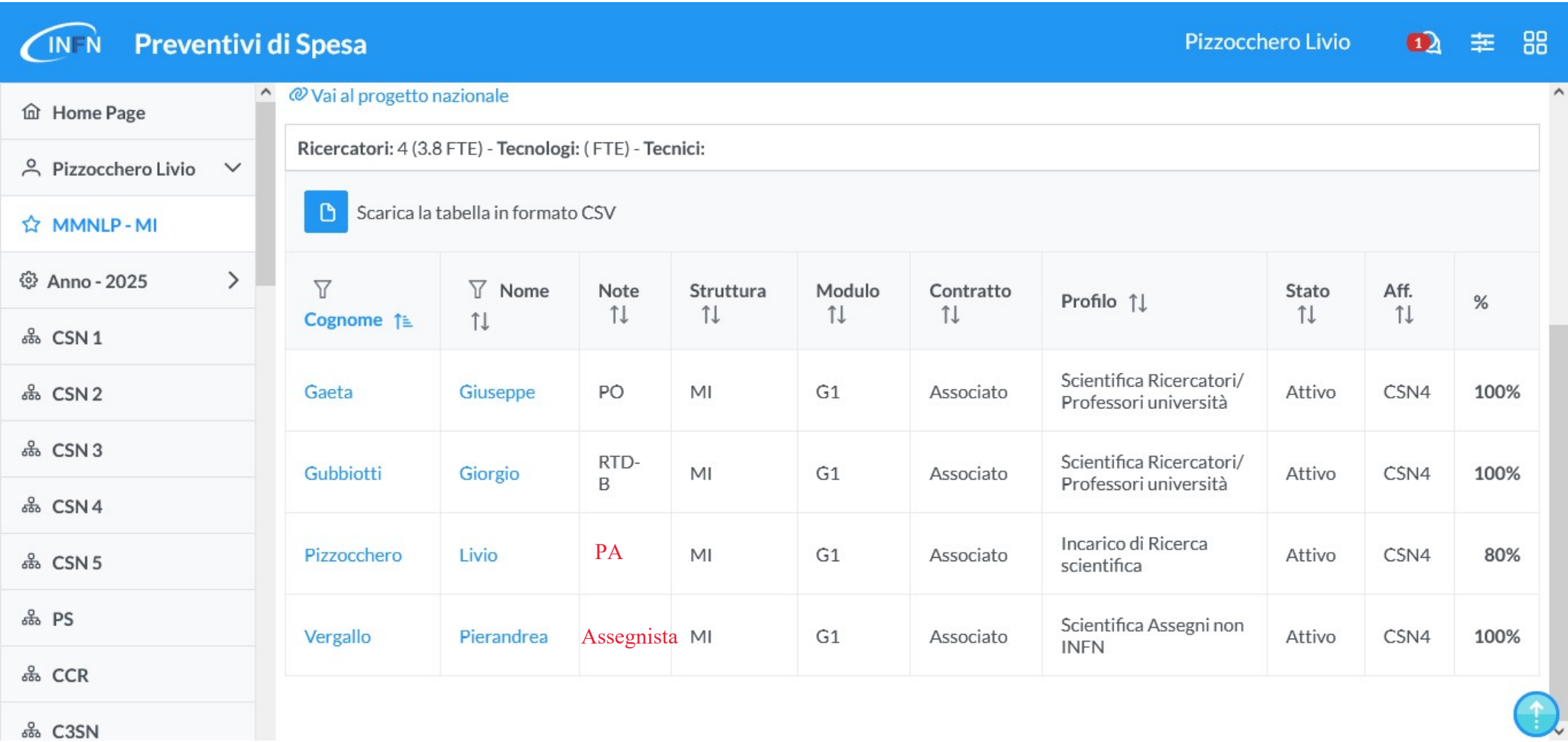
Home Page
Pizzocchero Livio
MMNLP - MI
Anno - 2025
CSN 1
CSN 2
CSN 3
CSN 4
CSN 5
PS
CCR
C3SN

