Marco Trombetti

Resumé

Dept. Math. at "Federico II"
Via Cintia, Monte S. Angelo
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Personal Information

date of birth 24 Oct. 1989
place of birth Naples, Italy

Education

2003–2008 **Diploma**, *Liceo Scientifico Linguistico Statale "A.M. De Carlo"*, Giugliano in Campania (NA), *Grade: 100/100*. On May 4, 2007, I obtained the **ECDL** (European Computer Driving Licence).

2008–21/07/2011 **Bachelor's Degree in Mathematics**, *University of Naples "Federico II"*, Naples, *Grade: 110/110 cum Laude. Weighted Average Grade: 30/30; 5 honors*.
thesis: A Taste of Combinatorial Group Theory
supervisor: Clorinda De Vivo
abstract: A study of the famous Max Dehn's Problems for the presentations of groups: the word, the conjugacy and the isomorphism problem. Computations of many presentations, algorithms and methods to solve in some specials case these problems are elaborated in the thesis.

2011–28/05/2013 **Master's Degree in Mathematics**, *University of Naples "Federico II"*, Naples, *Grade: 110/110 cum Laude. Weighted Average Grade: 29.929/30; 7 honors; all exams passed with 30/30 except one (29/30)*.
thesis: Looking at Infinite Groups through the Mirror of their Conjugacy Classes
supervisor: Francesco de Giovanni
abstract: Asking for peculiar properties on proper subgroups of a group usually have a strong influence on the structure of the group. A further evidence of this phenomenon is given here, looking also at the behavior of commutators of proper subgroup of an infinite (generalized) soluble group. The results achieved here were published in the first two item of the "Publications" section.

01/02/2014–28/02/2017 **Ph.D. in Mathematics**, *University of Naples "Federico II"*, Naples.
Dottorato in "Scienze Matematiche e Informatiche", XXIX ciclo.
Winner of a grant (first place in the Ph.D. contest for a grant).
Defended on: 28/04/2017
Grade: "Eccellente" — "Ottimo con Lode" (Full marks with honors).
Advisor: Francesco de Giovanni.
thesis: Countable and Uncountable in Group Theory
abstract: The thesis studies the influence of countable and uncountable subgroups in a group.

Current Positions

Associate Professor

affiliation University of Naples "Federico II"
department Mathematics and Applications "R. Caccioppoli"
since Oct. 14, 2024 to present

Member of an association

association UMI - Unione Matematica Italiana
branch Napoli
since 2023 to present

Vice-president of a non-profit association

association AGTA — Advances in Group Theory and Applications
url www.advgrouptheory.com
Enrolled 2015
Full member since 21/06/2019, #0002

- **vice president** — since 24.02.2024 to present
- **webmaster** — since 2023 to present
- **secretary** — since 2023 to 23.02.2024

- **editor-in-chief of a journal**

journal Advances in Group Theory and Applications
url www.advgrouptheory.com/journal
2015–2022 member of the editorial staff
2023 managing editor
since 2024 editor-in-chief

- **director of a book series**

of *AGTA Lost Monographs*
directed by F. de Giovanni (up to #5 (2024))
directed by M. Trombetti (since #6 (2025))
edited by M. Trombetti
publications
#5 M. Curzio – Some Problems of Sylow Type in Locally Finite Groups
#4 G. Scorza – Abstract Groups
#3 C. Casolo – Groups with all Subgroups Subnormal
#2 R.D. Brauer – On the Representation of the Rotation Group by Groups of Linear Substitutions (Translated by: *Arkadia Translations Srl*, *M. Newell* and *M. Trombetti*)
#1 B.H. Neumann – Lectures on: Topics in the Theory of Infinite Groups

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- **editor**

of *A history of Group Theory through the lives of group theorists*
editors M. Brescia – F. de Giovanni – M. Trombetti
for AGTA - Advances in Group Theory and Applications
translations . . . and transcriptions
#3 1 letter of Fitting to Hasse and 1 postcard of Noether to Hasse
Mattia Brescia – Marco Trombetti
www.advgrouptheory.com/journal/Volumes/7/A history of Group Theory through the lives of group theorists Hans Fitting - Part 2.pdf
#2 2 letters and 1 postcard of Fitting to Hasse

Mattia Brescia – Marco Trombetti

www.advgrouptheory.com/journal/Volumes/4/A history of Group Theory through the lives of group theorists Hans Fitting - Part 1.pdf

#1 G. Frattini's paper: *Intorno alla generazione dei gruppi di operazioni*

Mattia Brescia – Marco Trombetti

www.advgrouptheory.com/GTArchivum/Frattini/FrattiniPaper1885Transl.pdf

Past Positions

Full Time Researcher

type RTDb
affiliation University of Naples "Federico II"
department Mathematics and Applications "R. Caccioppoli"
Oct. 14, 2021 – Oct. 13, 2024

Full Time Researcher

type RTDa - "junior" (L.240/10)
affiliation University of Naples "Federico II"
department Mathematics and Applications "R. Caccioppoli"
Dec. 18, 2017 – Dec. 17, 2020
Dec. 2, 2020 renewed, due to a positive valuation (*valutazione ampiamente positiva dell'attività svolta*), up to Dec. 17, 2022
Oct. 13, 2021 end of the contract; *reason*: winner of an RTDb contract

Member of an association

association Mathesis — Società italiana di scienze matematiche e fisiche fondata nel 1895
branch Napoli
since 2021 to 2024

- **editorial staff of a journal**

journal Periodico di Matematiche
url http://www.mathesisnazionale.it/categoria/periodico/
since 2021 to 2024

Prizes and recognition

ASN **National Scientific Habilitation**

Associate Professor	Full Professor
18 September 2018	8 July 2024

Premio Nazionale "Mario Curzio" per l'algebra (2019)

awarded on January 30, 2020
ex aequo with Eugenio Giannelli
description The prize (€3000) was awarded by the *Accademia Pontaniana* to a young (≤ 33 years old) algebra researcher (non-professor) in group theory

During the award ceremony I held a conference entitled *da Lilliput a Brobdingnag – Viaggi dell'Infinito in Teoria dei Gruppi*

Premio Cultura San Giuliano Martire

won in 2011 and 2013
description The prize was awarded by the *Pro Loco* of Giugliano in Campania (Naples, Italy) to high school students who earned a bachelor's degree or a master's degree with full marks with honors

Conferences, talks and posters

Invitations to attend conferences

#1 **Skew Braces, Braids and the Yang-Baxter Equation (24w5201)**, Banff International Research Station for Mathematical Innovation and Discovery (BIRS) (Canada), May 5 - 10, 2024.

Chair of conference sessions

21/06/2023 **Groups, Rings and the Yang-Baxter Equation 2023**,
Blankenberge (Belgium), June 19 - 23, 2023.
Chair of the afternoon session.

Posters

09/2018 **Group Theory in Florence II**, Florence (Italy), September 5 - 7, 2018.
On a generalization of the f-Wielandt subgroup of a group (with Maria Ferrara)

03/2018 **Ischia Group Theory 2018**, Ischia (Italy), March 19 - 23, 2018.
Groups satisfying some chain condition on f-subnormal subgroups (with Maria Ferrara)

Scientific Committees

#5 **AGTA Workshop — Reinhold Baer Prize 2024**
(October 7-8, 2024) – www.advgrouptheory.com/wrbp2024/

#4 **Groups, Skew Braces and the Yang–Baxter equation**
(July 16-17, 2024) – www.ecm2024sevilla.com
Mini-symposia at the 9th European Congress of Mathematics

#3 **Young Researchers Algebra Conference 2023**
(July 25-29, 2023) – www.advgrouptheory.com/yrac2023/

#2 **Young Researchers Algebra Conference 2019**
(Sept. 16-18, 2019) – www.advgrouptheory.com/yrac2019/

#1 **Young Researchers Algebra Conference 2017**
(May 22-24, 2017) – www.advgrouptheory.com/yrac/

Organizing Committees

#6 **AGTA Workshop - Reinhold Baer Prize 2022**
(Sept. 20-22, 2022) – www.advgrouptheory.com/wrbp2022/

#5 **Group Theory in Naples 2019 - an AGTA Workshop**
(Oct. 22-24, 2019) – www.advgrouptheory.com/groups2019/

#4 **Young Researchers Algebra Conference 2019**
(Sept. 16-18, 2019) – www.advgrouptheory.com/yrac2019/

#3 **Advances in Group Theory and Applications 2019**
(May 25-28, 2019) – www.advgrouptheory.com/agta2019/

#2 **Advances in Group Theory and Applications 2017**
(Sept. 5-8, 2017) – www.advgrouptheory.com/agta2017/

#1 **Young Researchers Algebra Conference 2017**
(May 22-24, 2017) – www.advgrouptheory.com/yrac/

Invited talks

2/10/2024 **Cátedra Europa 2024**, Universidad del Norte, Barranquilla (Colombia),
Sept. 30 - Oct. 5, 2024.
www.uninorte.edu.co/web/catedra-europa/italia-2024
(all expenses have been convered by the organization)

The discreet charm of Group Theory

In 1983, the American mathematician Daniel Gorenstein announced the completion of the project of classifying finite simple groups. This classification, which is an extremely relevant result for the whole mathematical world, attracted the attention of the (non-specialist) media and still strikes non-mathematicians with its exceptional characteristics: the incredible number of pages required for its proof (over 15,000, compared to the approximately 200 needed for the proof of Fermat's Last Theorem), the high number of mathematicians involved in the proof itself (over 100), the order of the so-called Monster group (just below 10^{54}, i.e. 808.017.424.794.512.875.886.459.904.961.710.7 57.005.754.368.000.000.000).

Is it possible to tell in a few slides what simple groups are and why their classification is so complicated and important? It will be up to you to judge whether I was able to do so or not.

12/09/2024 **Université Claude Bernard Lyon 1, Institut Camille Jordan**, Villeurbanne (France).

invited by F.O. Wagner — *https://indico.math.cnrs.fr/event/12723/*

Skew braces of small Morley rank

The aim of the seminar is to introduce the audience to a very recent joint work in progress with M. Ferrara, M. Invitti and F.O. Wagner concerning the classification of skew braces of small Morley rank, and in particular of those of Morley rank 1 and 2.

16/07/2024 **Groups, skew braces and the Yang–Baxter equation (9ECM)**, Siviglia (Spain), July 16 - 17, 2024.

On the behaviour of closed subgroups in linear groups

It is well known that any linear group, endowed with the Zariski topology, satisfies the minimal condition on closed subgroups and the maximal condition on closed connected subgroups. In this talk, I will describe the behaviour of linear groups satisfying the maximal condition on arbitrary closed (normal) subgroups, with a special focus on Zariski-simple linear groups, that is, linear groups with no proper non-trivial closed normal subgroups.

