

Iniziativa specifica AAE (AstroAlteEnergie) - 2020

(sezioni di Pisa + Trieste + GranSasso)

Linee di ricerca:

- BSM physics: model building and phenomenology
- Collider Physics
- Dark Matter / Astro-particles
- Cosmology / Inflation / Gravity
- Neutrino physics

Responsabile Nazionale:

Roberto Contino [sezione di Pisa]

e-mail: roberto.contino@sns.it

Responsabili Locali:

Stefano Bertolini [sezione di Trieste]

e-mail: stefano.bertolini@sissa.it

Zurab Berezhiani [sezione LNGS/L'Aquila]

e-mail: Zurab.Berezhiani@aquila.infn.it

Componenti di Pisa (tutti al 100%)

Membri Permanenti

- | | |
|-----------------------|--|
| 1. Dario Buttazzo | Ricercatore INFN |
| 2. Roberto Contino | Associato SNS |
| 3. Alessandro Strumia | Associato Dipartimento |
| 4. Enrico Trincherini | Ricercatore SNS |
| 5. Riccardo Barbieri | Ordinario Emerito SNS (associato senior) |

Postdoc

- | | |
|-----------------------|--|
| 1. Rashmish Mishra | INFN → SNS |
| 2. Leonardo Trombetta | SNS |
| 3. Christian Gross | Dipartimento |
| 4. Daniele Teresi | Dipartimento |
| 5. Luca Di Luzio | Dipartimento |
| 6. Parsa Ghorbani | Dipartimento (associazione in corso) |
| 7. Natascia Vignaroli | Dipartimento (presa servizio Settembre 2019) |

Studenti Dottorato

- | | |
|----------------------|----------------------------|
| 1. Kevin Max | SNS, III anno |
| 2. Andrea Mitridate | SNS, III anno → Berkeley |
| 3. Alessandro Podo | SNS, II anno |
| 4. Sonali Verma | SNS, I anno |
| 5. Ludovico Vittorio | SNS, I anno |
| 6. Salvatore Bottaro | SNS, I anno |
| 7. Giacomo Landini | Dipartimento, I anno |
| 8. Marco Costa | SNS (inizio Novembre 2019) |
| 9. Francesco Serra | SNS (inizio Novembre 2019) |

Attività di Ricerca (Luglio 2018 - Giugno 2019)

• BSM: flavor and B-anomalies

D. Buttazzo

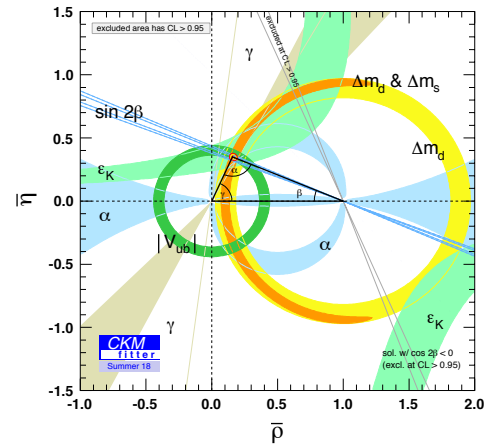
Building models for B-physics anomalies

J.Phys.Conf.Ser. 1137 (2019) no.1, 012026

F. Bjorkeroth, L. Di Luzio, F. Mescia, E. Nardi

U(1) flavour symmetries as Peccei-Quinn symmetries

JHEP 1902 (2019) 133



• Collider Phenomenology

D. Buttazzo, D. Redigolo, F. Sala, A. Tesi

Fusing Vectors into Scalars at High Energy Lepton Colliders

JHEP 1811 (2018) 144

R. Mishra et al.

Detecting a Boosted Diboson Resonance

JHEP 1811 (2018) 027

R. Mishra et al.

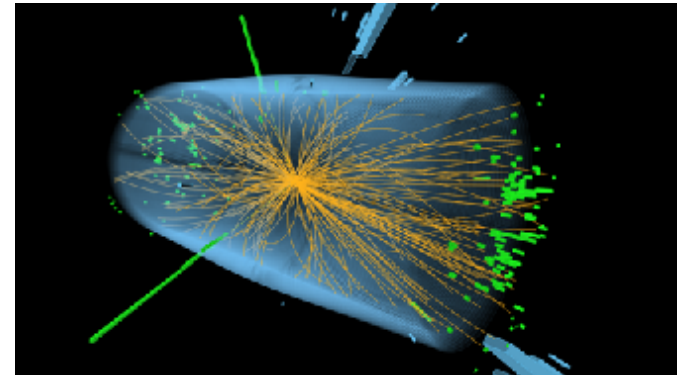
Dedicated Strategies for Triboson Signals from Cascade Decays of Vector Resonances