missioni	G. Gaeta: participation to an international conference	1.00	0.00			8	0
	G. Gaeta: participation to a national conference	0.50	0.00				
	G. Gaeta: participation to a national conference	0.50	0.00				
	G. Gubbiotti: participation to an international conference	1.00	0.00				
	G. Gubbiotti: participation to a national conference	0.50	0.00				
	G. Gubbiotti: participation to a national conference	0.50	0.00				
	L. Pizzocchero: participation to an international conference	1.00	0.00				
	L. Pizzocchero: participation to a national conference	0.50	0.00				
	L. Pizzocchero: participation to a national conference	0.50	0.00				
	P. Vergallo: participation to an international conference	1.00	0.00				
	P. Vergallo: visit for scientific collaboration with M. Dell'Atti	1.00	0.00				


INFN Preventivi di Spesa
Pizzocchero Livio
1
Home Page
Pizzocchero Livio
MMNLP - MI
Anno - 2025
CSN 1
CSN 2
CSN 3
CSN 4
CSN 5
PS
CCR
C3SN
Vai al progetto nazionale
Ricercatori: 4 (3.8 FTE) - Tecnologi: (FTE) - Tecnici:
Scarica la tabella in formato CSV
Cognome
Nome
Note
Struttura
Modulo
Contratto
Profilo
Stato
Aff.
%
Gaeta
Giuseppe
PO
MI
G1
Associato
Scientifica Ricercatori/ Professori università
Attivo
CSN4
100%
Gubbiotti
Giorgio
RTD-B
MI
G1
Associato
Scientifica Ricercatori/ Professori università
Attivo
CSN4
100%
Pizzocchero
Livio
PA
MI
G1
Associato
Incarico di Ricerca scientifica
Attivo
CSN4
80%
Vergallo
Pierandrea
Assegnista
MI
G1
Associato
Scientifica Assegni non INFN
Attivo
CSN4
100%

ACTIVITES UP TO MAY 2024

G. Gaeta continued his investigation (in collaboration with M.A. Rodriguez, Madrid) on symmetry and integrability for stochastic equations [Ga1,Ga2]. He also produced an invited review (in collaboration with E. Virga, Pavia) on "octupolar tensors" and their physical applications; albeit in the paper these are mainly concerned with liquid crystals, it is known these also concern gravitation and spin systems [Ga3]. A different activity concerned random walks and applications to the theory of evolution [Ga4]. Again in the area of stochastic systems, G. Gaeta applied renormalization group techniques to study asymptotic integrability, and indagated the conditional notions of symmetry and integrability.
In 2024, G. Gaeta organized the international conferences: "Symmetry and Perturbations in Quantum Theory – SPQT2024" [GaC1] and "Open Communications in Nonlinear Mathematical Physics -2024" [GaC2]. In 2023 he had organized a conference on "Symmetry and Perturbation Theory" [GaC3]. G. Gaeta is an Editor of the international open-access Journal "Open Communications in Nonlinear Mathematical Physics".

G. Gubbiotti (hereafter referred to as G.G.) worked along several research lines. With M. Graffeo (SISSA) and M. Weinreich (Harvard), G.G. explored the geometric properties of the Cremona cubes group and of its extensions, especially in dimension higher than 3. With P. Drozdov (Udine and INFN Trieste), G.G. characterised the discrete-time integrable systems admitting coalgebra symmetry with respect to the two-photon Lie algebra h6. With D. Latini and B. van Geemen (Milano), G.G. introduced a novel Lie algebra admitting symplectic realizations, and allowing to build a chain of Hamiltonian systems with many invariants. With A. P. Kels (New South Wales) and C-M. Viallet (Sorbonne), G.G. introduced the notion of algebraic entropy for new classes of infinite dimensional discrete systems [GuKV]; this should be useful to define the integrability of such systems. With B. van Geemen (Milano) and P. Vergallo (Messina and INFN Milano), G.G. gave an algebro-geometric description and started a classification of the second order Hamiltonian operators and of the associated quasilinear systems in terms of 3-forms over spaces of dimension N+2 (where N is the number of components in the field variable) [GuGV]. With D. I. McLaren (La Trobe) and G.R.W. Quispel (La Trobe), G.G. proposed a geometric explanation of the integrability of the Kahan-Hirota-Kimura discretisation of planar systems with cubic Hamiltonians [GuLQ]. With Y. Shi (Flinders), G.G. clarified the symmetry structures of the deautonomisation of some QRT maps [GuS].

