

**Andrea Mazzanti** was born in Modena (ITALY) in 1976. He received the *Laurea* and *Ph.D.* degrees in Electrical Engineering from the University of Modena, ITALY in October 2001 and March 2005 respectively.

In 2003 he spent a research period at Agere (Allentown-PA) working on low power CMOS RFICs.

In November 2005 he became assistant professor at the Faculty of Engineering, University of Modena.

In January 2010 he joined the Faculty of Engineering of the University of Pavia – ITALY, where since 2020 he is Full Professor of Electronics and responsible for the Analog Integrated Circuit Laboratory. In

In his research activity, he has been the advisor for more than 50 students in the preparation of their MSc or PhD thesis.

### Teaching Activity

In his academic career, Andrea Mazzanti held the courses “*Analog IC Design*”, “*Circuits and Systems for High-Speed Communications*”, “*RF Microelectronics*” and “*Industrial Topics in Microelectronics*” within Master Programs in Electronic Engineering.

“*Analog IC Design*” covers the fundamentals of analog design in CMOS technology, with the intent of giving an intuitive but formal approach to the conception and analysis of analog circuits. The lectures followed a bottom-up approach, starting from CMOS device physics and arriving to advanced op-amp and comparator architectures.

“*Circuits and Systems for High-Speed Communications*” introduces modern high speed electrical interfaces for wireline and optical communications. The course presents the transceiver architectures and circuit techniques for signal processing and clock management. It is greatly multidisciplinary, and it is a good example of how to mix concepts belonging to different domains (electromagnetic fields, optics, communication principles, analog and digital electronics).

“*RF Microelectronics*” covers the design of RF integrated circuits in CMOS technology. With a top-down approach, the first lectures review modulation/demodulation principles and the architectures of modern wireless transceivers, with the purpose of defining block functions, system and component specifications. Then, the circuit implementation of different building blocks are studied with emphasis on conceptual innovations introduced to boost the performances: low-noise amplifiers, up- and down-conversion mixers, power amplifiers, oscillators, frequency dividers, phase-locked loops and frequency synthesizers.

The aim of “*Industrial topics in Microelectronics*” is to bridge students with microelectronic companies. The course (of 3 credits only) comprises few focused lectures and several seminars, organized by the lecturer, with speakers invited from the industry, presenting their company and recently developed products, with emphasis on the design activity of microelectronic engineers.

### Research Focus

Andrea Mazzanti started his research investigating processing and reliability of III-V transistors for Microwave power applications in collaboration with *Alenia Marconi Systems*, in 2001. Since 2004 his research interests have been focused on analog and high frequency silicon integrated circuits for communications and consumer electronics. The most relevant contributions are related to building blocks and sub-systems for high-speed wireless and wireline transceivers at radio-frequency and millimeter waves (VCOs, frequency dividers, amplifiers, drivers, equalizers).

Overall, the research activity of Andrea Mazzanti has contributed to ~170 scientific publications (73 international journals of which 32 Journal of Solid State Circuits), 15 presentations at workshops or tutorials and 4 patents. 5 conference papers received an award and 18 conference papers have been presented at the IEEE International Solid State Circuit Conference (ISSCC), the premier conference on innovations in the field of silicon integrated circuits. In 2013 he has been included in the *Top Authors* list for the 60 years Anniversary of IEEE ISSCC for having contributed 10 papers in the past 10 years of the conference. The publications received ~5000 citations and the *h* factor is 38 ([google scholar](#)).

## Public and Private Funding

Andrea Mazzanti participated as principal investigator and co-investigator in several microelectronic research programs, funded by private companies, Italian government and European Community. He has participated to the following European projects:

FP7-ENIAC, 2010-13. MIRANDELA: Millimeter-wave and Radio-frequency integration in Nanoelectronics for Modern Wireless 5 A Communications

FP7-ENIAC, 2013-16. DeNeCoR: Devices for NeuroControl and Neuro Rehabilitation.

H2020, 2015-18. COSMICC: CMOS Solutions for Mid-board Integrated transceivers with breakthrough connectivity at ultra-low Cost

H2020-ECSEL, 2017-20. TARANTO: Towards Advanced BiCMOS Nano Technology Platforms for RF and THz applications

H2020, 2017-20. DREAM: D-band Radio solution Enabling up to 100 Gbps reconfigurable Approach for Meshed beyond 5G networks

H2020-ECSEL 2019-23. M4M: Moore4Medical

H2020-2019-23. DRAGON: D-band Radio 5G Network Technology

H-KDT-JU-2021-1-IA. SHIFT: Sustainable Technologies Enabling Future Telecom Applications

EDF-2021-SENS-R. ARTURO: Advanced Radar Technologies in Europe

He is tightly cooperating with *STMicroelectronics* (ST) and, since 2020, he is the scientific director of a joint research lab between University and ST, named *Studio di Microelettronica*, located inside the Engineering Campus of the University of Pavia. He had the scientific responsibility for research grants and PhD programs, funded by ST, equivalent to ~50men/year.