07/06/2023 **Advances in Group Theory and Applications 2023**, Lecce (Italy), June 5 - 9, 2023.

Subnormality in linear groups

In this talk I give an overview of the behaviour of subnormal subgroups (and related concepts, such as, but not only, ascendant, descendant and serial subgroups) in linear groups — actually I put the most emphasis on periodic linear groups. This essentially comes from a couple of joint works with F. de Giovanni and B.A.F. Wehrfritz.

06/04/2022 **Università degli Studi della Campania "Luigi Vanvitelli"**, Caserta (Italy).

invited by Alessio Russo, Antonio Tortora and Maria Ferrrara — (paid)

Generalized nilpotency in uncountable groups

What happens if all proper uncountable subgroups of a group are (bounded) Engel groups? What if they are hypercentral? The aim of the talk is to discuss these questions and related ones.

15/12/2021 **Università degli Studi di Firenze**, Firenze (Italy).

invited by Eugenio Giannelli
https://sites.google.com/unifi.it/algebra-al-dini/algebra-al-dini/seminario-di-algebra

Subnormality in Linear Groups

The aim of this talk is to give an overview of the behaviour of subnormal subgroups in linear groups, and in particular of a recent work I have made in collaboration with F. de Giovanni e B.A.F. Wehrfritz.

21/10/2020 **The University of Alabama**, Tuscaloosa, Alabama (USA) — Venue: Zoom.

invited by M.R. Dixon
https://math.ua.edu/event/algebra-topology-seminar-marco-trombetti-university-of-naples-federico-ii/

Abstract infinite group theory in linear groups

It is a classical result that the commutator subgroup of a group G is finite whenever such is the factor group $G/Z(G)$. In general, this result cannot be reverted: there are (soluble) groups with a finite commutator subgroup but an infinite factor over the centre. However, the situation changes if we restrict our attention to the universe of linear groups: the finiteness of G' is now equivalent to the finiteness of $G/Z(G)$ when G is linear. Do linear groups behave so better than arbitrary soluble groups with respect to classical group theoretical problems?

05/11/2018 **AGTA Workshop - Reinhold Baer Prize 2018**, Napoli (Italy), Nov. 5 - 6, 2018.

Large Characteristic Subgroups

31/01/2018 **Università degli Studi della Campania "Luigi Vanvitelli"**, Caserta (Italy).

invited by Alessio Russo

Mappe gemellari e sottogruppi caratteristici

È noto che se un gruppo contiene un sottogruppo abeliano di indice finito n, allora ne possiede anche uno caratteristico di indice al più n^n. Lo scopo di questo seminario è quello di mostrare che tale limitazione può essere migliorata sino ad un massimo di n^2. Il risultato sarà ottenuto mediante l'applicazione di un metodo generale per la costruzione di sottogruppi caratteristici.

21/12/2017 **Workshop "Giornata della Ricerca DMA 2017"**.

Università degli Studi di Napoli Federico II, Napoli (Italy)

Mappe gemellari e sottogruppi caratteristici

18/05/2017 **Young Researchers Seminar**.

http://sites.google.com/site/giovanniscilla1/young-researchers-seminar

Università degli Studi di Napoli Federico II, Napoli (Italy)

invited by Giovanni Scilla; feat Mattia Brescia

Chi è il vero autore dell'argomento di Frattini?

Contributed Talks

04/09/2023 **XXII Congresso dell'Unione Matematica Italiana**, Pisa (Italy), September 4 - 9, 2023 (Sezione 14: Algebra).

σ-Subnormalità nei gruppi localmente finiti

Sia $\sigma = \{\sigma_j : j \in J\}$ una partizione dell'insieme $\mathbb{P}$ di tutti i numeri primi. Un sottogruppo X di un gruppo finito G si dice σ-*subnormale* in G se esiste una catena di sottogruppi

$$X = X_0 \leq X_1 \leq \ldots \leq X_n = G$$

tale che, per ogni $1 \leq i \leq n-1$, o $X_{i-1} \trianglelefteq X_i$ o $X_i/(X_{i-1})_{X_i}$ è un σ_{j_i}-gruppo per qualche $j_i \in J$. Skiba [4] ha studiato le proprietà principali dei sottogruppi σ-subnormali nei gruppi finiti e ha mostrato che l'insieme di tutti i sottogruppi σ-subnormali gioca un ruolo rilevante nella struttura di un gruppo risolubile finito. In collaborazione con Maria Ferrara (vedi [2] e [3]), abbiamo posto i fondamenti di una teoria generale della σ-subnormalità (e delle σ-serie) nei gruppi localmente finiti. Si è così scoperto che, sebbene nei gruppi finiti i sottogruppi σ-subnormali formino un sotto-reticolo del reticolo dei sottogruppi (vedi [1]), quando si passa all'infinito ciò non è più vero (in analogia con la subnormalità). Uno dei problemi principali viene perciò ad essere quello di determinare quando il sottogruppo generato da due sottogruppi σ-subnormali sia ancora σ-subnormale.

Lo scopo di questo intervento è quello di introdurre il lettore alla teoria dei sottogruppi σ-subnormali e di discutere condizioni sotto cui il sottogruppo generato da due sottogruppi σ-subnormali sia ancora σ-subnormale.

06/07/2023 **Teoria dei Gruppi a Paestum**, Paestum (Italy), July 6 - 7, 2023.

Joins di sottogruppi σ-subnormali

Sia $\sigma = \{\sigma_j : j \in J\}$ una partizione dell'insieme $\mathbb{P}$ di tutti i numeri primi. Un sottogruppo X di un gruppo localmente finito G si dice σ-*subnormale* in G se esiste una catena di sottogruppi

$$X = X_0 \leq X_1 \leq \ldots \leq X_n = G$$

tale che, per ogni $1 \leq i \leq n-1$, o $X_{i-1} \trianglelefteq X_i$ o $X_i/(X_{i-1})_{X_i}$ è un σ_{j_i}-gruppo per qualche $j_i \in J$. È noto che, nel caso di gruppi finiti, il sottogruppo generato da due sottogruppi σ-subnormali (in altre parole, il loro *join*) è ancora σ-subnormale. In collaborazione con Maria Ferrara, abbiamo studiato il problema del join nel caso infinito. Si è così scoperto che in questo caso il join di σ-subnormali non necessita di essere σ-subnormale. D'altra parte, molti graziosi criteri di σ-subnormalità possono essere formulati in connessione con il join (è questo il caso, ad esempio, se i due sottogruppi permutano).

Lo scopo di questo intervento è quello di introdurre il lettore alla teoria dei sottogruppi σ-subnormali e di discutere il problema del join di tali sottogruppi.

22/06/2023 **Groups, Rings and the Yang-Baxter Equation 2023**, Blankenberge (Belgium), June 19 - 23, 2023.

Derived-indecomposable solutions, skew braces and presentations

Derived-indecomposable solutions are controlled by skew braces in which every element has finitely many *conjugates*. Thus, if B is a skew brace, the size (with respect to B) of the set $F(B)$ of all elements of B having finitely many conjugates could be used as a measure of how good is this controlling. It is unknown if the set of all elements of a skew brace with finitely many conjugates is actually a sub-skew brace (or even an ideal), but it turns out for instance that the structure skew brace does always contain an ideal I which is contained in $F(B)$ and is such that B/I is finite. The aim of the talk is to introduce the audience to a method proving this result, and having some other consequences for the general theory of (possibly infinite) skew braces.

22/09/2022 **AGTA Workshop - Reinhold Baer Prize 2022**, Caserta (Italy), September 21 - 23, 2022.

The upper and lower central series in linear groups

A classical theorem of Reinhold Baer shows that any group which is finite over its k-th centre has a finite $(k+1)$-th term of its lower central series. Although the converse statement is false in general, Philip Hall proved that for any group G the finiteness of $\gamma_{k+1}(G)$ implies that the index $|G : \zeta_{2k}(G)|$ is finite. Similar results have been obtained whenever finiteness is replaced by other relevant conditions. Moreover, it was proved by Yurĭ Merzljakov that the original Baer's theorem and its potential converse do hold for linear groups.

In a recent joint work with F. de Giovanni and B.A.F. Wehrfritz, we obtained a satisfying picture concerning those natural group classes for which theorems of Marzjliakov type (in linear groups) and theorems of Baer and Hall types are true or not. The aim of the talk is give an overview of these results.

05/08/2022 **Groups St Andrews 2022**, Newcastle (UK), July 30 - August 7, 2022.

Uncountable groups and abstract group properties

How strong is the influence of proper uncountable subgroups on the structure of an uncountable group? What if all proper uncountable subgroups are nilpotent, or even abelian? What if all proper uncountable subgroups are normal (subnormal) in the whole group? It turns out that the former kind of questions has a stronger impact than the latter kind of questions, and the aim of the talk is to discuss these problems and related ones.

25/10/2019 **Gruppen und Topologische Gruppen**, Cetara (Italy), October 25 - 26, 2019.

Groups with restrictions on non-permutable subgroups

The aim of this talk is to show that the imposition of some restrictions on non-permutable subgroups has in general a very strong outcome on the structure of the group. A characterization is given of all groups G with a finite normal subgroup N such that G/N has all subgroups permutable.

26/06/2019 **Advances in Group Theory and Applications 2019**, Lecce (Italy), June 25 - 28, 2019.

Large characteristic subgroups

It is well-known that every almost abelian group contains an abelian characteristic subgroup of finite index. This result may come in handy dealing with the intransitivity of normality when one is trying to prove the existence of large normal abelian subgroups.

Replacing abelianity with many other reasonable group theoretical properties it is still possible to get characteristic subgroups of finite index with the very same property. The aim of this talk is to present a roundup of (possibly) all the latest results on the topic.

06/09/2017 **Advances in Group Theory and Applications 2017**, Lecce (Italy), Sept. 5 - 8, 2017.

The countable character of closed subgroups of a group

Let $\mathfrak{X}$ be a class of groups and let G be a group. What if *all* countable subgroups of G belong to $\mathfrak{X}$? In this talk we examine this problem, showing that for many natural properties the answer is positive. In particular, we show that the property of being closed in the profinite topology can be countably detected.

17/06/2017 **Groups and Topological Groups**, Trento (Italy), June 16 - 17, 2017.

Countably recognizable group classes

29/06/2016 **Postgraduate Group Theory Conference (PGTC) 2016**, Imperial College London (Great Britain), 28 June - 1 July, 2016.

Nilpotency in uncountable groups

In the last few decades many results, showing the strong influence of proper large subgroups, were brought to light. Anyway most of these deal with the concept of "rank"; a group G is said to have *finite Prüfer rank* r if every finitely generated subgroup of G can be generated by at most r elements, and r is the least positive integer with such a property.

Here we attack the general problem from a different (and maybe more natural) point of view: studying the influence of subgroups which have large cardinality.

