

2019 12th German Microwave Conference (GeMiC 2019)

**Stuttgart, Germany
25-27 March 2019**



**IEEE Catalog Number: CFP1975F-POD
ISBN: 978-1-7281-0242-9**

**Copyright © 2019, IMA e.V.
All Rights Reserved**

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|-------------------------|-------------------|
| IEEE Catalog Number: | CFP1975F-POD |
| ISBN (Print-On-Demand): | 978-1-7281-0242-9 |
| ISBN (Online): | 978-3-9812668-9-4 |
| ISSN: | 2167-8022 |

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

SESSION LIST

- ❖ MO2a : Non-Planar Antenna Techniques
- ❖ MO2b : Electromagnetic Sensing and Material Characterization (SFB MARIE)
- ❖ MO3 : Opening Session & Keynotes 1+2
- ❖ PS1 : Poster Session 1
- ❖ MO4a : Wireless Communication Systems
- ❖ MO4b : Radar Signal Processing
- ❖ TU1a : Mixed-Signal IC and Microwave Integrated Oscillators
- ❖ TU1b : Phased-Array Front-End Concepts
- ❖ PS2 : Poster Session 2
- ❖ TU2 : Plenary Session: Keynotes 3+4
- ❖ TU3a : Application of Optical Components in Microwave Systems
- ❖ TU3b : Implementation Aspects of 5G Systems (Industrial Focus Session)
- ❖ TU4a : Planar Circuits, Transmission Lines, and Antennas
- ❖ TU4b : Short-Range Radar and FMCW Radar
- ❖ WE1a : Waveguide Components and Filters
- ❖ WE1b : Millimeter-Wave Integrated Circuits
- ❖ WE2a : Hybrid Amplifiers and Oscillators
- ❖ WE2b : Characterization and Modeling of Integrated-Circuit Components
- ❖ WE3 : Closing Session & Keynote 5

MO2a: Non-Planar Antenna Techniques

Chairs: Stefan Lindenmeier and Holger Maune

11:00 - 12:20, Monday, March 25, 2019, Schiller-Saal

| | |
|----------------------------|--|
| PAGE 1 MO2a-1 11:00 | Evaluation of Advantageous LTE MIMO Nefer Antennas in Real Test Drives and in a New Reproducible Half Virtual Test Drive <i>(M. Almarashli, S. Hastürkoğlu, S. Lindenmeier)</i> |
| PAGE 5 MO2a-2 11:20 | High RCS Passive Tag Based on Dielectric Resonator - 2D Lens Combination <i>(Ali Alhaj Abbas, Mohammed El-Absi, Ashraf Abuelhajja, Klaus Solbach, Thomas Kaiser)</i> |
| PAGE 9 MO2a-3 11:40 | Millimeter-Wave Leaky-Wave Antennas Based on Polymer Rod with Periodic Annular Metal Strips <i>(Utpal Dey, Julian Tonn, Jan Hesselbarth)</i> |
| PAGE 13 MO2a-4 12:00 | Fully Dielectric Rod Antenna Arrays with High Permittivity Materials <i>(Roland Reese, Henning Tesmer, Ersin Polat, Matthias Jost, Matthias Nickel, Rolf Jakoby, Holger Maune)</i> |

MO2b: Electromagnetic Sensing and Material Characterization (SFB MARIE)

Chairs: Andreas Rennings and Ilona Rolfes

11:00 - 12:20, Monday, March 25, 2019, Silcher-Saal

| | |
|----------------------------|---|
| PAGE 17 MO2b-1 11:00 | Triple-Barrier Resonant-Tunnelling Diode THz Detectors with On-Chip Antenna <i>(K. Arzi, S. Clochiatti, S. Suzuki, Andreas Rennings, Daniel Erni, N. Weimann, M. Asada, W. Prost)</i> |
| PAGE 20 MO2b-2 11:20 | Resonant Antenna Periodically Loaded with Series Capacitances for Enhanced Radiation Efficiency <i>(Benedikt Sievert, Daniel Erni, Andreas Rennings)</i> |
| PAGE 24 MO2b-3 11:40 | A Feed-Forward Control Based Method to Reduce the Settling Time of Phase-Locked Loops for Frequency Ramp Synthesis <i>(Lukas Polzin, Marcel van Delden, Thomas Musch)</i> |
| PAGE 28 MO2b-4 12:00 | Investigation on Optical Methods for Multi Scale Electromagnetic Simulations <i>(Steffen Vogt, Jochen Jebramcik, Orell Garten, Jan Barowski, Ilona Rolfes)</i> |