Since 2015 he had several research cooperations with Huawei and HiSilicon, focused on integrated circuits for 5G wireless communications in SiGe BiCMOS technology. The funding has supported research grants and PhD programs equivalent to ~18men/year

## IEEE Activities

Andrea Mazzanti is IEEE *Senior Member* and serves as reviewer for several journal papers (10 per year, on average) in the area of high frequency integrated circuits.

From 2012 to 2016 he was Associate Editor for the *IEEE Trans. on Circuits and Systems-I* (TCAS-I). He has been Guest Editor for the TCAS-I special issue on ISCAS-2016. He has been the Guest Editor for the issues of the *IEEE Journal of Solid State Circuits* dedicated to the 2013 and 2014 editions of the *Custom Integrated Circuit Conference* (CICC) and the 2015 edition of the *European Solid State Circuits Conference* (ESSCIRC). From 2017 to 2023 ha was Associate Editor for the IEEE Solid State Circuit Letters.

He has been member of the Technical Program Committee (TPC) of the IEEE Custom Integrated Circuits Conference (2008-2014), *International Solid State Circuits Conference* (2014-2019), European Solid State Circuits Conference (2014-2019) and Radio Frequency Integrated Circuits Symposium (2022 to present). Since 2018 *ESSCIRC*. Since 2018 he is member of the steering committee of ESSCIRC.

He is currently distinguished lecturer of the IEEE Solid State Circuits Society.

Pavia,

June 2024



## Journal Publications since 2020

- J1 G. D. Filippi, L. Piotto, M. M. Pirbazari and A. Mazzanti, "D-Band RX Front-End With a  $0^\circ$ – $-360^\circ$  Phase Shifter Based on Programmable Passive Networks in SiGe-BiCMOS," in *IEEE Transactions on Microwave Theory and Techniques*, doi: 10.1109/TMTT.2024.3395899.
- J2 A. Bilato, I. Petricli and A. Mazzanti, "SiGe BiCMOS D-Band Heterodyne Power Mixer With Back-Off Efficiency Enhanced by Current Clamping," in *IEEE Solid-State Circuits Letters*, vol. 7, pp. 2-5, 2024, doi: 10.1109/LSSC.2023.3332766.
- J3 L. Piotto, G. De Filippi, G. Brozzetti, D. D. Maistro, S. Erba and A. Mazzanti, "A 14–32 GHz SiGe-BiCMOS Gilbert-Cell Frequency Doubler With Self-Adjusted Reduced Duty-Cycle Performance Enhancement," in *IEEE Journal of Solid-State Circuits*, vol. 59, no. 3, pp. 878-888, March 2024, doi: 10.1109/JSSC.2023.3313501.
- J4 D. Manente, F. Quadrelli, F. Padovan, M. Bassi, A. Mazzanti and A. Bevilacqua, "A Compensation and Calibration Technique for Lumped Hybrid Couplers in Integrated Image-Reject Architectures," in *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 70, no. 2, pp. 607-617, Feb. 2023, doi: 10.1109/TCSI.2022.3221161.
- J5 D. del Rio et al., "A D-Band 16-Element Phased-Array Transceiver in 55-nm BiCMOS," in *IEEE Transactions on Microwave Theory and Techniques*, vol. 71, no. 2, pp. 854-869, Feb. 2023, doi: 10.1109/TMTT.2022.3203709.
- J6 A. Franceschin, D. Riccardi and A. Mazzanti, "Ultra-Low Phase Noise X-Band BiCMOS VCOs Leveraging the Series Resonance," in *IEEE Journal of Solid-State Circuits*, vol. 57, no. 12, pp. 3514-3526, Dec. 2022, doi: 10.1109/JSSC.2022.3202405.
- J7 D. Riccardi, A. Franceschin and A. Mazzanti, "16-Core BiCMOS VCOs With Phase Noise Down to  $-130$  dBc/Hz at 1-MHz Offset From 20 GHz," in *IEEE Solid-State Circuits Letters*, vol. 5, pp. 182-185, 2022, doi: 10.1109/LSSC.2022.3193236.
- J8 F. Quadrelli et al., "A Broadband 22–31-GHz Bidirectional Image-Reject Up/Down Converter Module in 28-nm CMOS for 5G Communications," in *IEEE Journal of Solid-State Circuits*, vol. 57, no. 7, pp. 1968-1981, July 2022, doi: 10.1109/JSSC.2022.3161846.
- J9 M. M. Pirbazari and A. Mazzanti, "E-Band Frequency Sextupler With  $>35$  dB Harmonics Rejection Over 20 GHz Bandwidth in 55 nm BiCMOS," in *IEEE Journal of Solid-State Circuits*, vol. 57, no. 7, pp. 2155-2166, July 2022, doi: 10.1109/JSSC.2022.3146730.
- J10 F. Bozorgi, M. Bruccoleri, E. Rahimi, M. Reposi, F. Svelto and A. Mazzanti, "Analog Front End of 50-Gb/s SiGe BiCMOS Opto-Electrical Receiver in 3-D-Integrated Silicon Photonics Technology," in *IEEE Journal of Solid-State Circuits*, vol. 57, no. 1, pp. 312-322, Jan. 2022, doi: 10.1109/JSSC.2021.3094995.
- J11 D. Riccardi, A. Franceschin and A. Mazzanti, " $1/f^2$  Phase Noise Analysis in Active-Coupling LC-Tank Oscillators With Frequency Mismatch," in *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 69, no. 2, pp. 319-323, Feb. 2022, doi: 10.1109/TCSII.2021.3094937.
- J12 A. Franceschin, F. Quadrelli, F. Padovan, M. Bassi, A. Mazzanti and A. Bevilacqua, "A 20-GHz Class-C VCO With 80-GHz Fourth-Harmonic Output in 28-nm CMOS," in *IEEE Microwave and Wireless Components Letters*, vol. 31, no. 10, pp. 1154-1157, Oct. 2021, doi: 10.1109/LMWC.2021.3104143.
- J13 I. Petricli, H. Lotfi and A. Mazzanti, "Analysis and Design of D-Band Cascode SiGe BiCMOS Amplifiers With Gain-Bandwidth Product Enhanced by Load Reflection," in *IEEE Transactions on Microwave Theory and Techniques*, vol. 69, no. 9, pp. 4059-4068, Sept. 2021, doi: 10.1109/TMTT.2021.3094468.

