 1 MAY 2017 | DOI: 10.1038/NPHYS4109

nature
physics

OPEN

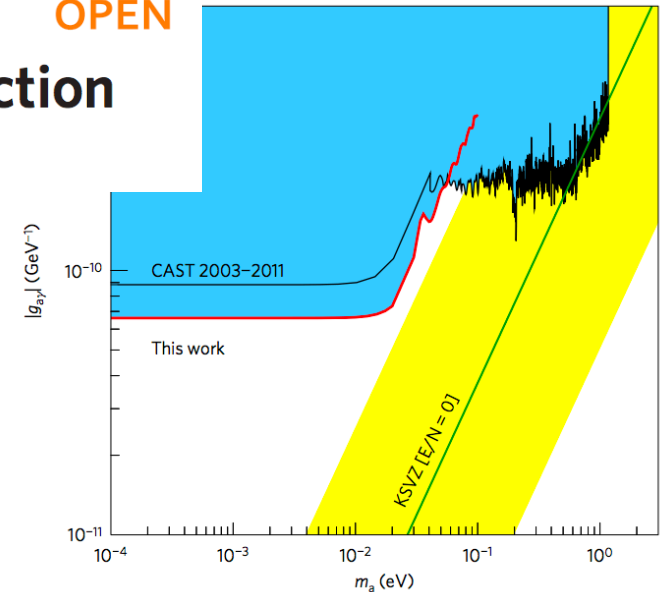
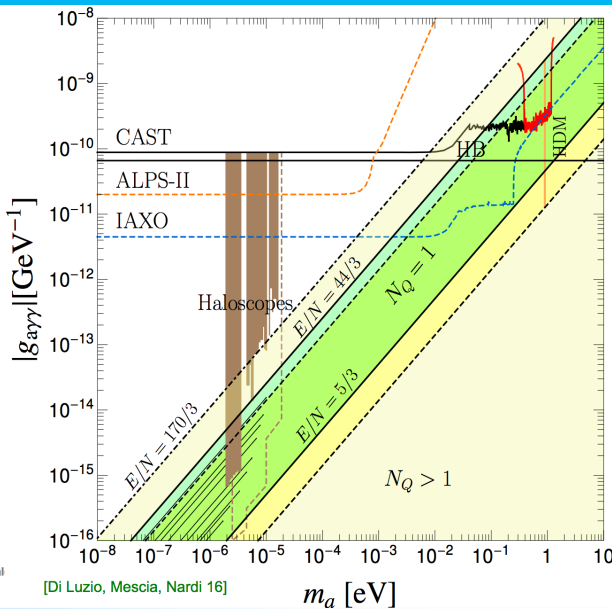
New CAST limit on the axion-photon interaction

CAST Collaboration[†]

ALPS II

How wide is the axion window?

- > Axion window in photon coupling much wider than commonly assumed
- > ALPS II discovery reach nearly touches extended axion window



Axion in Reach of ALPS II?