MO3 : Opening Session & Keynotes 1+2

Chair: Jan Hesselbarth

13:10 – 15:10, Monday, March 25, 2019, Schiller-Saal

| | |
|--------------|---|
| KEY-1 B#5 | The Evolving Landscape in Automotive Radars: Waveform, System Implementation, and IC Technologies <i>(Cicero Vaucher)</i> |
| KEY-2 B#5 | Chip-Scale Wave-Matter Interactions: New Frontier for RF-to-THz Integrated Sensors in Silicon <i>(Ruonan Han)</i> |

PS1 : Poster Session 1

Chair: Ning Yan Zhu

15:10 – 17:10, Monday, March 25, 2019, Foyer

| | |
|------------------|--|
| PAGE 32 PS1-1 | Antenna Selection Performance of Distributed Antenna Systems in Full-Duplex Indoor Base Station <i>(Nidal Zarifeh, Mai Alissa, Theo Kreul, Thomas Kaiser)</i> |
| PAGE 36 PS1-2 | Dual Band Metamaterial Power Divider with Improved Relative Bandwidth for LTE Applications <i>(Iulia Andreea Mocanu, Laura Manoliu)</i> |
| PAGE 40 PS1-3 | Comparison of Hybrid Beamforming Systems Using Phase Shifters and Switches <i>(Joerg Eisenbeis, Yueheng Li, Pablo Ramos López, Jan Fischer, Thomas Zwick)</i> |
| PAGE 44 PS1-4 | Figure of Merit for Beam-Steering Antennas <i>(Julio Gonzalez Marin, Jan Hesselbarth)</i> |
| PAGE 48 PS1-5 | A High Precision Reconfigurable Bistatic Interferometric Radar with Integrated Six-Port Receiver at 60GHz <i>(Matthias Voelkel, Sebastian Mann, Martin Frank, Robert Weigel, Amelie Hagelauer)</i> |
| PAGE 51 PS1-6 | A Compact Low-Loss Multilayer SIW Diplexer at K/Ka-Band <i>(Anton Sieganschin, Thomas Jaschke, Hans K. Mitto, Nadja J. Lamann, Jan Waldhelm, Arne F. Jacob)</i> |

MO4a: Wireless Communication Systems

Chairs: Rolf Jakoby and Thomas Zwick

15:40 – 17:40, Monday, March 25, 2019, Schiller-Saal

- PAGE 55
MO4a-1
15:40
- Numerical Investigation of the Impact of Array Orientations on Orbital Angular Momentum (OAM) Based Communication Using a Mixed-Mode Matrix**
(Lei Wang, Woocheon Park, Heinz-Dietrich Brüns, Dong Gun Kam, Christian Schuster)
- PAGE 59
MO4a-2
16:00
- A Novel Scheduling Technique for NOMA in 5G Wireless Communication Systems**
(Yasser Naquib Ahmed)
- PAGE 63
MO4a-3
16:20
- E-Band Simplex Wireless Data Transmission and Bandwidth-Dependent Performance Analysis Based on OFDM Signals**
(Seyyid M. Dilek, Eswara R. Bammidi, Ingmar Kallfass)
- PAGE 67
MO4a-5
17:00
- Compact and Wireless 2.5–5GHz Frequency Doubler for Harmonic RFID Applications**
(Paula Palacios, Mohamed Saeed, Ahmed Hamed, Renato Negra)
- PAGE 71
MO4a-6
17:20
- A Multi-Beam Direction- and Polarization-Agile mm-Wave Front-End for 5G Communications**
(Steffen Spira, Reiner S. Thomä, Matthias Hein)