Phys.Rev. D99 (2019) no.7, 075016

L. Di Luzio, R. Groeber, G. Panico

Probing new electroweak states via precision measurements at the LHC and future colliders

JHEP 1901 (2019) 011



- **Dark Matter**

C. Gross, A. Mitridate, M. Redi, J. Smirnov, A. Strumia,
Cosmological Abundance of Colored Relics
Phys.Rev. D99 (2019) no.1, 016024

R. Contino, A. Mitridate, A. Podo, M. Redi
Gluequark Dark Matter
JHEP 1902 (2019) 187



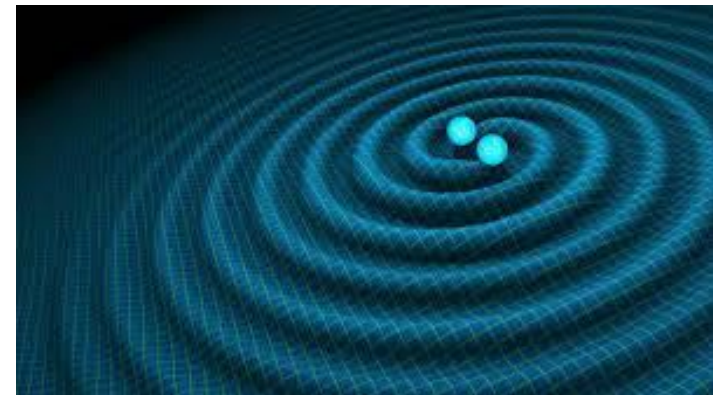
- **Gravity and Cosmology**

G. Franciolini, L. Hiu, R. Penco, L. Santoni, E. Trincherini
Effective Field Theory of Black Hole Quasinormal Modes in Scalar-Tensor Theories
JHEP 1902 (2019) 127

G. Franciolini, L. Hiu, R. Penco, L. Santoni, E. Trincherini
Stable wormholes in scalar-tensor theories
JHEP 1901 (2019) 221

A. Salvio, A. Strumia, H. Veermae
New infra-red enhancements in 4-derivative gravity
Eur.Phys.J. C78 (2018) no.10, 842

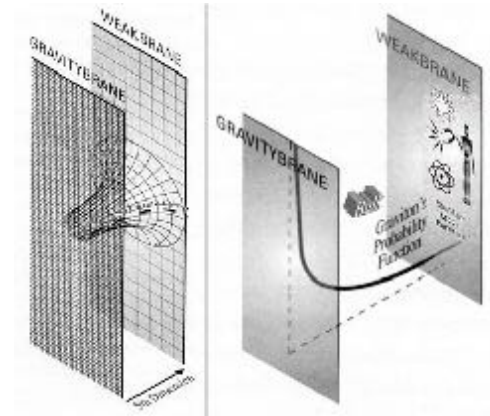
L. Di Luzio, M. Redi, A. Strumia, D. Teresi
Coset Cosmology
JHEP 1906 (2019) 110



- **QFT and model building**

R. Mishra, A. Mohd, R. Sundrum
AdS Asymptotic Symmetries from CFT Mirrors
JHEP 1903 (2019) 017

D. L. Nacir, F. D. Mazzitelli, L. Trombetta
Long distance behavior of $O(N)$ -model correlators in de Sitter space and the resummation of secular terms
JHEP 1810 (2018) 016



Attività prevista per il 2020: stesse linee di ricerca del 2019

Tesi magistrali nel 2018:

Leonardo Vaglini

Interazioni effettive per la terza generazione di quark a LHC

(relatore: Buttazzo)

Giuseppe Marseglia

Cosmologia in modelli Mirror Twin Higgs

(relatore: Buttazzo)

Massimo Bedini

Localization of Quantum Fields in a modified Randall-Sundrum scenario

(relatore: Contino)

Filippo Revello

Composite Dark Matter from Strongly-Interacting Chiral Dynamics

(relatore: Contino)

Finanziamento per Missioni

Storico:

Anno	FTE*	Richiesto	Assegnato
2017	5.5	11k€	6.5k€
2018	6.0	13k€	9k€
2019	10	19k€	14k€

* alla data del preventivo

FTE al 4 Luglio 2019: **14.5** (calcolo con regola Becchi)

👉 FTE previsti da Novembre 2019: **18.5**

Richiesta per il 2020: 25 k€ ($1.4 \text{ k€} \times 18 \text{ FTE}$)

