

Curriculum Vitae

Alessandro De Luca

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Personal Details

Born: 1981 in Heerlen, Netherlands. Nationality: Italian.

Current Position

Post-doc researcher (*stagiaire postdoctorale*) at the Laboratoire de Combinatoire et d'Informatique Mathématique (LaCIM) of Université du Québec à Montréal (UQAM) under the supervision of Christophe Reutenauer and Srečko Brlek, since September 21, 2009.

Education and Employment

- Post-doc researcher in computer science at the Department of Mathematics and Applications of University of Naples Federico II, from June 1, 2008 to May 31, 2009.
- Ph.D. in Mathematical Sciences, awarded on March 3, 2008 by the University of Naples Federico II. Thesis: *Combinatorial aspects of Sturmian sequences and their generalizations*. Supervisor: Prof. Aldo de Luca.
- University degree (“Laurea”) in Mathematics, awarded on October 22, 2003 by the University of Naples Federico II. Thesis: *Il test AKS: primalità in tempo polinomiale* (“AKS: polynomial-time primality testing”). Supervisor: Dr. Ulderico Dardano. Mark: 110/110 cum laude.
- Attendance of the Algebraic Geometry and Algebraic Topology courses of the Scuola Matematica Interuniversitaria (SMI), at the University of Perugia (Italy), August 2003.
- Native Italian speaker; very good knowledge of English, good knowledge of French.

Teaching Experience

Teaching assistance for the Information Theory course held by Prof. Aldo de Luca at the University of Naples Federico II, 2005–2008.

Scientific Research

My main research areas are theoretical computer science and discrete mathematics. In particular, I am interested in *combinatorics on words*, the study of structural and algebraic properties of finite and infinite strings of symbols. This field has deep connections with number theory, physics, biology, and other areas of computer science.

Sturmian and episturmian words, as well as several generalizations, have been the main topic of my investigation. I began working together with Aldo de Luca on finite factors of Sturmian words, finding new characterizations and studying the structure of palindromic factors [1–3]. Later we moved to episturmian words, studied some properties of the palindrome closure operator, and generalized them to obtain new classes of words, all based on involutory antimorphisms of the alphabet [4]. We studied such words more in detail, in collaboration with Michelangelo Bucci and Luca Q. Zamboni [5–9, 11, 13, 14]. Recently I also focused on rich words, a family of finite and infinite words which contains episturmian words and their factors. I considered the structure and complexity of rich words in some papers with Amy Glen, Bucci, and Zamboni [10, 12], and the relation between richness and some periodicity properties in a recent paper with Bucci and de Luca [15].

Research Projects and Collaborations

- Member of the Group for Algebraic and Geometric Structures and Their Applications (GNSAGA) by the Italian Institute for Higher Mathematics (INdAM) since 2005.
- Participating to the project PRIN 2007 “Aspetti matematici e applicazioni emergenti degli automi e dei linguaggi formali” (Mathematical aspects and applications of automata and formal languages) funded by the Italian Ministry of Education (MIUR).
- Invited at the University of Turku (Finland) from March till June 2006, doing research under the supervision of Prof. Juhani Karhumäki.
- Visiting University of North Texas (Denton, USA) in 2007, from November 6 to December 18, invited by Prof. Luca Q. Zamboni.

Participation in Conferences

- Developments in Language Theory, Palermo (Italy) July 4–8, 2005.

- WORDS, Montréal (Canada) September 13–17, 2005.
- Workshop on Words and Automata, St. Petersburg (Russia) June 7, 2006.
- Journées Montoises d’Informatique Théorique, Rennes (France) Aug 30–Sep 2, 2006.
- Workshop on Fibonacci Words, Turku (Finland) September 27–30, 2006.
- AutoMathA, Palermo, June 18–22, 2007.
- WORDS, Marseille (France) September 17–21, 2007.
- Journées Montoises d’Informatique Théorique, Mons (Belgium) August 27–30, 2008.
- Developments in Language Theory, Kyoto (Japan) September 16–19, 2008.
- Language and Automata Theory and Applications, Tarragona (Spain) April 2–8, 2009.
- WORDS, Salerno (Italy) September 14–18, 2009: member of the organizing committee.
- Discrete Geometry for Computer Imagery, September 30–October 2, Montreal.