After the conclusion of an investigation with D. Fermi (Politecnico di Milano and INFN) on the scalar Casimir effect in presence of an external delta-like potential [PF], **L. Pizzocchero** worked in a different area with M. Cimaglia (Master degree in Mathematics at Milano) and M. Gengo (PhD in Mathematics at Milano); this study concerned the exactly solvable Friedman-Lemaître-Robertson-Walker cosmological models with matter and a canonical or phantom scalar field. It was shown that a phantom scalar favours the appearing of nonsingular cosmologies (with no Big Bang); in presence of dust and of a suitable trigonometric potential for the phantom scalar, the time evolution of the scale factor and of the scalar field can be described in terms of a Lissajous curve in a Euclidean plane [PCG].

P. Vergallo (hereafter referred to as P.V.) worked along the following research lines.
With F. Nicassio (Salento), P.V. proposed a simple mathematical model in one dimension for structural health monitoring of a single lap joint [VN]; a related MathLab simulation program was made available. With N. Manganaro (Messina) and A. Rizzo (Messina), P.V. discussed from the viewpoint of integrability the commuting flows of 2-component quasilinear equations [VMR]; applications of this setting include the shallow-water equations. With A. Rizzo (Messina), P.V. analyzed the parabolic sistems of PDEs in Jordan block form, discussing the relations between linear degeneracy, compatible differential constraints and the existence of a Hamiltonian structure [VR]. With E.V. Ferantopov (Loughborough), P.V. determined the Hamiltonian structure of the integro-differential kinetic equations for several types of dense soliton gases [VF]. The collaboration of P.V. with B. van Geemen (Milano) and G. Gubbiotti on second order Hamiltonian operators [GUGV] was already mentioned before.
P.V. participated (in both cases as Invited Speaker) to the AGADDE workshop on Integrable systems (Portsmouth, UK, June 2024), and to the workshop on Integrable systems and Nijenhuis Geometry (Melbourne, AU, February 2024). He was also Visiting Scholar at the University of New South Wales, for a collaboration with W. Schief (March 2024).

References

[Ga1] G. Gaeta, M.A. Rodriguez, *Integrable Ito equations and properties of the associated Fokker-Planck equations*, Open Commun. Nonlin. Math. Phys. 3 (2023), 67-90.

[Ga2] G. Gaeta, *On the integration of Ito equations with a random or a W-symmetry*, J. Math. Phys. 64 (2023), 123504.

[Ga3] G. Gaeta, E.G. Virga, *A Review on Octupolar Tensors*, J. Phys. A 56 (2023), 363001 (invited review paper).

[Ga4] G. Gaeta, *On some dynamical features of the complete Moran model for neutral evolution in the presence of mutations*, Open Commun. Nonlin. Math. Phys. 4 (2024), 22-43.

[GaC1] https://www.sptspt.it/SPT2024/SPQT2024.html

[GaC2] https://euler-ocnmp.de/

[GAC3] https://www.sptspt.it/SPT2023.html

[GuKV] G. Gubbiotti1, A. P. Kels, C-M. Viallet, *Algebraic entropy for hex systems*, arXiv:2311.01359v1 [nlin.SI] (2023).

[GuGV] G. Gubbiotti, B. Van Geemen, P. Vergallo, *Line geometry of pairs of second-order Hamiltonian operators and quasilinear systems*, arXiv:2403.09152v1 [math-ph] (2024).

[GuLQ] G. Gubbiotti, D. McLaren, G. R.W. Quispel, *An elementary construction of modified Hamiltonians and modified measures of 2D Kahan maps*, Open Communications in Nonlinear Mathematical Physics, Special Issue 1 (2024), pp 1–29.

[GuS] G. Gubbiotti, Y. Shi, *Determination of the symmetry group for some QRT roots*, arXiv:2305.17107v1 [nlin.SI] (2023).