MO4b: Radar Signal Processing

Chairs: Mario Pauli and Christian Waldschmidt

15:40 – 17:40, Monday, March 25, 2019, Silcher-Saal

- MO4b-1
15:40
B#5
- Typical Architectures of a Generic Radar Front-End for the Application in Automotive Sensors (Invited)**
(Ernst Weissbrodt)
- PAGE 75
MO4b-2
16:00
- Compressed Sensing Based Single Snapshot DoA Estimation for Sparse MIMO Radar Arrays**
(Fabian Roos, Philipp Hügler, Lizette Lorraine Tovar Torres, Christina Knill, Johannes Schlichenmaier, Claudia Vasanelli, Nils Appenrodt, Jürgen Dickmann, Christian Waldschmidt)
- PAGE 79
MO4b-3
16:20
- Extraction of Scattering Centers Using a 77GHz FMCW Radar**
(Sevda Abadpour, Axel Diewald, Mario Pauli, Thomas Zwick)
- PAGE 83
MO4b-4
16:40
- Predictive Quantization for Staggered Synthetic Aperture Radar**
(Nicola Gollin, Michele Martone, Michelangelo Villano, Paola Rizzoli, Gerhard Krieger)
- PAGE 87
MO4b-5
17:00
- Novel 4D 79GHz Radar Concept for Object Detection and Active Safety Applications**
(Gang Li, Yoke Leen Sit, Sarath Manchala, Tobias Kettner, Alicja Ossowska, Kevin Krupinski, Christian Sturm, Urs Lübbert)
- PAGE 91
MO4b-6
17:20
- Cooperative Target Detection in a Network of Single-Channel Radar Sensors**
(Maximilian Steiner, Karim S. Osman, Christian Waldschmidt)

TU1a: Mixed-Signal IC and Microwave Integrated Oscillators

Chairs: Manfred Berroth and Friedel Gerfers

8:30 – 10:30, Tuesday, March 26, 2019, Schiller-Saal

- PAGE 95
TU1a-1
08:30 **A Compact Resistive Quadrature Low Noise K_a -Band VCO SiGe HBT MMIC**
(Aleksy Dyskin, Sandrine Wagner, Ingmar Kallfass)
- PAGE 99
TU1a-2
08:50 **An Integrated VCO with Frequency Tripler in SiGe BiCMOS with a 1-dB Bandwidth from 22GHz to 32GHz for Multiband 5G Wireless Networks**
(Frank Herzel, Goran Panic, Johannes Borngräber, Dietmar Kissinger)
- PAGE 103
TU1a-3
09:10 **An Ultra-Wideband 3–23GHz VCO Array with High Continuous Tuning Range for FMCW Radar Application**
(Tom Drechsel, Niko Joram, Frank Ellinger)
- PAGE 107
TU1a-4
09:30 **A 0.2–18GHz Schmitt Trigger with up to 13%–85% Duty-Cycle Tuning in 130nm SiGe BiCMOS**
(Hatem Ghaleb, Yu Zhu, Corrado Carta, Frank Ellinger)
- PAGE 111
TU1a-5
09:50 **A 44fs RMS Jitter 6GHz Limiting Amplifier in 22nm CMOS FDSOI**
(Marcel Runge, Philipp Scholz, Friedel Gerfers)
- PAGE 115
TU1a-6
10:10 **Non-Linear PAM-4 VCSEL Equalization and 22nm SOI CMOS DAC for 112Gbit/s Data Transmission**
(Urs Hecht, Nikolay Ledentsov Jr., Philipp Scholz, Mikel Agustin, Patrick Schulz, Nikolay N. Ledentsov, Friedel Gerfers)