Presentations

- *Palindromes in Sturmian Words*, at the DLT 2005 conference in Palermo, July 8, 2005.
- *Sequenze Sturmiane. Teoria e Applicazioni*, at the University of Naples Federico II, October 24, 2005.
- *Sturmian Words. Some characterisations and extensions*, at the University of Turku, May 24, 2006.
- *Some generalizations of episturmian words and morphisms*, at the WORDS 2007 conference in Marseille, September 18, 2007.
- *Special factors and images of Arnoux-Rauzy words*, at the JM08 conference in Mons, August 30, 2008.
- *On a Family of Morphic Images of Arnoux-Rauzy Words*, at the LATA 2009 conference in Tarragona, April 6, 2009.
- *Palindromic Richness in Finite and Infinite Words*, for the Séminaire du LaCIM in Montreal, November 27, 2009.

Publications

- [15] M. Bucci, A. de Luca, and A. De Luca. Rich and Periodic-like Words. In V. Diekert and D. Nowotka, editors, *DLT 2009*, volume 5583 (to appear) of *Lecture Notes in Computer Science*, pages 145–155. Springer, 2009.
- [14] M. Bucci and A. De Luca. On a Family of Morphic Images of Arnoux-Rauzy Words. In A. H. Dediu, A. M. Ionescu, and C. Martín-Vide, editors, *Language and Automata Theory and Applications*, volume 5457 of *Lecture Notes in Computer Science*, pages 259–266. Springer, 2009.
- [13] M. Bucci, A. de Luca, and A. De Luca. Characteristic morphisms of generalized episturmian words. *Theoretical Computer Science*, to appear, 2009.
- [12] M. Bucci, A. De Luca, A. Glen, and L. Q. Zamboni. A new characteristic property of rich words. *Theoretical Computer Science*, to appear, 2009. Preliminary version in *Local Proceedings of the 12th Journées Montoises d’Informatique Théorique*, 2008.
- [11] M. Bucci, A. de Luca, A. De Luca, and L. Q. Zamboni. On θ -episturmian words. *European Journal of Combinatorics*, 30:473–479, 2009.
- [10] M. Bucci, A. De Luca, A. Glen, and L. Q. Zamboni. A connection between palindromic and factor complexity using return words. *Advances in Applied Mathematics*, 42:60–74, 2009.
- [9] M. Bucci, A. de Luca, and A. De Luca. On a Generalization of Standard Episturmian Morphisms. In M. Ito and M. Toyama, editors, *Developments in Language Theory*, volume 5257 of *Lecture Notes in Computer Science*, pages 158–169. Springer, 2008.
- [8] M. Bucci and A. De Luca. Special factors and images of Arnoux-Rauzy words. In *Local Proceedings of the 12th Journées Montoises d’Informatique Théorique*, 2008.
- [7] M. Bucci, A. de Luca, A. De Luca, and L. Q. Zamboni. On different generalizations of episturmian words. *Theoretical Computer Science*, 393:23–36, 2008.
- [6] M. Bucci, A. de Luca, A. De Luca, and L. Q. Zamboni. On some problems related to palindrome closure. *Theoretical Informatics and Applications*, 42:679–700, 2008.
- [5] M. Bucci, A. de Luca, and A. De Luca. Some generalizations of episturmian words and morphisms. In P. Arnoux, N. Bédaride, and J. Cassaigne, editors, *Proceedings of WORDS 2007*, pages 100–108, 2007.
- [4] A. de Luca and A. De Luca. Pseudopalindrome closure operators in free monoids. *Theoretical Computer Science*, 362:282–300, 2006.
- [3] A. de Luca and A. De Luca. Combinatorial properties of Sturmian palindromes. *International Journal of Foundations of Computer Science*, 17:557–574, 2006.
- [2] A. de Luca and A. De Luca. Some characterizations of finite Sturmian words. *Theoretical Computer Science*, 356:118–125, 2006.
- [1] A. de Luca and A. De Luca. Palindromes in Sturmian Words. In C. De Felice and A. Restivo, editors, *Developments in Language Theory*, volume 3572 of *Lecture Notes in Computer Science*, pages 199–208. Springer, 2005.