[PF] D. Fermi, L. Pizzocchero, *On the Casimir Effect with δ-Like Potentials, and a Recent Paper by K. Ziemian (Ann. Henri Poincaré, 2021)*, Ann. Ann. Henri Poincaré 24 (2023), 2363–2400.

[PCG] M. Cimaglia, M. Gengo, L. Pizzocchero, *Cosmologies with perfect fluids and scalar fields in Einstein's gravity. Phantom scalars and nonsingular universes* (in preparation; 146 pp in the current version).

[VN] P. Vergallo, F. Nicassio, *S4: simple quasi-1D model for structural health monitoring of single lap joint software*, Eur. Phys. J. Plus (2023) 138:1135 (14 pp).

[VMR] N. Manganaro, A. Rizzo, P. Vergallo, *Solutions to the wave equation for commuting flows of dispersionless PDEs*, International Journal of Non–Linear Mechanics 159 (2024), 104611 (7pp).

[VR] A. Rizzo, P. Vergallo, *Quasilinear differential constraints for parabolic systems of Jordan-block type*, arXiv:2404.10101v1 [math-ph] (2024).

[VF] P. Vergallo, E.V. Ferantopov, *Hamiltonian aspects of the kinetic equation for soliton gas*, arXiv:2403.20162v1 [nlin.SI] (2024).

PLANNED ACTIVITIES IN 2025

G. Gaeta will continue his investigations in the following areas: symmetries and integrability of stochastic systems (with M.A. Rodrigues, Universidad Complutense Madrid); application of statistical mechanics tools in biology and evolution theory; perturbation theory of classical and quantum systems. G. Gaeta expects to attend an international conference (1000 EUR) and two local ones (500 EUR for each one).

G. Gubbiotti will work on the following subjects: introduction of new Lotka-Volterra models, and analysis of their integrability features (with D. McLaren (LaTrobe), R. Quispel (LaTrobe) and P. van der Kamp (LaTrobe)); continuous limits of semi-discrete Hamiltonian operators, in view of the classification introduced by B.A. Dubrovin in the semidiscrete case (with P. Vergallo (Messina and INFN Milano) and M. Dell'Atti (Portsmouth)); continuation of previous studies on the classification of second order Hamiltonian operators and of the associated conservation laws (with B. van Geemen (Milano) and P. Vergallo (Messina and INFN Milano)); algebraic properties of non-QRT maps of the plane, like the VGR map, defined on Halphen pencils (with C-M. Viallet (CRNS), N. Joshi (USyd), and Y. Shi (Flinders)); construction of non-homogeneous infinite-dimensional Hamiltonian structures using Lie algebra techniques (with F. Oliveri (Messina), E. Sgroi (Messina) and P. Vergallo (Messina and INFN Milano)). G. Gubbiotti expects to attend at least one international conference (1000 EUR) and two local ones (500 EUR for each one).

L. Pizzocchero will continue previous investigations in the following ares: *a posteriori* analysis of the approximate solutions of the equations of fluid dynamics and magnetohydrodynamics (with M. Pernici (INFN Milano) and Emanuele Tassi (CNRS Marseille)); exactly solvable cosmological models with scalar fields; stability analysis of wormholes (with F. Cremona (PhD in Mathematics, Milano) and O. Sarbach (Univ. Michoacana de San Nicolás de Hidalgo, Morelia)). L. Pizzocchero expects to attend an international conference (1000 EUR) and two local ones (500 EUR for each one).

P. Vergallo will work with G. Gubbiotti and other collaborators along some of research lines already described above. More precisely, the activites planned by P. Vergallo will concern: the continuous limits of semi-discrete Hamiltonian operators (with M. Dell'Atti and G. Gubbiotti); the classification of second order Hamiltonian operators and of the associated conservation laws (with B. van Geemen and G. Gubbiotti); the construction of non-homogeneous infinite-dimensional Hamiltonian structures via Lie algebra techniques (with G. Gubbiotti, F. Oliveri and E. Sgroi). In order to investigate these topics, P. Vergallo plans a visit for collaboration with M. Dell'Atti (EUR 1000); moreover, he expects to attend an international conference about integrable systems (EUR 1000).