



# AUTOMATIC RF TECHNIQUES GROUP

## NEWSLETTER

### Important deadlines:

January 25<sup>th</sup>, 2015: 85<sup>th</sup> conference abstracts/summaries due

March 15<sup>th</sup>, 2015: 85<sup>th</sup> conference final papers due

October 1<sup>st</sup>, 2015: Student fellowship applications due

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## *Fall 2014 ARFTG Microwave Measurement Symposium: The New Frontiers for Microwave Measurements*

### OVERVIEW



*St. Julien Hotel, site for the Fall 2014 ARFTG Symposium*

The Fall 2014 ARFTG Microwave Measurement Symposium took place at the St. Julien Hotel in Boulder, CO. The event was held over four days from Tuesday, December 2<sup>nd</sup> to Friday, December 5<sup>th</sup>. The Symposium consisted of a 1 ½ day short course on microwave measurements, two workshops, an NVNA users' forum meeting, and the main conference. The theme of this year's symposium was "The New Frontiers for Microwave Measurements". The symposium 'main event' was the 84<sup>th</sup> ARFTG Microwave Measurement Conference, which took place on Thursday and Friday. In addition to these technical events, there was an awards banquet on Thursday evening and a vendor exhibition during the main conference. Taken together, this amounted to four days packed with exciting activities for RF, microwave, and millimeter-wave engineers and technologists.

### SHORT COURSE ON MICROWAVE MEASUREMENTS

A tutorial on practical microwave measurements, organized by Patrick Roblin, was held on December 2<sup>nd</sup>-

3<sup>rd</sup>. About 30 people attended this course with topics covering everything from power, S-parameter, noise, oscilloscope, and spectral measurements to mm-wave and on-wafer techniques, nonlinear characterization, and load pull. Many thanks are due to the twelve instructors who made this short course successful.



*The Short Course introduces attendees to a wide range of microwave measurements topics.*

### WORKSHOPS

Two workshops were held as part of the symposium. The first, "New Techniques and New Applications for Microwave Materials Measurements" was held on the afternoon of Wednesday, December 3<sup>rd</sup> and was organized by Mitch Wallis. About 53 people attended and heard lectures from Andrew Gregory (NPL; Teddington, UK), Michael Havrilla (Air Force Institute of Technology; OH, US), Hao Xin (University of Arizona; Tucson, AZ, US), James C. Booth (NIST;

Boulder, CO, US). The second workshop, attended by about 54 people and held on the afternoon of Friday, December 5<sup>th</sup>, was entitled “High Efficiency Microwave Power Amplifiers: Design & Characterization” and was organized by Zoya Popovic and Patrick Roblin. Attendees at this workshop heard lectures by Zoya Popovic (Colorado University), Charles Campbell (TriQuint Semiconductor), Guillaume Bigny (Infineon Technologies) and Patrick Roblin (The Ohio State University).



*Two workshops covering extensive overviews on emerging topics are organised at the Fall Symposium.*

## CONFERENCE TECHNICAL SESSIONS

The 84<sup>th</sup> ARFTG Microwave Measurement Conference began on Thursday, December 4<sup>th</sup> with introductions by ARFTG President Mohamed Sayed and the conference chair, Ron Ginley. On this occasion, about 85 people attended the conference. ARFTG is pleased to thank the sponsors of this conference:

Gold sponsors: Anritsu and Qorvo.

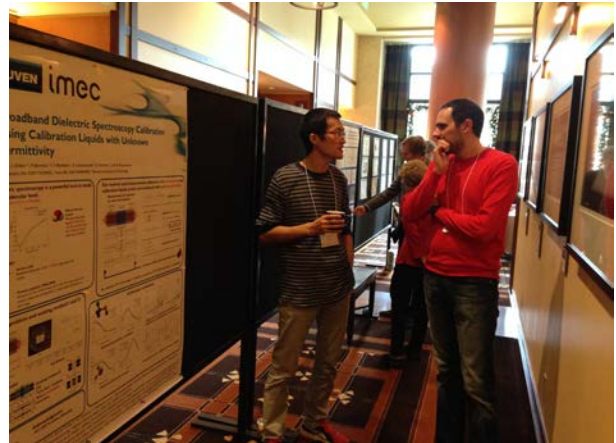
Silver sponsors: Keysight Technologies, Maury Microwave, and National Instruments.

For future sponsorship opportunities, contact the Sponsorship Chair, Joe Gering ([sponsorship@arftg.org](mailto:sponsorship@arftg.org)).

The conference consisted of six general sessions and an interactive forum spread over the two days organized by Technical Program Chair, Mitch Wallis. All papers have been published in the conference digest. Videos of presented papers will be available at [www.arftg.org](http://www.arftg.org).