TU1b: Phased-Array Front-End Concepts

Chairs: Alexander Koelpin and Dirk Plettemeier

9:00 – 10:20, Tuesday, March 26, 2019, Silcher-Saal

- PAGE 119
TU1b-1
09:00 **Conformal Antennas for a Wide View Angle in Automotive Radar**
(Jonathan Mayer, Lukas Matter, Benjamin Nuss, Jerzy Kowalewski, Thomas Zwick)
- PAGE 123
TU1b-2
09:20 **Low-Cost Transmitarray Antenna Designs with $\pm 70^\circ$ Beam Steering Range in V-Band**
(Martin Frank, Fabian Lurz, Robert Weigel, Alexander Koelpin)
- PAGE 127
TU1b-3
09:40 **MIMO Antenna Array System with Integrated 16×16 Butler Matrix and Power Amplifiers for 28GHz Wireless Communication**
(Xiaozhou Wang, Martin Laabs, Dirk Plettemeier, Keishi Kosaka, Yasuhiko Matsunaga)
- PAGE 131
TU1b-4
10:00 **Class-G Supply Modulation for MIMO and Radar with Phased Array Antennas**
(Nikolai Wolff, Wolfgang Heinrich, Olof Bengtsson)

PS2 : Poster Session 2

Chair: Ning Yan Zhu

9:00 – 11:00, Tuesday, March 26, 2019, Foyer

- PAGE 135
PS2-1 **Design and Optimization of Mixers Using Load-Pull Analysis of Higher Order Intermodulation Products**
(Laura Manoliu, Christopher M. Grötsch, Ingmar Kallfass)
- PAGE 139
PS2-2 **Millimeter Wave Spectroscopy System for Blood Coagulation Measurements**
(G. Ulisse, S. Harder, Viktor Krozer)
- PAGE 142
PS2-3 **Design and Numerical Analysis of a Ka-Band Patch Antenna for Structural Health Monitoring Applications**
(Duy Hai Nguyen, Gernot Zimmer, Jochen Moll, Viktor Krozer)
- PAGE 146
PS2-4 **Numerical Analysis of Two-Dimensional Waveguide Patches for Surface Damage Detection**
(Jochen Moll)
- PAGE 150
PS2-5 **Novel Passive Calibration Method for Fully Polarimetric Near Field MIMO Imaging Radars**
(Georg Körner, Daniel Oppelt, Julian Adametz, Martin Vossiek)

TU2 : Plenary Session: Keynotes 3+4

Chair: Jan Hesselbarth

11:00 – 12:30, Tuesday, March 26, 2019, Schiller-Saal

- KEY-3
B#5 **Terahertz Communications at 300 GHz: Devices, Packages and System**
(Ho-Jin Song)
- KEY-4
B#5 **Dielectric Resonator Antennas: A Journey Through the Spectrum**
(Christophe Fumeaux)

TU3a: Application of Optical Components in Microwave Systems

Chairs: Joerg Schoebel and Andreas Stöhr

13:10 - 15:10, Tuesday, March 26, 2019, Schiller-Saal

| | |
|-----------------------------|---|
| TU3a-1 13:10 B#5 | Microwave Photonics (Invited) <i>(Thomas Schneider)</i> |
| PAGE 154 TU3a-2 13:30 | Optical Signal Generation and Distribution for Large Aperture Radar in Autonomous Driving <i>(Stefan Preussler, Fabian Schwartau, Joerg Schoebel, Thomas Schneider)</i> |
| PAGE 158 TU3a-3 13:50 | 2D mm-Wave Beam Steering via Optical True-Time Delay and Leaky-Wave Antennas <i>(Matthias Steeg, Peng Lu, Jonas Tebart, Andreas Stöhr)</i> |
| PAGE 162 TU3a-4 14:10 | Fully-Hermetic 71-86GHz WR12 Coherent Photonic Mixer Providing an RF Output Power up to +15dBm <i>(Beshar Khani, Sumer Makhlof, Jörg Lackmann, Andreas Steffan, Jörg Honecker, Andreas Stöhr)</i> |
| PAGE 166 TU3a-5 14:30 | Precise, High-Bandwidth Digital-to-Analog Conversion by Optical Sinc-Pulse Sequences <i>(Janosch Meier, Thomas Schneider)</i> |
| PAGE 170 TU3a-6 14:50 | Sinc-Shaped, Nyquist Channel Demultiplexing with Silicon Photonics <i>(Arijit Misra, Dvir Munk, Moshe Katzman, Stefan Preussler, Avi Zadok, Thomas Schneider)</i> |