02/02/2016 **New Pathways between Group Theory and Model Theory**, Mülheim an der Ruhr (Germany), Feb. 1 - 4, 2016.

Nilpotency in uncountable groups

In the last few decades many results, showing the strong influence of proper large subgroups, were brought to light. Anyway most of these deal with the concept of *rank*; a group G is said to have *finite Prüfer rank* r if every finitely generated subgroup of G can be generated by at most r elements, and r is the least positive integer with such a property.

Here we attack the general problem from a different (and maybe more natural) point of view: studying the influence of subgroups which have large cardinality.

16/06/2015 **Advances in Group Theory and Applications 2015**, Porto Cesareo (Lecce, Italy), June 16 - 19, 2015.

Uncountable Groups with Restrictions on Subgroups of Large Cardinality

In the last few decades many results, showing the strong influence of proper large subgroups, were brought to light. Anyway most of these deal with the concept of "rank"; a group G is said to have *finite Prüfer rank* r if every finitely generated subgroup of G can be generated by at most r elements, and r is the least positive integer with such a property.

Here we attack the general problem from a different (and maybe more natural) point of view: studying the influence of subgroups which have large cardinality

13/06/2013 **Advances in Group Theory and Applications 2013**, Porto Cesareo (Lecce, Italy), June 10 - 14, 2013.

Looking at Infinite Groups through the Mirror of their Conjugacy Classes

A short communication about the results achieved in the Master Thesis and published in the first two articles of the "Publications" section.

Research in pairs

CIRM — Centre International de rencontres mathématiques

title *On lambda-critical skew braces: classification and applications for Hopf–Galois structures and the Yang–Baxter equation*

participants Mattia Brescia — Maria Ferrara — Marco Trombetti

when October 14 - 18, 2024

url https://conferences.cirm-math.fr/3281.html

Visiting Periods

where Lyon, France (Institut Camille Jordan)

when **17/08/2024 — 18/09/2024**

type winner of an INdAM grant to study abroad (2023/2024)
(3000€ + partial reimbursement of travel expenses)
(grant resigned due to incompatibility reasons, but still going)

to work with Frank Wagner

where Tuscaloosa, Alabama (USA)

when **28/06/2024 — 11/07/2024**

invited by The University of Alabama

to work with Martyn R. Dixon

note Travel and accommodation expenses are totally covered by the host institution

where Valencia, Spain

when **19/09/2023 — 21/10/2023**

invited by Universitat de Valencia

to work with Adolfo Ballester-Bolinches

where Galway, Ireland

when **16/09/2023 — 30/09/2023**

invited by University of Galway

to work with Martin L. Newell

where Dnipro, Ukraine

when **12/10/2016 — 14/11/2016**

invited by Oles Honchar Dnepropetrovsk National University

to work with Leonid A. Kurdachenko

Participation in Research Projects

project's title **Group Theory and Applications**

type MIUR-PRIN 2022

role **Vice-PI** and **Local Coordinator**

total amount 186.648€

since 28 Sept. 2023 to 28 Sept. 2025

project's title **Un approccio (semi)gruppale alle skew braces e all'equazione di Yang-Baxter**

type GNSAGA's Research Project

role **scientific director**
amount 2500€
since 17 March 2023 to 16 March 2024

project's title **Strutture Algebriche Grandi - SAG**

type Departmental Research Project
where Department of Mathematics, University of Naples "Federico II"
role **participant**
since Apr. 2018 to Oct. 2022

project's title **Teoria dei Gruppi e Applicazioni**

type MIUR-PRIN 2015
role **participant**
total amount 182.351€
since 22 Jan. 2018 to 5 Feb. 2020 (expiry date of the project)

project's title **Gruppi risolubili di cardinalità elevata (Soluble groups of high cardinality)**

role **participant**
year 2015
scientific director Carmen Musella
description The idea was to study groups of high cardinality in order to prove that the behavior of countable subgroups of those groups can be neglected.

member of **Gruppo INdAM: GNSAGA**

role **participant**
since 2015 to present

member of **A_DV-AGTA**

role **participant**
description The research project was issued by the non-profit association "AGTA — Advances in Group Theory and Applications" with the aim of supporting group theory worldwide.
since 2016 to 2021 (expiry date of the project)

Teaching Experience

Lecturer

class **Algebra II**
university University of Naples "Federico II"
Dept. Mathematics and Applications
MAT/02; n. of hours: 48 per year
acad. years **2024/2025** (first semester – first year BS); type: RTDB assigment

class **Strutture Algebriche**
university University of Naples "Federico II"
Dept. Mathematics and Applications
MAT/02; n. of hours: 48 per year
acad. years **since 2021/2022 to 2023/2024** (second semester – second year MS); type: RTDB assigment
acad. year **2020/2021** (second semester – second year MS); type: paid (ADA-AFRET)
acad. year **2019/2020** (second semester – second year MS); type: for free

class **Geometria**
university University of Naples "Federico II"
Dept. Computational Sciences
MAT/03; n. of hours: 48 per year
acad. years **since 2021/2022 to 2023/2024** (second semester – first year BS); type: RTDB assigment
acad. years **2019/2020**, **2020/2021** (second semester – first year BS); type: RTDA assigment

class **Groups with many abelian subgroups**

details University of Naples "Federico II"
Ph.D. program of the Dept. of Mathematics and Applications
year: 2023; n. of hours: 16

class **Groups with finite conjugacy classes**

details University of Naples "Federico II"
Ph.D. program of the Dept. of Mathematics and Applications
year: 2022; n. of hours: 20 per year

class **Geometria ed Algebra**

university University of Naples "Federico II"

n. of hours 48 per year and per class (second semester – first year BA), MAT/03

acad. year **2018/2019** (type: RTDA assignment) — Depts: Engineering: "Biomedica", "Automazione", "Elettronica", "Telecomunicazioni" and "Informatica" (MAT/03)

acad. year **2017/2018** (2 classes: 1st: RTDA assignment; 2nd: substitute teacher: 32 hours, for free) — Depts: Engineering: "Biomedica", "Automazione", "Elettronica", "Telecomunicazioni" and "Informatica"

acad. year **2016/2017** (winner of a public contract) — Depts: Engineering: "Biomedica", "Elettronica" and "Telecomunicazioni"

Supervisor

BSc

University of Naples "Federico II"
Department of Mathematics and Applications "Renato Caccioppoli"

#2 Roberto Carnevale

Applicazioni della Logica Infinitaria: Classi $\mathfrak{k}$-Riconoscibili e Gruppi Quasi Liberi – 24 September 2024 – Summa cum Laude

#1 Carmela Scoglio

Una Introduzione alla Teoria dei Reticoli – 16 July 2019 – Summa cum Laude

MSc

University of Naples "Federico II"
Department of Mathematics and Applications "Renato Caccioppoli"

#4 Bernardo Giuseppe di Siena

Teoria di Sylow nei CC-Gruppi Localmente Risolubili – 18 June 2024 – Summa cum Laude

#3 Ernesto Ingrosso

Su Alcune Classi di Gruppi Localmente Finite (*On Some Classes of Locally Finite Groups*) – 18 June 2024 – Summa cum Laude

#2 Massimiliano di Matteo

Automorfismi Potenza di Gruppi e Applicazioni – 16 July 2024 – Summa cum Laude

#1 Alessandro Alfieri

Teorema di Zacher–Rips e sue Estensioni – 16 Julys 2024 – Summa cum Laude

PhD

University of Naples "Federico II"
Doctoral program: "Scienze Matematiche e Informatiche"

#3 Ernesto Ingrosso

XL ciclo (2024 –)

#2 Luigi Iorio

XXXIX ciclo (2023 –)

#1 Dario Esposito

XXXIII ciclo (co-advisor) — Thesis: *Groups with Restriction on Non-Normal Subgroups* — Defended on Sept. 6th, 2021

Other activities

project PLS - Piano Lauree Scientifiche

description The project is dedicated to prospective students and furnishes university orientation to high school students. It also provide teacher training courses.

role I've provided orientation to senior high school students through a mini-course titled "Introduzione all'Algebra Moderna" for the Dept. of Mathematics at the University of Naples "Federico II"

years: 2022, 2023, 2024; number of hours per year: 12

project Literacy e Numeracy

role Tutor in Fase B

specs. Napoli 16
Potenziamento delle Competenze in Matematica e in Italiano (PoCoMaI)
CUP: B24F17009710001
Codice Ufficio: 76
url:www.literacyenumeracy.unina.it/dipartimenti/

year: 2019 (from February); number of hours: 45

year: 2020 (up to November); number of hours: 109

project Federica Weblearning. La Fabbrica digitale

description Production of an exercise toolbox for the course "Metodi algebrici in crittografia"

year 2018

class Algebra 1

university University of Naples "Federico II"

department Dipartimento di Matematica e Applicazioni "Renato Caccioppoli"

description Support activity: exercises and lectures

n. of hours 20 per academic year

acad. years 2014/2015, 2015/2016

project Orizzonti Matematici

description Support activity for the development of the activities of the project

year: 2016; number of hours: 50

Publications

[83] *On groups covered by relatively subnormal Chernikov local systems*

authors E. Ingrosso – M. Trombetti

on Acta Math. Hungarica

abstract Let $\mathcal{L}_{\mathfrak{F}}$ be the class of groups having a local system $\{X_i : i \in I\}$ of finite subgroups such that X_i is subnormal in X_j whenever $X_i \leq X_j$. It has been shown by Rae in [18] that the class of soluble $\mathcal{L}_{\mathfrak{F}}$-groups is closer to the class of soluble periodic FC-groups than might be expected. The aim of this paper is to prove that, under some additional finite-rank assumptions, one can extend Rae's results to local systems of Černikov subgroups, showing for example that the locally nilpotent residual is always covered by normal Černikov subgroups of the group, and that the factor group by the Hirsch–Plotkin radical has Černikov conjugacy classes of elements (see Theorem 5.9).

In [2], Reinhold Baer introduced a characteristic subgroup of a group which coincides with the hypercentre in the finite case (we call this subgroup the *Baer centre* of the group); actually, as shown in [4], this subgroup coincides with the hypercentre even in periodic FC-groups. Extending these results, we prove that this equivalence holds in many relevant universes of locally finite groups (see Theorem 6.2) and in particular in certain classes of locally finite groups having local systems of the above-mentioned type (see Theorem 6.9).

Finally, in order to better understand the behaviour of the Baer centre in our context, we introduce and study a new class of groups that is strictly contained between the classes of periodic FC-groups and periodic BFC-groups, and that could be very useful from a computational point of view (see Section 7).