GSS - Pi

Members

- **S. Ferrara** (Associato Senior a INFN-LNF)
- **D. Francia** (Centro Fermi since June 2018)
- **K. Mkrtchyan** (RTDA, September 2019)
 - **E. Hatefi** (INFN Fellow since October 2018)
- **A. Sagnotti** (PO, Scuola Normale) [Coord.]
 - **R. Antonelli** (Ph.D. Student)
 - **I. Basile** (Ph.D. Student)
 - **C. Heissenberg** (Ph.D. Student) → U. Stockholm
 - **K. Zartimaylov** (Ph.D. Student)
 - **S. Raucci** IV Year Master Student

Conferences & Colloquia 2018 -19

D. Francia:

- *"Higher Spin Gravity: Chaotic, Conformal and Algebraic Aspects"* Pohang, S. Korea, September 2019
- *"Supersymmetries and Quantum Symmetries – SQS'19"* Yerevan, August 2019
- *"Higher Symmetries and Quantum Gravity"*, Albert Einstein Institute, Germany, December 2018
- *"SIGRAV 2018"*, Santa Margherita di Pula, Cagliari — September 2018
- *"QFTG2018, TSPU"*, Tomsk, Russia, August 2018

A. Sagnotti:

- *Colloquium at DESY*, April 2018
- *4 Lectures at the Brazilian School of Cosmology and Gravitation*, CBPF-Rio, July 2018
- *CMB and Large Scale Structure of the Universe*, Villa Mondragone, Rome, January 2019
- *Universum 2019*, Milano, Marzo 2019
- *61th Anniversary of Ecole Polytechnique*, Paris, March 2019
- *ASI/COSMOS Meeting 2019*, Univ. Roma "Tor Vergata", Maggio 2019
- *Gravity & Other Fields under the Volcano*, Catania, June 2019

Papers 2018–19

- [1] R. Antonelli, I. Basile and E. Hatefi, “On All-Order Higher-Point D_p - $D_{\bar{p}}$ Effective Actions,” *arXiv:1903.07540 [hep-th]*.
- [2] I. Basile, J. Mourad and A. Sagnotti, “On Classical Stability with Broken Supersymmetry,” *JHEP* 1901 (2019) 174 [*arXiv:1811.11448 [hep-th]*].
- [3] S. Ferrara and M. Tournoy, “Noether Supercurrents, Supergravity and Broken Supersymmetry,” *arXiv:1811.09450 [hep-th]*, Erice 2018 Lecture.
- [4] S. Ferrara, A. Kehagias and D. Lüst, “Bimetric, Conformal Supergravity and its Superstring Embedding,” *JHEP* 1905 (2019) 100 [*arXiv:1810.08147 [hep-th]*].
- [5] S. Ferrara, A. Kehagias and D. Lüst, “Aspects of Weyl Supergravity,” *JHEP* 1808 (2018) 197 [*arXiv:1806.10016 [hep-th]*].

Papers 2018–19

[6] D. Francia and C. Heissenberg, “Two-Form Asymptotic Symmetries and Scalar Soft Theorems,” *Phys. Rev. D* 98 (2018) no.10, 105003 [arXiv:1810.05634 [hep-th]].

[7] A. Campoleoni, D. Francia and C. Heissenberg, “Asymptotic symmetries and charges at null infinity: from low to high spins,” *EPJ Web Conf.* 191 (2018) 06011 [arXiv:1808.01542 [hep-th]].

[8] E. Hatefi, “All Order α' Corrections to Fermionic Couplings of D-brane-Anti-D-brane Effective Actions,” *JCAP* 1905 (2019) no.05, 044 [arXiv:1904.02699 [hep-th]].

[9] A. Sagnotti, “The Incomplete Revolutions of String Theory”, to appear in “Il Saggiatore” (September 2019)

Main Themes for 2020

R. Antonelli, I. Basile: *stability issues with broken SUSY, AdS/CFT and RG flows.*

K. Zatrimeylov: *models of dark matter, lessons from String Theory*

S. Ferrara: *SUSY Breaking with fields and branes, higher derivatives in Supergravity and String Theory*

D. Francia: *Lagrangian origin and geometry of double copy relations between gravity and (super)YM theories; asymptotic symmetries for theories with massless quanta of arbitrary spin in any dimensions; locality in field theory.*

E. Hatefi: *string amplitudes with broken supersymmetry and weak-gravity conjectures*

A. Sagnotti: *lessons and tools from unbroken supersymmetry for broken supersymmetry in supergravity, brane systems and String Theory*

Theses 2018–19

- G. Bogna – Tesi Triennale (September 2019, A. Sagnotti)
- C. Heissenberg — Ph.D. student Scuola Normale Superiore; *exp.*: Fall 2019
- L. Carducci — Master student Roma Tre U; *exp.*: Fall 2019

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