The best oral paper, as voted on by conference attendees, was “Novel Flexible Dielectric Waveguide for Millimeter and Submillimeter Frequencies - Design and Characterization” by U. Nickel and J. Zovo,

(Spinner GmbH, Germany). The best interactive forum paper was selected to be “A Near-Field Scanning Microwave Microscope for Measurement of the Permittivity and Loss of High-loss Materials” by A.P. Gregory, *et al.* (NPL, UK & Imperial College, UK). The best exhibitor was voted as Spinner GmbH, which was also a first time exhibitor.



*The poster session encouraged ample attendee discussion with authors.*

## CONFERENCE EXHIBITS

The exhibits area gave conference attendees an excellent opportunity to see the latest range of products available from some of the leading suppliers in the RF and microwave test and measurement industry.

This conference’s exhibiting companies were Anritsu, Copper Mountain Technologies, Focus Microwaves, Gowanda, Keysight Technologies, Maury Microwave, Megaphase, Mesuro, Teledyne LeCroy, Spinner GmbH.

To exhibit at future conferences, please contact the Exhibits Chair, Joe Gering, at [exhibits@arftg.org](mailto:exhibits@arftg.org).



*Extended breaks allowed for ample interaction between attendees and exhibitors.*



## ANNUAL BUSINESS MEETING

The annual ARFTG Business Meeting was held on Dec. 4<sup>th</sup>, 2014, during the 84<sup>th</sup> conference. A significant part of this meeting consisted of electing five members to the ARFTG Executive Committee (ExCom). Biographies for the candidates were distributed prior to voting. The outcome of the voting was the (re-)election of five members to ExCom: Peter Aaen, Gayle Collins, Jon Martens, Ken Wong, and John Wood.

## CONFERENCE AWARDS

ARFTG President, Mohamed Sayed, presided over the conference awards ceremony, which took place during the banquet on Thursday evening. Certificates of appreciation were presented to the organizers of the 84<sup>th</sup> conference, namely Ron Ginley, Conference Chair, and Mitch Wallis, Technical Program Chair. Awards were also given for best papers and exhibitors from the previous (83<sup>rd</sup>) conference held in Tampa. The best oral paper award went to “Enhanced Vector Calibration of Load-pull Measurement Systems” by A. Aldoumani, *et al.* (Cardiff University and Mesuro, UK). The best interactive forum presentation was voted to be “Further Investigations into Connection Repeatability of Waveguide Devices at Frequencies from 750 GHz to 1.1 THz,” by N. Ridler, *et al.* (NPL and University of Leeds, UK). Anritsu received the best exhibitor award.

The Awards ceremony proceeded with the prestigious ARFTG Awards. The ARFTG Distinguished Service Award was presented to Nick Ridler “for outstanding leadership and dedicated service to ARFTG”. The ARFTG Technology Award was offered to OML, Inc. and Virginia Diodes, Inc. “for contributions making Terahertz Vector Network Analysis possible and practical”. Finally, James Randa was recognized with the Career Award with the citation: “for a career of meritorious achievement and outstanding contribution in the field of electric noise measurement”. The following persons became Lifetime Members: Nick Ridler and Gary Simpson. Qualification information is at <http://www.arftg.org/membership/lifemember.html>.



*ARFTG Awards Banquet: place for social interactions.*



*ARFTG President Mohamed Sayed presents the Certificate of Appreciation to Ron Ginley, 84<sup>th</sup> Conference Chair.*



*ARFTG President Mohamed Sayed presents the Career Award to James Randa.*

## NVNA USERS' FORUM

The Fall 2014 meeting of the NVNA Users' Forum, held on Wednesday Dec. 3<sup>rd</sup>, was moderated by Patrick Roblin and Apolinar Reynoso Hernandez and over 20 people attended. Two research updates were provided. In the first update Apolinar Reynoso Hernandez (CICESE) presented a short “Overview of Nonlinear RF Research in Mexico and CICESE.” In the second research update Thibault Reveyrand (University of Colorado) gave a presentation on “Large Signal Network Analyzer: Past and Future of the LSNA.” This presentation included an update on LSNA work pursued in Prof. Popovic lab in collaboration with T. Inoue of National Instruments. Finally a Round Table Discussion was led by Jean Pierre Teyssier on the “Future of the LSNA/NVNA measurement systems.” More information can be found at [http://www.arftg.org/about\\_nvna.html](http://www.arftg.org/about_nvna.html).

The NVNA Users' Forum was followed by the IEEE Special Interest Group (SIG) meeting. Nick Ridler (NPL) and Michael Janezic (NIST) led discussions on nonlinear standards initiatives. They discussed “Standardization of nonlinear microwave measurements” and circulated a sign-up list.