[81] *On locally finite groups whose derived subgroup is locally nilpotent*

authors M. Trombetti

on Math. Nachr.; doi:10.1002/mana.202400263

abstract A celebrated theorem of Helmut Wielandt shows that the nilpotent residual of the subgroup generated by two subnormal subgroups of a finite group is the subgroup generated by the nilpotent residuals of the subgroups. This result has been extended to saturated formations in [2]. Although Wielandt's result is not true in arbitrary locally finite groups, we are able to extend it (even in a stronger form) to homomorphic images of periodic linear groups (see Theorem 3.3). Also, all results in [2] are extended to locally finite groups, so it is possible to characterize the class of locally finite groups with a locally nilpotent derived subgroup as the largest subgroup-closed saturated formation $\mathfrak{X}$ such that, for all $\mathbf{SL}$-closed saturated formations $\mathfrak{F}$, the $\mathfrak{F}$-residual of an $\mathfrak{X}$-group generated by $\mathfrak{F}$-subnormal subgroups is the subgroup generated by their $\mathfrak{F}$-residuals (see Theorem 3.13). Our proofs are based on a reduction theorem that is of an independent interest (see Theorem 2.8). Furthermore, we provide strengthened versions of Wielandt's result for other relevant classes of groups, among which we mention the class of paranilpotent groups (see Theorem 3.11). A brief discussion on the permutability of the residuals is given at the end of the paper.

[80] *Editorial*

author M. Trombetti

on Adv. Group Theory Appl. 18 (2024), 1–2.

[78] *Obituary: Francesco de Giovanni (1955–2024)*

authors M. De Falco – C. Musella – M. Trombetti

on Mediterranean Journal of Mathematics; doi:10.1007/s00009-024-02637-w

[76] *Francesco de Giovanni (1955–2024)*

authors M. Brescia – M. De Falco – M. Ferrara – C. Musella – A. Russo – M. Trombetti – G. Vincenzi

on Notiziario UMI (Feb. 2024, No.2)

[75] *Finite skew braces of square-free order and supersolubility*

authors A. Ballester-Bolinches – R. Esteban-Romero – M. Ferrara – V. Pérez-Calabuig – M. Trombetti

on Forum Math. Sigma 12:e39 (2024), 1–33; doi:10.1017/fms.2024.29

abstract The aim of this paper is to study supersoluble skew braces, a class of skew braces that encompasses all finite skew braces of square-free order. It turns out that finite supersoluble skew braces have Sylow towers, and that in an arbitrary supersoluble skew brace B many relevant skew brace-theoretical properties are easier to identify: for example, a centrally nilpotent ideal of B is B-centrally nilpotent, a fact that simplifies the computational search for the Fitting ideal; also, B has finite multipermutational level if and only if $(B,+)$ is nilpotent.

Given a finite presentation of the structure skew brace $G(X,r)$ associated with a finite non-degenerate solution of the Yang–Baxter Equation (YBE), there is an algorithm that decides if $G(X,r)$ is supersoluble or not. Moreover, supersoluble skew braces are examples of almost polycyclic skew braces, so they give rise to solutions of the YBE on which one can algorithmically work on.

[71] *On the lattice of closed subgroups of a profinite group*

authors I. de las Heras-Kerejeta – F. de Giovanni – M. Trombetti

on Internat. J. Algebra Comput. 34 (2024), no. 4, 515–542.; doi:10.1142/S0218196724500206

abstract The subgroup lattice of a group is a great source of information about the structure of the group itself. The aim of this paper is to use a similar tool for studying profinite groups. In more detail, we study the lattice of closed subgroups of a profinite group and its relation with the whole group. We show, for example, that pro-cyclic groups are the only profinite groups with a distributive lattice of closed subgroups, and we give a sharp characterization of profinite groups whose lattice of closed subgroups satisfies the Dedekind modular law; we actually give a precise description of the behaviour of modular elements of the lattice of closed subgroups. We also deal with the problem of carrying some structural information from a profinite group to another one having an isomorphic lattice of closed (or open) subgroups. Some interesting consequences and related results concerning decomposability and the number of profinite groups with a given lattice of closed subgroups are also obtained.

[70] *Large norms in group theory*

authors M. Ferrara – M. Trombetti

on J. Algebra 646 (2024), 236–267; doi:10.1016/j.jalgebra.2024.02.007

abstract In 1935, the introduction of the *norm* of a group by Reinhold Baer is a turning point in group theory. In fact, Baer proved that there is a very strong relationship between the structure of the norm and that of the whole group (see [1],[2],[3],[4],[5]). Since then, the norm has been playing a very significant roles in many aspects of group theory and its applications: it has been used in [43] to describe the connection between Hopf–Galois structures and skew braces; it has been used in [23] to describe some special types of profinite groups; and it has been fundamental in the theory of subgroup lattices of groups (see [40]).

In this paper, we weaken the original definition of norm by taking into account only those subgroups that are "large" in some sense. Depending on the chosen concept of largeness, the resulting norm can have an impact on the structure of the whole group that is even greater than that of Baer's norm. This is exactly what happens with the *non-polycyclic norm*, and in fact, Theorem **??** gives a precise description of generalized soluble groups in which the non-polycyclic norm is non-Dedekind (and can be considered as the main result of the paper). Other times, the resulting norms have their own peculiar behaviour; this is the case if "large" means "infinite", "having infinite rank", "being non-Černikov", or "having cardinality $\mathfrak{m}$" for some given uncountable cardinal number $\mathfrak{m}$.

[69] *A local approach to stability groups*

authors M.L. Newell – M. Trombetti

on J. Algebraic Combinatorics 60 (2024), no. 2, 599–602; doi:10.1007/s10801-024-01345-8

abstract In this short note we prove a local version of Philip Hall's theorem on the nilpotency of the stability group of a chain of subgroups by only using elementary commutator calculus (Hall's theorem is a direct consequence of our result). This provides a new way of dealing with stability groups.

[68] *Hall classes of groups*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on RACSAM 118:50 (2024), 18pp.; doi:10.1007/s13398-023-01549-w

abstract In 1958, Philip Hall [13] proved that if a group G has a nilpotent normal subgroup N such that G/N' is nilpotent, then G is nilpotent. The scope of Hall's nilpotency criterion is not restricted to group theory, and in fact similar statements hold for Lie algebras and more generally for algebraically coherent semiabelian categories (see [4],[10],[22]).

We say that a group class $\mathfrak{X}$ is a *Hall class* if it contains every group G admitting a nilpotent normal subgroup N such that G/N' belongs to $\mathfrak{X}$. Thus, Hall's nilpotency criterion just asserts that nilpotent groups form a Hall class. Many other relevant classes of groups have been proved to be Hall classes; for example, Plotkin [18] and Robinson [19] proved that locally nilpotent groups and hypercentral groups form Hall classes. Note that these generalizations also hold if groups are replaced by other algebraic structures, for example Lie algebras (see [22]).

The aim of this paper is to develop a general theory of Hall classes of groups, that could later be reasonably extended to Lie algebras. Among other results, we prove that many natural types of generalized nilpotent groups form Hall classes, and we give examples showing in particular that the class of groups having a finite term in the lower central series is not a Hall class, even if we restrict to the universe of linear groups.

[67] *A survey of recent results connected with subnormal subgroups*

authors M.R. Dixon – M. Ferrara – M. Trombetti

on J. Iranian Math. Soc. 5 (2024), 1–19; doi:10.30504/JIMS.2023.407445.1135

abstract In this paper we give a brief survey of some highlights from the theory of subnormal subgroups and then reveal some recent extensions of this theory due to the current authors and others.

[66] *A note on conjugacy of supplements in soluble periodic linear groups*

authors M. Trombetti

on Forum Math.; doi:10.1515/forum-2024-0102

abstract The aim of this short note is to extend a nice result of Parker and Rowley [**?**] to (homomorphic images of) soluble periodic linear groups. In particular, we prove that if G is a soluble periodic linear group and N is a locally nilpotent normal subgroup of G such that N and G/N have no isomorphic G-chief factors, then two supplements to N in G are conjugate provided that they have the same intersection with N.

[65] *Periodic linear groups in which permutability is a transitive relation*

authors M. Ferrara – M. Trombetti

on Ann. Mat. Pura Appl.; doi:10.1007/s10231-023-01367-2

abstract A PT-*group* is a group in which the relation of being a permutable subgroup is transitive. The main aim of this paper is to show that a (homomorphic image of a) periodic linear group is a soluble PT-group if and only if each subgroup of a Sylow subgroup is permutable in the corresponding Sylow normalizer (see Theorem 4.7); for a fixed prime p, the latter condition is denoted by $\mathfrak{X}_p$. In order to prove our main theorem, we need

- to characterize (homomorphic images of) periodic linear groups that are PT-groups (see Section 2),
- to develop a fusion theory for locally finite groups (see Section 3),
- to carefully study (homomorphic images of) periodic linear groups with the property $\mathfrak{X}_p$ for a fixed prime p (see for instance Theorem 4.6).

As a by-product we obtain (among other results) a characterization of (homomorphic images of) periodic linear $\mathfrak{X}_p$-groups in terms of pronormality (see Theorem 4.11) that will allow us to show that, on some occasions, the property $\mathfrak{X}_p$ is inherited by subgroups.

[64] *Hall classes in linear groups*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on J. Group Theory 27, No. 2 (2024), 383–412; doi:10.1515/jgth-2023-0063

abstract A well known theorem of Philip Hall states that if a group G has a nilpotent normal subgroup N such that G/N' is nilpotent, then G itself is nilpotent. We say that a group class $\mathfrak{X}$ is a *Hall class* if it contains every group G admitting a nilpotent normal subgroup N such that G/N' belongs to $\mathfrak{X}$.

Examples have been given in [5] to show that finite-by-$\mathfrak{X}$ groups do not form a Hall class for many natural choices of the Hall class $\mathfrak{X}$. Although these examples are often linear, our aim here is to prove that the situation is much better within certain natural subclasses of the universe of linear groups.

[63] *Locally finite simple groups whose nonnilpotent subgroups are pronormal*

authors M. Ferrara – M. Trombetti

on Bull. Austral. Math. Soc. 109 (2024), 512–521; doi:10.1017/S0004972723000576

abstract A subgroup H of a group G is said to be *pronormal* in G if each of its conjugates H^g in G is conjugate to it already in the subgroup $\langle H, H^g \rangle$. The aim of this paper is to classify those (locally) finite simple groups which have only nilpotent or pronormal subgroups.

[62] *Hall classes of groups with a locally finite obstruction*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on J. Austral. Math. Soc. 117 (2024) , 16–43; doi:10.1017/S1446788723000071

abstract A well known theorem of Philip Hall states that if a group G has a nilpotent normal subgroup N such that G/N' is nilpotent, then G itself is nilpotent. We say that a group class $\mathfrak{X}$ is a *Hall class* if it contains every group G admitting a nilpotent normal subgroup N such that G/N' belongs to $\mathfrak{X}$. Hall classes have been considered by several authors, among which Plotkin [12] and Robinson [13]. A further detailed study of Hall classes can be found in the recent paper [8], where, for a given Hall class $\mathfrak{Y}$, the behaviour of the class of finite-by-$\mathfrak{Y}$ groups is also investigated.