- J14 A. Bilato, V. Issakov, A. Mazzanti and A. Bevilacqua, "A Multichannel D-Band Radar Receiver With Optimized LO Distribution," in IEEE Solid-State Circuits Letters, vol. 4, pp. 141-144, 2021, doi: 10.1109/LSSC.2021.3099069.
- J15 M. M. Pirbazari and A. Mazzanti, "High Gain 130-GHz Frequency Doubler With Colpitts Output Buffer Delivering Pout up to 8 dBm with 6% PAE in 55-nm SiGe BiCMOS," in IEEE Solid-State Circuits Letters, vol. 4, pp. 36-39, 2021, doi: 10.1109/LSSC.2021.3053314.
- J16 I. Petricli, D. Riccardi and A. Mazzanti, "D-Band SiGe BiCMOS Power Amplifier With 16.8dBm P<sub>1</sub>dB and 17.1% PAE Enhanced by Current-Clamping in Multiple Common-Base Stages," in IEEE Microwave and Wireless Components Letters, vol. 31, no. 3, pp. 288-291, March 2021, doi: 10.1109/LMWC.2021.3049458.
- J17 A. Bevilacqua and A. Mazzanti, "Doubly-Tuned Transformer Networks: A Tutorial," in IEEE Transactions on Circuits and Systems II: Express Briefs, vol. 68, no. 2, pp. 550-555, Feb. 2021, doi: 10.1109/TCSII.2020.3046021.
- J18 I. Petricli, H. Zhang, E. Monaco, G. Albasini and A. Mazzanti, "A 112 Gb/s PAM-4 RX Front-End With Unclocked Decision Feedback Equalizer," in IEEE Transactions on Circuits and Systems II: Express Briefs, vol. 68, no. 1, pp. 256-260, Jan. 2021, doi: 10.1109/TCSII.2020.3011972.
- J19 I. Petricli, H. Lotfi and A. Mazzanti, "Design of Compact D-Band Amplifiers With Accurate Modeling of Inductors and Current Return Paths in 55-nm SiGe BiCMOS," in IEEE Solid-State Circuits Letters, vol. 3, pp. 250-253, 2020, doi: 10.1109/LSSC.2020.3013330.
- J20 A. Garghetti, F. Quadrelli, M. Bassi and A. Mazzanti, "Impact of the Base Resistance Noise and Design of a -190-dBc/Hz FoM Bipolar Class-C VCO," in IEEE Solid-State Circuits Letters, vol. 3, pp. 90-93, 2020, doi: 10.1109/LSSC.2020.3006484.

The full list of publications is available on [google scholar](#)