Andreas Ringwald



ALPS Collaboration Meeting
Mainz, D
6-8 March 2017

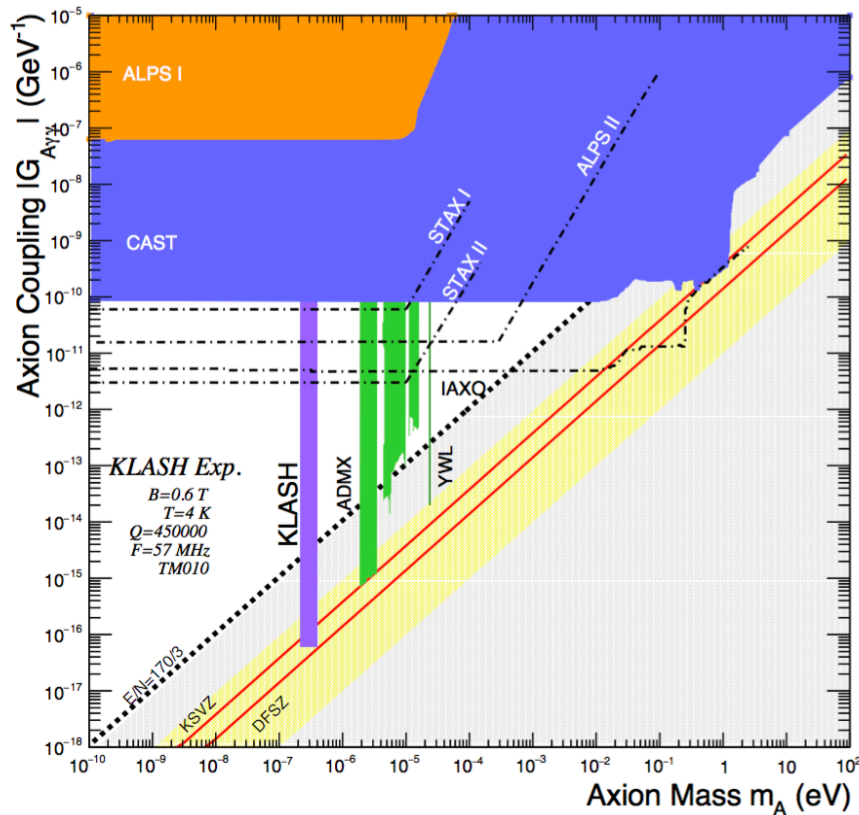


The KLASH Proposal

Axion Calling

D. Alesini, D. Babusci, D. Di Gioacchino, C. Gatti, G. Lamanna, C. Ligi
INFN, Laboratori Nazionali di Frascati, P.O. Box 13, I-00044 Frascati, Italy

<http://www.lnf.infn.it/sis/preprint/pdf/getfile.php?filename=INFN-17-14-LNF.pdf>



Nostrì risultati adottati da KLASH per categorica imposizione, piú che per libera scelta scientifica..

“Nemo propheta in Patria sua”

Question 2:

Where does the PQ symmetry come from ?

Answer:

It might arise as an accidental symmetry, protected by a larger local gauge symmetry

Accepted Paper

Accidental Peccei-Quinn symmetry protected to arbitrary order

Phys. Rev. Lett.

Luca Di Luzio, Enrico Nardi, and Lorenzo Ubaldi

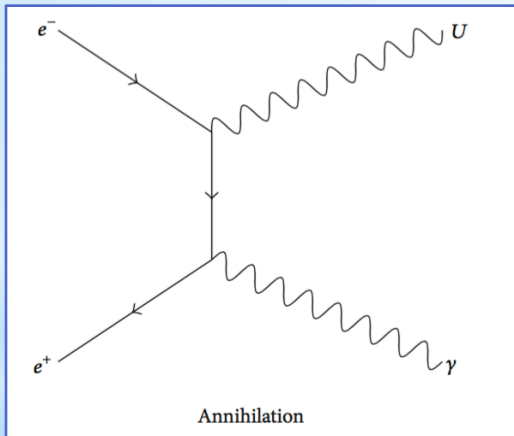
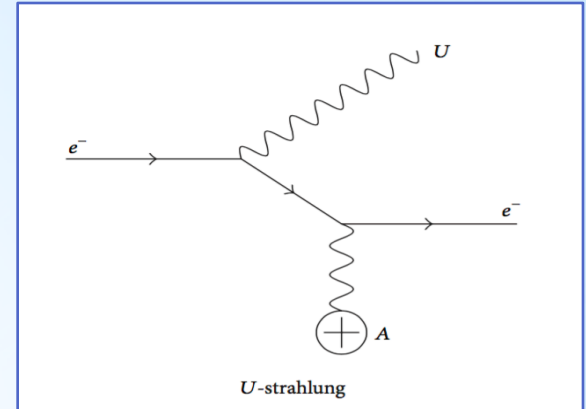
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[arXiv:1704.01122](https://arxiv.org/abs/1704.01122)

Positron fixed target experiment to search for Dark Photons (and test the Atomki ^8Be anomaly)

With C.D. Carvajal, A. Ghoshal, D. Meloni, M. Raggi

Electron fixed target experiments:
Electron-nucleon scattering: A' bremsstrahlung
 $O(\alpha^3)$ process