The aim of this paper is to prove that for most natural choices of the Hall class $\mathfrak{Y}$, also the classes $(\mathbf{L}\mathfrak{F})\mathfrak{Y}$ and $\mathfrak{B}\mathfrak{Y}$ are Hall classes, where $\mathbf{L}\mathfrak{F}$ is the class of locally finite groups and $\mathfrak{B}$ is the class of locally finite groups of finite exponent.

[61] *The structure skew brace associated with a finite non-degenerate solution of the Yang-Baxter equation is finitely presented*

authors M. Trombetti

on Proc. Amer. Math. Soc. 152, No. 2 (2024), 573–583; ArXiv:2307.05540; doi:10.1090/proc/16566

abstract The aim of this paper is to show that the structure skew brace associated with a finite non-degenerate solution of the Yang-Baxter equation is finitely presented.

[60] *On derived-indecomposable solutions of the Yang–Baxter equation*

authors I. Colazzo – M. Ferrara – M. Trombetti

on Publ. Math.; ArXiv:2210.08598

abstract If (X, r) is a finite non-degenerate set-theoretic solution of the Yang–Baxter equation, the additive group of the structure skew brace $G(X, r)$ is an FC-group, i.e. a group whose elements have finitely many conjugates. Moreover, its multiplicative group is virtually abelian, so it is also close to being an FC-group itself. If one additionally assumes that the derived solution of (X, r) is indecomposable, then for every element b of $G(X, r)$ there are finitely many elements of the form $b * c$ and $c * b$, with $c \in G(X, r)$.

This naturally leads to the study of a brace-theoretic analogue of the class of FC-groups. For this class of skew braces, the fundamental results and their connections with the solutions of the YBE are described: we prove that they have good torsion and radical theories, and that they behave well with respect to certain nilpotency concepts and finite generation.

[59] *Joins of σ-subnormal subgroups*

authors M. Ferrara – M. Trombetti

on Illinois J. Math. 68 (2024), 211–244; doi:10.1215/00192082-11152469; ArXiv:2310.03391

abstract Let $\sigma = \{\sigma_j \,:\, j \in J\}$ be a partition of the set $\mathbb{P}$ of all prime numbers. A subgroup X of a finite group G is *σ-subnormal* in G if there exists a chain of subgroups

$$X = X_0 \leq X_1 \leq \ldots \leq X_n = G$$

such that, for each $1 \leq i \leq n-1$, $X_{i-1} \trianglelefteq X_i$ or $X_i/(X_{i-1})_{X_i}$ is a σ_{j_i}-group for some $j_i \in J$. Skiba [12] studied the main properties of σ-subnormal subgroups in finite groups and showed that the set of all σ-subnormal subgroups plays a very relevant role in the structure of a finite soluble group. In [5], we laid the foundation of a general theory of σ-subnormal subgroups (and σ-series) in locally finite groups. It turns out that the main difference between the finite and the locally finite case concerns the behaviour of the join of σ-subnormal subgroups: in finite groups, σ-subnormal subgroups form a sublattice of the lattice of all subgroups (see for instance [3]), but this is no longer true for arbitrary locally finite groups. This situation is very similar to that concerning with subnormal subgroups, so, as in the case of subnormal subgroups (see for instance [8],[11],[13],[15] and the monograph [7]), it therefore makes sense to study the class $\mathfrak{S}_\sigma^\infty$ (resp. $\mathfrak{S}_\sigma$) of locally finite groups in which the join of (resp. of finitely many) σ-subnormal subgroups is σ-subnormal. In particular, the aim of this paper is to study how much one can extend a group in one of these classes before going outside the same class (see for example Theorems 3.6, 3.8, 5.5 and 5.7). Furthermore, some σ-subnormality criteria for the join of two σ-subnormal subgroups are obtained: for example, similarly to a celebrated theorem of Williams (see [15]), we give a necessary and sufficient conditions for a join of two σ-subnormal subgroups to always be σ-subnormal; as a consequence we show that the join of two orthogonal σ-subnormal subgroups is σ-subnormal (this is the analog of a result of Roseblade [11]).

[58] *σ-Subnormality in locally finite groups*

authors M. Ferrara – M. Trombetti

on J. Algebra 614 (2023), 867–897; doi:10.1016/j.jalgebra.2022.10.013

abstract Let $\sigma = \{\sigma_j \,:\, j \in J\}$ be a partition of the set $\mathbb{P}$ of all prime numbers. A subgroup X of a finite group G is *σ-subnormal* in G if there exists a chain of subgroups

$$X = X_0 \leq X_1 \leq \ldots \leq X_n = G$$

such that, for each $1 \leq i \leq n-1$, $X_{i-1} \trianglelefteq X_i$ or $X_i/(X_{i-1})_{X_i}$ is a σ_{j_i}-group for some $j_i \in J$. Skiba [17] studied the main properties of σ-subnormal subgroups in finite groups and showed that the set of all σ-subnormal subgroups plays a very relevant role in the structure of a finite soluble group. In this paper we lay the foundation of a general theory of σ-subnormal subgroups (and σ-series) in locally finite groups. Although in finite groups, σ-subnormal subgroups form a sublattice of the lattice of all subgroups (see for instance [3]), this is no longer true for locally finite groups; in fact, the join of σ-subnormal subgroups is not always σ-subnormal, but this is the case (for example) whenever the join of subnormal subgroups is subnormal (see Theorem 3.16). We provide many criteria to determining when a subgroup is σ-subnormal starting from the much weaker concept of *σ-seriality* (see Section 2). These criteria are particularly useful when employed to investigate the join of σ-subnormal subgroups — we show for example that if two σ-subnormal subgroups H and K of a locally finite group G are such that $HK = KH$, then HK is σ-subnormal in G (see Theorem 3.15) — but they are also fit to show that on some occasions σ-seriality coincides with σ-subnormality — this is the case of linear groups (see Theorem 3.35).

[57] *Periodic linear groups factorized by mutually permutable subgroups*

authors M. Ferrara – M. Trombetti

on Czechoslovak Mathematical Journal 73 (2023), 1229–1254; doi:10.21136/CMJ.2023.0485-22

abstract The aim of this paper is to investigate the behaviour of (homomorphic images of) periodic linear groups which are factorized by mutually permutable subgroups. Mutually permutable subgroups have been extensively investigated in the finite case by several authors, among which, for our purposes, we only cite Beidleman and Heineken (see [6]). In a previous paper of ours (see [9]) we have been able to generalize the first main result of [6] to periodic linear groups (showing that the commutator subgroups and the intersection of mutually permutable subgroups are subnormal subgroups of the whole group), and in this paper we completely generalize all other main results of [6] to (homomorphic images of) periodic linear groups.

[56] *On groups factorized by mutually permutable subgroups*

authors M. Ferrara – M. Trombetti

on Results Math. 77 (2022), art. 211, 15pp.; doi:10.1007/s00025-022-01734-0

abstract The aim of the paper is to provide a large extension of the recent results of [9], strengthening at the same time their conclusions. Our second main theorem is actually a complete generalization of a result obtained in the finite case by Beidleman and Heineken [6] to periodic linear groups.

[55] *Subnormality in linear groups*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on J. Pure Appl. Algebra 227, No. 2 (2023), 107185; doi:10.1016/j.jpaa.2022.107185

abstract This paper investigates subnormality and its generalizations in the universe of linear groups. Among other results, it is proved that in any periodic linear group serial subgroups are ascendant, while descendant subgroups are subnormal. Moreover, the join of subnormal subgroups of linear groups is studied.

[54] *A note on the series' of ordinal numbers*

author M. Trombetti

on ArXiv:2201.07345

abstract The aim of this short note is to provide a proof to a statement of Sierpiński concerning the number of possible sums of a series (of type $\lambda < \aleph_1$) of arbitrary ordinal numbers.

[53] *Groups with iterated restrictions on conjugacy classes*

authors M. Ferrara - M. Trombetti

on J. Algebra Appl. 22, No. 11 (2023), Article No. 2350242, 34pp.; doi:10.1142/S0219498823502420

abstract Let $\mathfrak{X}$ be a group class (such as the class $\mathfrak{F}$ of all finite groups). Starting from $\mathfrak{X}$, we can define the class $\mathfrak{X}C$ of all groups G such that, for any $g \in G$, the *co-centralizer* $G/C_G(\langle g\rangle^G)$ of g in G is an $\mathfrak{X}$-group; of course, if $\mathfrak{X} = \mathfrak{F}$, these are the well known FC-groups. Iterating this request, we define the class $\mathfrak{X}C^2$ of groups whose co-centralizers are $\mathfrak{X}C$-groups, and so on. We generically refer to these groups as groups with *$\mathfrak{X}$-iterated conjugacy classes*. Of course, if $\mathfrak{X}$ is quotient closed, then any group G such that $G/\zeta_k(G) \in \mathfrak{X}$, for some $k \geq 0$, has $\mathfrak{X}$-iterated conjugacy classes, and actually these concepts are almost always equivalent in the universe of linear groups. For $\mathfrak{X} = \mathfrak{F}$, this type of restrictions have recently been investigated, and the aim of the present paper is to study the general theory of groups with $\mathfrak{X}$-iterated conjugacy classes, paying particular attention to the case in which $\mathfrak{X}$ is the class $\mathfrak{C}$ of Černikov groups: we extent (and improve) results concerning groups with $\mathfrak{F}$-iterated conjugacy classes. The main focus is on Sylow theory, serial subgroups and groups with many proper subgroups having $\mathfrak{C}$-iterated conjugacy classes.

[52] *Paranilpotency in uncountable groups*

author M. Trombetti

on Archiv der Mathematik 119 (2022), 449–460; doi:10.1007/s00013-022-01781-7

abstract The aim of this paper is to provide a contribution to the theory of uncountable groups and to that of paranilpotent groups. Extending the structural results in [14] and [20], we prove that locally soluble *minimal non-paranilpotent groups*, i.e. non-paranilpotent groups whose proper subgroups are paranilpotent, are soluble. It is also shown that the class of paranilpotent groups is countably recognizable and, as an application of these results, that a soluble uncountable group whose proper uncountable subgroups are paranilpotent is itself paranilpotent.

[51] *Spectra of groups*

authors A. Facchini – F. de Giovanni – M. Trombetti

on Algebra Repr. Theory 26 (2023), no. 5, 1415–1431; doi:10.1007/s10468-022-10138-1

abstract The aim of this paper is to investigate the behaviour of prime and semiprime subgroups of groups, and their relation with the existence of abelian normal subgroups. In particular, we study the set $\mathrm{Spec}(G)$ of all prime subgroups of a group G endowed with the Zariski topology and, among other results, we prove that $\mathrm{Spec}(G) = \emptyset$ if and only if G is hyperabelian.

