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### Vacuum Tubes - Alive and Well!

**Dr. Colin D. Joye**

**The Naval Research Laboratory  
Washington, DC**

**Sponsors: W/NoVa Chapters of MTT-S**

**Date: Thursday, April 02, 2015**

**Time: 5:30 Reception, Dinner (Optional) 6:00 pm, Lecture 7:00**

**Place: Mitre Building 2, 7515 Colshire Drive, McLean, VA**

**Directions: [Google Maps](#)**

**Free parking.**

**All IEEE members and guests are welcome to attend.**

**Cost: Lecture and reception free, optional Dinner \$10**

**Please RSVP (Dinner only) to Roger Kaul, 301-394-4775, [r.kaul@ieee.org](mailto:r.kaul@ieee.org), by Tuesday, 31 March**

#### Abstract:

Part 1. Vacuum tube technology is alive and well, pushing to higher power levels, higher efficiencies and higher frequencies than ever before. A crucial issue facing the success of millimeter-wave (mmW) and sub-mmW traveling wave tube (TWT) technology is the ability control tolerances as the dimensions shrink. A novel microfabrication technique involving ultraviolet photolithography (UV-LIGA) with embedded polymer monofilaments allows quasi-3D structures to be made created in pure copper with tight tolerance control down to about 2 microns. This technique should be capable of creating highly precise TWT circuits in the range of about 100 GHz to several THz.

Part 2. Vacuum tubes versus transistors in audio. For decades the debate has raged on about whether tubes sound better than transistors, and if so, why? This discussion highlights some findings that range from decades ago, when transistors and op-amps were in their infancy, to now. Learn how to make a transistor amp sound like a tube amp with the addition of only a resistor. From that segway, we jump further into audio and talk about the MIDI-controller minimalist guitar that the author develops as part of his side company, Gittler Instruments, LLC [[www.GittlerInstruments.com](http://www.GittlerInstruments.com)]. We will discuss synthesizer pedals that have just come on the market in the last few years, which utilize multi-channel guitar pickups not available on traditional guitars.

#### Speaker:

Dr. Colin D. Joye (IEEE SM'13) received the B.S. degree in Electrical Engineering and Computer Science from Villanova University in Villanova, PA in 2002, and the M.S. and Ph.D. degrees in Electrical Engineering from Massachusetts Institute of Technology (MIT), Cambridge, MA in 2004 and 2008, respectively. Since 2008, he has been a senior scientist in the Electromagnetics Technology Branch at the U.S. Naval Research Laboratory in Washington DC. His current research interests

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include vacuum electron oscillator and amplifier sources at the millimeter and submillimeter wavelengths, and novel microfabrication techniques. In 2013, he was awarded the Dr. Delores M. Etter Top Scientists & Engineers for the Year Award for contributions to the U.S. Navy.

Dr. Joye is also CTO of a startup company, Gittler Instruments, LLC [[www.GittlerInstruments.com](http://www.GittlerInstruments.com)], devoted to bringing back the famed minimalist Gittler Guitar from the late 1970's, an original of which became the first musical instrument to be on display at the Museum of Modern Art in New York City, NY, and a second of which is in the Museum of Fine Arts in Boston, MA. He also developed the Plasma Tweeter, an omnidirectional high frequency sound point-source that has no moving parts but a corona discharge. He hopes to continue development soon and bring it to market.

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