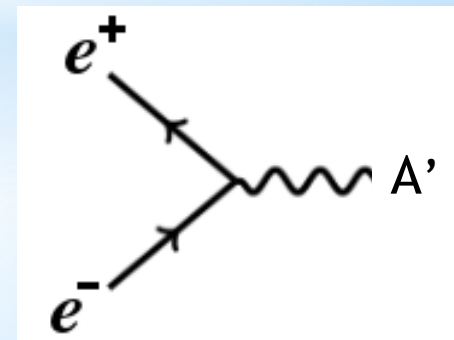


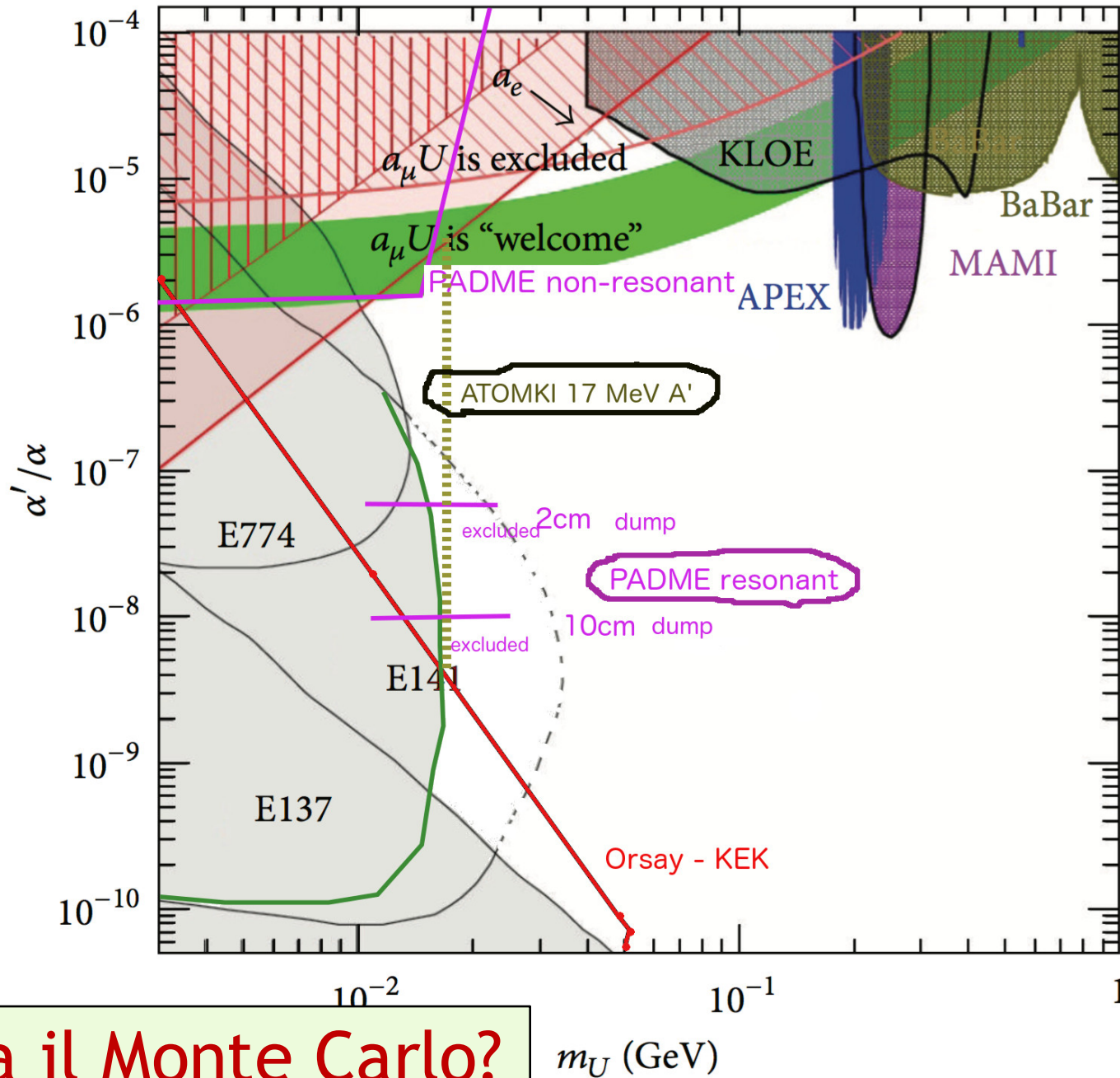
Positron beams: VEPP3 (BINP), PADME (LNF), [MMAPS (Cornell)]

Positron-electron (non-resonant) annihilation $\rightarrow A'$ γ
 $O(\alpha^2)$ process

Positron-electron resonant annihilation $\rightarrow A'$
 $O(\alpha)$ process

Thanks to the continuous energy loss when propagating in the dump, e^+ will “scan”, eventually hitting the resonance





Adapted from M. Raggi

Richieste di supporto per il Gruppo Teorico (generiche)

- Servizi di segreteria (sono fondamentali)
- SIDS (FotoAudioVideo)
- Eventualmente supporto di Direzione per organizzazzazione di Workshops tematici (qualche Keu)

GRAZIE PER L'ATTENZIONE