[50] *The pro-norm of a profinite group*

authors M. Ferrara – M. Trombetti

on Israel J. Math. 254 (2023), no. 1, 399-429; doi:10.1007/s11856-022-2404-5

abstract In "classical" group theory, a subgroup which is often relevant in the study of a group G is the *norm*, i.e. the intersection of all normalizers of subgroups of G. The main aim of this paper is to introduce the analogous concept of *pro-norm* for a profinite group and to investigate its relation to the norm. In order to understand this connection, we first investigate profinite groups whose closed proper subgroups are normal or abelian. This will also naturally lead to the concept of *pro-metanorm*, which, in turns, generalize another very useful characteristic subgroup of an arbitrary group. Finally, other restrictions on closed proper subgroups of a profinite group are investigated.

[49] *A compendium in infinite group theory: Part 1 – Countable recognizability*

authors F. de Giovanni – M. Trombetti

on Mathematics 9(19) (2021), 2366, 17pp.; doi:10.3390/math9192366

abstract Countably recognizable group classes were introduced by Reinhold Baer in [5] and provide a very ingenious way to study large groups through the properties of their countable subgroups. This is the reason why we have chosen the countable recognizability to start this series of survey papers on infinite group theory.

[48] *Groups whose proper subgroups are linear*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on J. Algebra 592 (2022), 153–168; doi:10.1016/j.jalgebra.2021.11.003

abstract The aim of this paper is to investigate groups whose proper subgroups are linear. Although there exist locally nilpotent non-linear groups in which every proper subgroup is linear, we prove that, for a large group class containing in particular all hypercentral groups, the linearity of the proper subgroups implies that of the whole group. Moreover, we study groups whose proper subgroups are linear of characteristic 0, showing in particular that these groups are themselves linear of characteristic 0 provided that they are either locally nilpotent or locally finite.

[47] *Generalized nilpotency in uncountable groups*

authors M. Ferrara – M. Trombetti

on Forum Math. 34 (2022), no. 3, 669–683; doi:10.1515/forum-2021-0137

abstract The main purpose of this paper is to investigate the behaviour of uncountable groups of cardinality $\aleph$ whose proper subgroups of cardinality $\aleph$ are (bounded) Engel groups. It is proved that such groups are (bounded) Engel groups, provided that they satisfy some generalized solubility condition.

A similar analysis is carried out also for (generalized soluble) uncountable groups of cardinality $\aleph$ whose proper subgroups of cardinality $\aleph$ are hypercentral. In this case, we get that the whole group is hypercentral provided that the hypercentral lengths of the proper "large" subgroups are not too close to $\aleph$. This generalizes results that have already been obtained for nilpotency.

Finally, as a by-product, we obtain similar results for many other relevant group classes such as that of Gruenberg groups and that of $\mathcal{N}_1$-groups.

Corrigendum in: [70]

[46] *Linear groups with restricted conjugacy classes*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on Ricerche Mat. 71 (2022), 179–188; doi:10.1007/s11587-021-00607-y

abstract In this paper we characterize, in terms of their conjugacy classes, linear groups G such that $G/\zeta_k(G)$ belongs to a certain group class $\mathfrak{X}$ for several natural choices of $\mathfrak{X}$. Moreover, a description is given of linear groups with restrictions on layers.

[45] *Infinite locally finite simple groups with many complemented subgroups*

authors M. Ferrara – M. Trombetti

on Int. J. Group Theory 11 (2022), no. 3, 191–200; doi:10.22108/ijgt.2021.129515.1700
Proceedings of the "Ischia Group Theory Conference 2020/2021"

abstract We prove that the following families of (infinite) groups have complemented subgroup lattice: alternating groups, finitary symmetric groups, Suzuki groups over an infinite locally finite field of characteristic 2, Ree groups over an infinite locally finite field of characteristic 3. We also show that if the Sylow primary subgroups of a locally finite simple group G have complemented subgroup lattice, then this is also the case for G.

[44] *A constructive approach to accessible group classes*

authors F. de Giovanni – M. Trombetti

on Ann. Mat. Pura Appl. 201 (2022), 985–1003; doi:10.1007/s10231-021-01146-x

abstract Let $\mathfrak{X}$ be a group class. A group G is an opponent of $\mathfrak{X}$ if it is not an $\mathfrak{X}$-group but all its proper subgroups belong to $\mathfrak{X}$. Of course, every opponent of $\mathfrak{X}$ is a cohopfian group and the aim of this paper is to describe the smallest group class containing $\mathfrak{X}$ and admitting no such a kind of cohopfian groups

[43] *The structure of metahamiltonian groups*

authors M. Brescia – M. Ferrara – M. Trombetti

on Japanese J. Math. 18 (2023), no. 1, 1–65; doi:10.1007/s11537-023-2216-3

abstract A group is called *metahamiltonian* if all its non-abelian subgroups are normal. The aim of this paper is to provide an exhaustive but self-contained reference to the structure of metahamiltonian groups fixing several relevant mistakes appearing in the literature.

[42] *Infinite groups with many complemented subgroups*

authors M. Ferrara – M. Trombetti

on Beitr. Algebra Geom. 63 (2022), 775–808; doi:10.1007/s13366-021-00597-w

abstract This paper has two souls. On one side, it is a survey on (infinite) groups in which certain systems of subgroups are complemented (like for instance the abelian subgroups). On another side, it provides generalizations and new, easier proofs of some (un)known results in this area.

[41] *Groups with many pronormal subgroups*

authors M. Ferrara – M. Trombetti

on Bull. Austral. Math. Soc. 105 (2022), 75–86; doi:10.1017/S0004972721000277

abstract A subgroup H of a group G is said to be *pronormal* in G if each of its conjugates H^g in G is conjugate to it already in the subgroup $\langle H, H^g\rangle$; a group is then said *prohamiltonian* if all its non-abelian subgroups are pronormal. The aim of the paper is to show that a locally soluble group of (regular) cardinality in which all proper uncountable subgroups are prohamiltonian is prohamiltonian; in order to obtain this result, it is proved that the class of prohamiltonian groups is detectable from the behaviour of countable subgroups. Examples are exhibited to show that there are uncountable prohamiltonian groups which do not behave very well. Finally, it is also showed that prohamiltonianity can be sometimes detectable through the analysis of the finite homomorphic images of a group.

[40] *The upper and lower central series in linear groups*

authors F. de Giovanni – M. Trombetti – B.A.F. Wehrfritz

on Quart. J. Math. 73 (2022), no. 1, 261–275; doi:10.1093/qmath/haab030

abstract A classical theorem of Reinhold Baer shows that any group which is finite over its k-th centre has a finite $(k+1)$-th term of its lower central series. Although the converse statement is false in general, Philip Hall proved that for any group G the finiteness of $\gamma_{k+1}(G)$ implies that the index $|G : \zeta_{2k}(G)|$ is finite. Similar situations have been investigated when finiteness is replaced by suitable weaker conditions. Moreover, it was proved by Yuriĭ Merzljakov that Baer's theorem and its potential converse do hold for linear groups. The aim of this paper is to obtain results of the latter type for several other finiteness conditions.
Finally, although a result of Baer type does not hold for the class of soluble-by-finite reduced minimax groups, we prove that for this class a theorem of Hall type is true in arbitrary groups.

[39] *A lattice-theoretical characterization of pure subgroups of abelian groups*

authors M. Ferrara – M. Trombetti

on Ricerche Mat. 72 (2023), 779–783; doi:10.1007/s11587-021-00580-6

abstract Let G be an abelian group. The aim of this short paper is to describe a way to identify pure subgroups H of G by looking only at how the subgroup lattice $\mathcal{L}(H)$ embeds in $\mathcal{L}(G)$. It is worth noticing that all results are carried out in a local nilpotent context for a general definition of purity.

[38] *Il fascino discreto della teoria dei gruppi: la classificazione dei gruppi semplici finiti*
The discreet charm of group theory: the classification of finite simple groups

authors F. de Giovanni – M. Trombetti

on Periodico di Matematiche 12 (2020), 117–132

[37] *Locally finite simple groups whose non-abelian subgroups are pronormal*

authors M. Brescia – M. Trombetti

on Comm. Algebra 51 (2023), no. 8, 3346–3353; doi:10.1080/00927872.2023.2182604

abstract A subgroup X of a group G is said to be *pronormal* if the subgroups X and X^g are conjugate in $\langle X, X^g\rangle$ for all $g \in G$. Moreover, in analogy with *metahamiltonian groups* (i.e., groups in which every non-abelian subgroup is normal), a group in which every non-abelian subgroup is pronormal is called *prohamiltonian*. In this article we will determine those finite simple groups which are prohamiltonian. It will easily follow that the only prohamiltonian locally finite simple groups are the finite ones.

[36] *Groups whose subgroups are either abelian or pronormal*

authors M. Brescia – M. Ferrara – M. Trombetti

on Kyoto Math. J. 63 (2023), no. 3, 471–500; doi:10.1215/21562261-10607307

abstract A subgroup H of a group G is said to be *pronormal* in G if each of its conjugate H^g in G is conjugate to it already in the subgroup $\langle H, H^g\rangle$. Extending the well-known class of metahamiltonian groups, we study soluble groups in which every subgroup is abelian or pronormal.

[35] *Linear groups whose proper subgroups are close to being nilpotent*

authors F. de Giovanni – Marco Trombetti – B.A.F. Wehrfritz

on Comm. Algebra 49 (2021), 3020–3033; doi:10.1080/00927872.2021.1887206

abstract The aim of this paper is to describe linear groups in which all proper subgroups belong to a group class $\mathfrak{X}$ for several relevant choices of $\mathfrak{X}$. In particular, we study linear groups either with only nilpotent-by-finite proper subgroups or with only paranilpotent subgroups; here a group G is paranilpotent if it has a normal series of finite length whose factors are abelian and have only G-invariants subgroups.

[34] *Pronormality in group theory*

authors F. de Giovanni – Marco Trombetti

on Adv. Group Theory Appl. 9 (2020), 123–149; doi:10.32037/agta-2020-005

abstract A subgroup X of a group G is said to be pronormal if for each element g of G the subgroups X and X^g are conjugate in $\langle X, X^g \rangle$. The aim of this paper is to study pronormality and some close embedding properties, like weak normality and weak pronormality. In particular, it is proved that these properties can be countably detected, and the behaviour of groups which are rich in (generalized) pronormal subgroups is investigated.