## FUTURE EVENTS

### Summer 2015 ARFTG activities

#### ***Microwave Measurement Conference***

The 85<sup>th</sup> ARFTG Microwave Measurement Conference will be held on May 22<sup>nd</sup>, 2015, in Phoenix, Arizona, as part of Microwave Week 2015 (May 17<sup>th</sup>-22<sup>nd</sup>), which also includes the IEEE MTT-S International Microwave Symposium ([www.ims2015.org](http://www.ims2015.org)), the Radio Frequency Integrated Circuits symposium ([www.rfic2015.org](http://www.rfic2015.org)) and workshops. The theme for the ARFTG conference is “*Measurements and Techniques for 5G Applications*” and the summary submission deadline is January 25<sup>th</sup>, 2015. For more information, contact the Conference Chair, Dave Blackham ([dave\\_blackham@keysight.com](mailto:dave_blackham@keysight.com)) or the Technical Program Chair, Nick Ridler ([nick.ridler@npl.co.uk](mailto:nick.ridler@npl.co.uk)) or visit [www.arftg.org](http://www.arftg.org). ARFTG will also be co-sponsoring two workshops: “Direct Extraction of FET Circuit Models from Microwave and Baseband Large-Signal Measurements for Model-Based Microwave Power Amplifier Design,” organized by Patrick Roblin and David Root; and “Measurement-based Modeling in SI Applications,” organized by Mike Resso, Heidi Barnes and Ken Wong.



*The Hyatt Regency Hotel, site for the 85<sup>th</sup> ARFTG Microwave Measurement Conference.*

### NVNA Users' Forum

ARFTG is organizing three NVNA Users' Forums during 2015. This is an excellent opportunity for an informal exchange of ideas related to nonlinear vector measurements and their uses. Please contact the moderators listed below if you wish to present a research update at an NVNA Users' Forum.

- Spring 2015 IMS/ARFTG Conference: May 17<sup>th</sup>-22<sup>nd</sup>, Phoenix, AZ. Moderator: Jean-Pierre Teyssier ([jean-pierre\\_teyssier@keysight.com](mailto:jean-pierre_teyssier@keysight.com)).

- 2015 INMMiC conference: Oct. 1-2<sup>nd</sup>, Taormina, Italy. Moderator: Dominique Schreurs ([Dominique.Schreurs@esat.kuleuven.be](mailto:Dominique.Schreurs@esat.kuleuven.be)).
- Fall 2015 ARFTG Microwave Measurement Symposium: Dec. 1-4<sup>th</sup>, Atlanta, GA. Moderators: Apolinar Reynoso Hernandez ([apolinar@cicese.mx](mailto:apolinar@cicese.mx)), Patrick Roblin.

### Fall 2015 ARFTG Symposium

The Fall 2015 ARFTG Microwave Measurement Symposium will be held in Atlanta, GA, from Tuesday, December 1<sup>st</sup> through Friday, December 4<sup>th</sup>. It is planned to hold the 86<sup>th</sup> ARFTG Microwave Measurement Conference, a short course, a workshop and the NVNA Users' Forum during this symposium. The conference theme is “*Microwave Measurements with Applications to Bioengineering and Biomedicine*”. For more information, contact the Conference Chair, Mohamed Sayed ([mmsayed@sbcglobal.net](mailto:mmsayed@sbcglobal.net)) or the Technical Program Chair, Joe Gering ([jgering@gorvo.com](mailto:jgering@gorvo.com)). More information will be available at [www.arftg.org](http://www.arftg.org).

## ARFTG STUDENT PROGRAMS

ARFTG can award one or more graduate fellowships each year to students working in RF/microwave measurement-related topics. This year, the Roger Pollard Memorial Student Fellowship in Microwave Measurement was awarded to Ms. Maria Cordoba (University of South Florida) and Mr. Cosan Caglayan (The Ohio State University). The application instructions and criteria for the next award cycle are published at [www.arftg.org](http://www.arftg.org). It should be noted that one of the new awardees (Cosan Caglayan) and one of the recent recipients (Song Liu) gave presentations at the 84<sup>th</sup> conference.

At individual conferences, ARFTG can also provide sponsorships to support student attendance. For the Fall 2014 symposium, two such sponsorships were awarded. For information on sponsorships at future fall conferences, see [www.arftg.org](http://www.arftg.org) or contact the sponsorships chair at [sponsorship@arftg.org](mailto:sponsorship@arftg.org).

## ADDENDUM

Every effort has been made to publish correct information in this newsletter. Significant errors should be reported to the ARFTG Executive Committee Secretary, Dominique Schreurs ([Dominique.Schreurs@esat.kuleuven.be](mailto:Dominique.Schreurs@esat.kuleuven.be)), so that corrections can be reported in the next issue.