[33] *Cohopfian groups and accessible group classes*

authors F. de Giovanni – Marco Trombetti

on Pacific J. Math. 312, No. 2 (2021), 457–475

abstract A group G is said to be cohopfian if it is neither trivial nor isomorphic to any of its proper subgroups, and this property is equivalent to the existence of a suitable group class $\mathfrak{X}$ such that G is minimal non-$\mathfrak{X}$. If $\mathfrak{X}$ is any group class, the subclass $\mathfrak{X}^\circ$ consisting of all groups that are isomorphic to proper subgroups of locally graded minimal non-$\mathfrak{X}$ groups is often much smaller than $\mathfrak{X}$. Similarly, if $\mathfrak{X}^{\mathrm{prop}}$ is the class of all groups isomorphic to proper subgroups of $\mathfrak{X}$-groups, the class $\overline{\mathfrak{X}}$ of all locally graded minimal non-X^{prop} groups may contain many groups which are not in $\mathfrak{X}$. This paper investigates the relations between the classes $\mathfrak{X}$, $\mathfrak{X}^\circ$ and $\overline{\mathfrak{X}}$.

[32] *A local study of group classes*

authors M. Ferrara – Marco Trombetti

on Note Mat. 40, No.2 (2020), 1–20; doi:10.1285/i15900932v40n2p1

abstract It was established in [29] that the class of groups with a finite commutator subgroup can be locally described by locally graded groups having a bound on the length of particular chains of non-normal subgroups. This approximation was later extended to groups having a finite normal subgroup whose factor group has no non-permutable subgroups (see [31]).

The aim of this paper is to show that these approximating group classes behave better than the classes they approximate, and can be used to derive new results on these.

[31] *Groups whose non-permutable subgroups are metaquasihamiltonian*

authors M. Ferrara – Marco Trombetti

on J. Group Theory 23 (2019), 513–529; doi:10.1515/jgth-2019-0143

abstract If $\mathfrak{X}$ is a class of groups, we define a sequence of group classes $\mathfrak{X}_1, \mathfrak{X}_2, \ldots, \mathfrak{X}_k, \ldots$ by putting $\mathfrak{X}_1 = \mathfrak{X}$ and choosing $\mathfrak{X}_{k+1}$ as the class of all groups whose non-permutable subgroups belong to $\mathfrak{X}_k$. In particular, if $\mathfrak{A}$ is the class of abelian groups, $\mathfrak{A}_2$ is the class of quasimetahamiltonian groups, i.e. groups whose non-permutable subgroups are abelian. The aim of this paper is to study the structure of $\mathfrak{X}_k$-groups, with special emphasis on the case $\mathfrak{X} = \mathfrak{A}$. Among other results, it will also be proved that a group has a finite normal subgroup with quasihamiltonian quotient if and only if it is locally graded and belongs to $\mathfrak{A}_k$ for some positive integer k.

Corrigendum in: ??

[30] *Some trends in the theory of groups with finitely many normalizers*

authors D. Esposito – F. de Giovanni – Marco Trombetti

on Ricerche Mat. 69 (2020), 357–365; doi:10.1007/s11587-019-00466-8

abstract This paper provides an account of results and methods from the theory of infinite groups admitting only finitely many normalizers of subgroups with a given property. Some new statements on this subject are also proved.

[29] *Groups whose non-normal subgroups are metahamiltonian*

authors D. Esposito – F. de Giovanni – Marco Trombetti

on Bull. Austral. Math. Soc. 102 (2020), 96–103; doi:10.1017/S0004972719001047

abstract If $\mathfrak{X}$ is a class of groups, we define a sequence of group classes $\mathfrak{X}_1, \mathfrak{X}_2, \ldots, \mathfrak{X}_k, \ldots$ by putting $\mathfrak{X}_1 = \mathfrak{X}$ and choosing $\mathfrak{X}_{k+1}$ as the class of all groups whose non-normal subgroups belong to $\mathfrak{X}_k$. In particular, if $\mathfrak{A}$ is the class of abelian groups, $\mathfrak{A}_2$ is the class of metahamiltonian groups, i.e. groups whose non-normal subgroups are abelian. The aim of this paper is to study the structure of $\mathfrak{X}_k$-groups, with special emphasis on the case $\mathfrak{X} = \mathfrak{A}$. Among other results, it will also be proved that a group has a finite commutator subgroup if and only if it is locally graded and belongs to $\mathfrak{A}_k$ for some positive integer k.

[28] *Groups with all subgroups permutable or soluble of finite rank*

authors Martyn R. Dixon – Maria Ferrara – Z. Yalcin Karatas – Marco Trombetti

on J. Algebra 549 (2020), 195–214; doi:10.1016/j.jalgebra.2019.12.014

abstract In this paper the authors study the class of locally graded groups all of whose subgroups are permutable or are soluble and satisfy a certain rank condition. The rank conditions in question include groups of finite abelian section rank, minimax groups and polycyclic groups. In each case necessary and sufficient conditions are given for a locally graded group to have all subgroups permutable or soluble with the given rank condition.

[27] *Groups whose proper subgroups are metahamiltonian-by-finite*

authors F. de Giovanni – Marco Trombetti

on Rocky Mountain J. Math. 50 (2020), 153–162; doi:10.1216/rmj.2020.50.153

abstract A group is called metahamiltonian if all its non-abelian subgroups are normal. Metahamiltonian groups form a relevant group class that has been studied by several authors. It is known that any infinite locally graded group whose proper subgroups are metahamiltonian is likewise metahamiltonian, and the aim of this paper is to describe the structure of locally graded groups whose proper subgroups contain a metahamiltonian subgroup of finite index.

[26] *An analogue of the Wielandt subgroup in infinite groups*

authors Martyn R. Dixon – Maria Ferrara – Marco Trombetti

on Ann. Mat. Pura Appl. 199 (2020), 253–272; doi:10.1007/s10231-019-00876-3

abstract In this paper we define analogues of the Wielandt subgroup of a group. We say that a subgroup H of a group G is f-subnormal in G if there is a finite chain of subgroups $H = H_0 \leq H_1 \leq \ldots \leq H_n = G$ such that either $|H_{i+1} : H_i|$ is finite or H_i is normal in H_{i+1}, for $0 \leq i \leq n-1$. We study in a group G the connection between the subgroups $\overline{\omega}(G)$ and $\overline{w}_i(G)$ which are respectively the sets of elements of G normalizing all f-subnormal subgroups of G and those normalizing all infinite f-subnormal subgroups of G. In particular we show that $\overline{\omega}_i(G)/\overline{\omega}(G)$ is always Dedekind and often abelian.

[25] *Large characteristic subgroups with restricted conjugacy classes*

authors Francesco de Giovanni – Marco Trombetti

on Results in Mathematics 74 (2019), article 166; doi:10.1007/s00025-019-1089-5

abstract It is well-known that every almost abelian group contains an abelian characteristic subgroup of finite index. We shall say that a group class $\mathfrak{X}$ is F-characteristic if any group containing an $\mathfrak{X}$-subgroup of finite index has also a characteristic subgroup of finite index that belongs to $\mathfrak{X}$. Thus the class $\mathfrak{A}$ of abelian groups is F-characteristic. The aim of this paper is to prove that many interesting classes of infinite groups are F-characteristic. Moreover, it is shown that the class of free groups and that of free abelian groups are not F-characteristic.

[24] *Large characteristic subgroups and abstract group classes*

authors Francesco de Giovanni – Marco Trombetti

on Quaestiones Mathematicae 43, No. 8 (2020), 1159–1172; doi:10.2989/16073606.2019.1602087

abstract It is well-known that every almost abelian group contains an abelian characteristic subgroup of finite index. We shall say that a group class $\mathfrak{X}$ is F-characteristic if any group containing an $\mathfrak{X}$-subgroup of finite index has also a characteristic subgroup of finite index that belongs to $\mathfrak{X}$. Thus the class $\mathfrak{A}$ of abelian groups is F-characteristic. Many other relevant group classes have recently been proved to be F-characteristic, and the aim of this paper is to give a further contribution to this topic.

[23] *Large characteristic subgroups in which normality is a transitive relation*

authors Francesco de Giovanni – Marco Trombetti

on Rendiconti Lincei: Matematica e Applicazioni 30, No.2 (2019), 255–268; doi:10.4171/RLM/846

abstract It is known that if a group contains an abelian subgroup of finite index, then it also has an abelian characteristic subgroup of finite index. The aim of this paper is to study the corresponding question whenever abelian subgroups are replaced by subgroups in which normality is a transitive relation.

[22] *Groups satisfying chain conditions on f-subnormal subgroups*

authors Martyn R. Dixon – Maria Ferrara – Marco Trombetti

on Mediterranean Journal of Mathematics 15 (2018), article:146; doi:10.1007/s00009-018-1190-0

abstract In this paper we study groups with various chain conditions on f -subnormal subgroups. A subgroup H of a group G is called f-subnormal in G if there is a finite chain of subgroups $H = H_0 \leq H_1 \leq \ldots \leq H_n = G$ such that either $|H_{i+1} : H_i|$ is finite or H_i is normal in H_{i+1}, for $0 \leq i \leq n-1$.

[21] *Large characteristic subgroups with modular subgroup lattice*

authors Francesco de Giovanni – Marco Trombetti

on Archiv der Mathematik 111(2) (2018), 123–128; doi:10.1007/s00013-018-1190-0

abstract It is known that if a group contains an abelian subgroup of finite index, then it also has an abelian characteristic subgroup of finite index. The aim of this paper is to prove that corresponding results hold when abelian subgroups are replaced either by subgroups having a modular subgroup lattice or by quasihamiltonian subgroups.

[20] *A note on large characteristic subgroups*

authors Francesco de Giovanni – Marco Trombetti

on Comm. Algebra 46(11) (2018), 4654–4662; doi:10.1080/00927872.2018.1448851

abstract It is known that if a group G has an abelian subgroup of finite index n, then it contains an abelian characteristic subgroup A of index at most n^n. The aim of this paper is to improve this bound by showing that the characteristic subgroup A can be chosen of index at most n^2. Examples prove that this bound is the best possible. Our main result is obtained as an application of a general method for the construction of large characteristic subgroups.

[19] *Groups in which all subgroups of infinite rank have bounded near defect*

authors Martyn R. Dixon – Maria Ferrara – Marco Trombetti

on Comm. Algebra 46 (2018), 5416–5426; doi:10.1080/00927872.2018.1468908

abstract If G is a group with subgroup H and n, m are two fixed non-negative integers, we say that H is (n, m)-subnormal in G if there is a subgroup H_0 containing H such that $|H_0 : H| \leq n$ and H_0 is subnormal in G with subnormal defect at most m. We define $S(n, m)$ to be the class of all groups of infinite rank (and the trivial groups) whose subgroups of infinite rank are (n, m)-subnormal in G. In this paper we show that $S(n, m)$-groups are finite-by-nilpotent, in a large class of locally graded groups.

[18] *The true story behind Frattini's Argument*

authors Mattia Brescia – Francesco de Giovanni – Marco Trombetti

on Adv. Group Theory Appl. 3 (2017), 117–129; doi:10.4399/97888255036928

[17] *A countable-type theorem for uncountable groups*

authors Maria Ferrara – Marco Trombetti

on Adv. Group Theory Appl. 3 (2017), 97–114; doi:10.4399/97888255036927

abstract The aim of this paper is to develop a general construction method of finite series of a group G based on the existence of suitable finite series in the countable subgroups of G. This method is applied to prove that certain group theoretical properties are countably recognizable.

[16] *Modules over group rings with restrictions on some factor-modules*

authors Leonid A. Kurdachenko – Marco Trombetti

on Medit. J. Math. 14:135 (2017), doi:10.1007/s00009-017-0937-3

abstract Let D be a Dedekind domain and G be a group. In this paper we study DG-modules in which every proper factor-module, a part from the trivial one, is D-artinian. In particular, we prove that if such modules are not D-torsion-free, then their study can be leaded back to the already known study of FG-modules (here F is a field) with each proper factor-module having finite F-dimension. Finally, we obtain a good picture of D-torsion-free, factorially D-artinian DG-modules, when G is a locally soluble FC-hypercentral group.

[15] *Just non-artinian modules over some group rings*

authors Leonid A. Kurdachenko – Marco Trombetti

on Turkish Journal of Mathematics 42 (2018), 1242–1254; doi:10.3906/mat-1704-4

abstract Let D be a Dedekind domain and G be a periodic abelian-by-finite group. In this paper we study artinian DG-modules in which every factor-module, a part from the trivial one, is DG-artinian. In particular we prove that such modules cannot be D-periodic and that G must be subject to some restrictions. Finally, we give a detailed description of such modules when G is periodic abelian and the spectrum of D is infinite.

[14] *Countable recognizability and residual properties of groups*

authors Francesco de Giovanni – Marco Trombetti

on Rendiconti del Seminario Matematico della Università di Padova 140 (2018), 69–80; doi:10.4171/RSMUP/3

abstract A class of groups $\mathfrak{X}$ is said to be countably recognizable if a group belongs to $\mathfrak{X}$ whenever all its countable subgroups lie in $\mathfrak{X}$. It is proved here that the class of groups whose subgroups are closed in the profinite topology is countably recognizable. Moreover, countably detectable properties of the finite residual of a group are studied.

[13] *The class of minimax groups is countably recognizable*

authors Francesco de Giovanni – Marco Trombetti

on Monatshefte für Mathematik 185 (2018), no. 1, 81–86; doi:10.1007/s00605-016-0978-x

abstract A class $\mathfrak{X}$ is said to be countably recognizable if a group belongs to $\mathfrak{X}$ whenever all its countable subgroups lie in $\mathfrak{X}$. It is proved here that the class of minimax groups is countably recognizable.

[12] *Groups with restrictions on proper uncountable subgroups*

authors Francesco de Giovanni – Marco Trombetti

on Studia Scientiarum Mathematicarum Hungarica 56(2) (2019), 154–165; doi:10.1556/012.2019.56.2.1427

abstract A group G is called metahamiltonian if all its non-abelian subgroups are normal. The aim of this paper is to investigate the structure of uncountable groups of cardinality $\aleph$ in which all proper subgroups of cardinality $\aleph$ are metahamiltonian. It is proved that such a group is metahamiltonian, provided that it has no simple homomorphic images of cardinality $\aleph$. Furthermore, the behaviour of elements of finite order in uncountable groups is studied in the second part of the paper.

[11] *Countably recognizable classes of groups with restricted conjugacy classes*

authors Francesco de Giovanni – Marco Trombetti

on Int. J. Group Theory 7 (2018), no. 1, 5-16; doi:10.22108/IJGT.2016.21235

abstract A group class $\mathfrak{X}$ is said to be countably recognizable if a group belongs to $\mathfrak{X}$ whenever all its countable subgroups lie in $\mathfrak{X}$. It is proved here that most of the relevant classes of groups defined by restrictions on the conjugacy classes are countably recognizable.

[10] *A note on groups whose proper large subgroups have a transitive normality relation*

authors Francesco de Giovanni – Marco Trombetti

on Bull. Austral. Math. Soc. 95, no. 1 (2017), 38–47; doi:10.1017/S0004972716000848

abstract The aim of this paper is to investigate the behaviour of uncountable groups of cardinality $\aleph$ whose proper subgroups of cardinality $\aleph$ have a transitive normality relation. It is proved here that such a group G is a T-group (and all its subgroups have the same property), provided that G has an ascending subnormal series with abelian factors. Moreover, it is shown that if G is an uncountable soluble group of cardinality $\aleph$ whose proper normal subgroups of cardinality $\aleph$ have the T-property, then every subnormal subgroup of G has only finitely many conjugates.

[9] *A note on uncountable groups with modular subgroup lattice*

authors Francesco de Giovanni – Marco Trombetti

on Archiv der Mathematik 107 (2016), no. 6, 581–587; doi:10.1007/s00013-016-0964-5

abstract The aim of this paper is to investigate the behaviour of uncountable groups of cardinality $\aleph$ in which all proper subgroups of cardinality $\aleph$ have modular subgroup lattice. It is proved here that the lattice of subgroups of such a group G is modular, provided that G has no infinite simple homomorphic images of cardinality $\aleph$. A corresponding result for groups whose proper subgroups of large cardinality are quasihamiltonian is also proved.

[8] *Nilpotency in uncountable groups*

authors Francesco de Giovanni – Marco Trombetti

on J. Austral. Math. Soc. 103 (2017), no. 1, 59–69; doi:10.1017/S1446788716000379

abstract The main purpose of this paper is to investigate the behaviour of uncountable groups of cardinality $\aleph$ in which all proper subgroups of cardinality $\aleph$ are nilpotent. It is proved that such a group G is nilpotent, provided that G has no infinite simple homomorphic images and either $\aleph$ has cofinality strictly larger than $\aleph_0$ or the generalized continuum hypothesis is assumed to hold. Furthermore, groups whose proper subgroups of large cardinality are soluble are studied in the last part of the paper.

[7] *Countable recognizability and nilpotency properties of groups*

authors Francesco de Giovanni – Marco Trombetti

on Rend. Circ. Mat. Palermo [Series 2] 66 (2017), no. 3, 399–412; doi:10.1007/s12215-016-0261-y

abstract A class $\mathfrak{X}$ of groups is said to be countably recognizable if a group belongs to $\mathfrak{X}$ whenever all its countable subgroups lie in $\mathfrak{X}$. It is proved here that most of the relevant group classes of generalized nilpotent groups are countably recognizable. Moreover, some further countably recognizable group classes are exhibited.

[6] *Uncountable groups with restrictions on subgroups of large cardinality*

authors Francesco de Giovanni – Marco Trombetti

on J. Algebra 447 (2016), 383–396; doi:10.1016/j.jalgebra.2015.10.002

abstract The aim of this paper is to investigate the behaviour of uncountable groups of regular cardinality $\aleph$ in which all proper subgroups of cardinality $\aleph$ belong to a given group class $\mathfrak{X}$. It is proved that if every proper subgroup of G of cardinality $\aleph$ has finite conjugacy classes, then also the conjugacy classes of G are finite, provided that G has no simple homomorphic images of cardinality $\aleph$. Moreover, it turns out that if G is a locally graded group of cardinality $\aleph$ in which every proper subgroup of cardinality $\aleph$ contains a nilpotent subgroup of finite index, then G is nilpotent-by-finite, again under the assumption that G has no simple homomorphic images of cardinality $\aleph$. A similar result holds also for uncountable locally graded groups whose large proper subgroups are abelian-by-finite.

[5] *Infinite minimal non-hypercyclic groups*

authors Francesco de Giovanni – Marco Trombetti

on J. Algebra Appl. 14 (2015), no. 10, 15pp.; doi:10.1142/S0219498815501431

abstract If $\mathfrak{X}$ is a class of groups, a group G is minimal non-$\mathfrak{X}$ if it is not an $\mathfrak{X}$-group, but all its proper subgroups belong to $\mathfrak{X}$. The aim of this paper is to prove that for an infinite locally graded group, the property of being minimal non-hypercentral and that of being minimal non-hypercyclic are equivalent. Moreover, the main properties of infinite minimal non-hypercentral groups are described. In the last section, we study groups of infinite rank in which all proper subgroups of infinite rank satisfy a generalized supersolubility condition.

[4] *Groups of infinite rank with a locally finite term in the lower central series*

authors Francesco de Giovanni – Marco Trombetti

on Beitr. Algebra Geom. 56 (2015), no. 2, 735–741; doi:10.1007/s13366-014-0207-5

abstract It is proved that if G is a strongly locally graded group of infinite rank whose proper subgroups of infinite rank are (locally finite)-by-nilpotent, then G itself is (locally finite)-by-nilpotent. A corresponding result is also obtained for groups whose proper subgroups of infinite rank are (locally finite)-by-(locally nilpotent).

[3] *Groups whose proper subgroups of infinite rank have polycyclic conjugacy classes*

authors Francesco de Giovanni – Marco Trombetti

on Algebra Colloquium 22 (2015), no. 2, 181–188; doi:10.1142/S1005386715000164

abstract A group G is called a PC-group if the factor group $G/C_G(\langle x\rangle^G)$ is polycyclic for each x of G. It is proved here that if G is a group of infinite rank whose proper subgroups of infinite rank have the property PC, then G itself is a PC-group, provided that G has an abelian non-trivial homomorphic image. Moreover, under the same assumption, a complete classification of minimal non-PC groups is obtained.

[2] *A note on groups with many locally supersoluble subgroups*

authors Francesco de Giovanni – Marco Trombetti

on International Journal of Group Theory 4 (2015), no. 2, 1–7; doi:10.22108/IJGT.2015.9144

abstract It is proved here that if G is a locally graded group satisfying the minimal condition on subgroups which are not locally supersoluble, then G is either locally supersoluble or a Černikov group. The same conclusion holds for locally finite groups satisfying the weak minimal condition on non-(locally supersoluble) subgroups. As a consequence, it is shown that any infinite locally graded group whose non-(locally supersoluble) subgroups lie into finitely many conjugacy classes must be locally supersoluble.

[1] *Groups with minimax commutator subgroup*

authors Francesco de Giovanni – Marco Trombetti

on International Journal of Group Theory 3 (2014), no. 1, 9–16; doi:10.22108/IJGT.2014.2968

abstract A result of Dixon, Evans and Smith shows that if G is a locally (soluble-by-finite) group whose proper subgroups are (finite rank)-by-abelian, then G itself has this property, i.e. the commutator subgroup of G has finite rank. It is proved here that if G is a locally (soluble-by-finite) group whose proper subgroups have minimax commutator subgroup, then also the commutator subgroup G' of G is minimax. A corresponding result is proved for groups in which the commutator subgroup of every proper subgroup has finite torsion-free rank.

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