TU3b: Implementation Aspects of 5G Systems (Industrial Focus Session)

Chairs: Jan Hesselbarth and Wolfgang Templ

13:10 - 15:10, Tuesday, March 26, 2019, Silcher-Saal

| | |
|------------------------|---|
| TU3b-1 13:10 B#5 | Future Cell Massive MIMO Research System for Future 5G Applications (Invited) <i>(D. Wiegner, W. Templ, T. Bohn, C. Haase, G. Kaltbeitzel, S. Wörner, P. Klose, S. Merk, J. Scherzinger, H. Schlesinger, S. Wesemann)</i> |
| TU3b-2 13:50 B#5 | Co-Simulating mm-Wave 5G Phased Array Antennas Together with Beamforming ICs for Optimum System Performance (Invited) <i>(R. Giacometti)</i> |
| TU3b-3 14:30 B#5 | 5G Technology, New Challenges and Solutions for Millimetre-Wave 'Over The Air' Testing (Invited) <i>(J. Borrill)</i> |

TU4a: Planar Circuits, Transmission Lines, and Antennas

Chairs: Wolfgang Heinrich and Arne F. Jacob

15:40 – 17:20, Tuesday, March 26, 2019, Schiller-Saal

| | |
|-----------------------------|---|
| PAGE 174 TU4a-1 15:40 | Wideband Out-of-Phase Power Divider with Large Power Division Ratios <i>(Seyed-Ali Malakooti, Marzieh Salarrahami, Christophe Fumeaux)</i> |
| PAGE 178 TU4a-2 16:00 | Crosstalk Effects of Differential Thin-Film Microstrip Lines in Multilayer Motherboards <i>(G.N. Phung, F.J. Schmückle, R. Doerner, T. Fritzsich, S. Schulz, Wolfgang Heinrich)</i> |
| PAGE 182 TU4a-3 16:20 | L-Band Antenna Array for Next Generation DLR Airborne SAR Sensor <i>(Diego Lorente, Markus Limbach, Bernd Gabler)</i> |
| PAGE 186 TU4a-4 16:40 | Optically Transparent Patch Antennas at 77GHz Using Meshed Aluminum <i>(Philipp Hügler, Mohamad Zaky, Michael Roos, Steffen Strehle, Christian Waldschmidt)</i> |
| PAGE 190 TU4a-5 17:00 | 76GHz Band Rat-Race Circuit Utilizing Composite Right-/Left-Handed Transmission Line without Chip Elements <i>(Ryoto Nakano, Tadashi Kawai, Akira Enokihara)</i> |

TU4b: Short-Range Radar and FMCW Radar

Chairs: Martin Vossiek and Thomas Walter

15:40 – 17:20, Tuesday, March 26, 2019, Silcher-Saal

| | |
|-----------------------------|--|
| PAGE 194 TU4b-1 15:40 | Modular Wideband High Angular Resolution 79GHz Radar System <i>(Fabian Schwartau, Stefan Preussler, Markus Krueckemeier, Florian Pfeiffer, Hannes Stuelzebach, Thomas Schneider, Joerg Schoebel)</i> |
| PAGE 198 TU4b-2 16:00 | A Radar Target Simulator Concept for Close-Range Targets with Micro-Doppler Signatures <i>(Johannes Iberle, Marc A. Mutschler, Philipp A. Scharf, Thomas Walter)</i> |
| PAGE 202 TU4b-3 16:20 | Simulation Method for Multiple Reflections in Near-Field Applications <i>(Mark A. Eberspächer)</i> |
| PAGE 206 TU4b-4 16:40 | Parametric Study of Time-Reversal Imaging for the Detection of Tumors in MRI-Derived Breast Phantoms <i>(Elham Norouzzadeh, Somayyeh Chamaani, Jochen Moll)</i> |
| PAGE 210 TU4b-5 17:00 | A Broadband UAV-Based FMCW GPR and the Influence of Vegetation <i>(Ralf Burr, Markus Schartel, Winfried Mayer, Thomas Walter, Christian Waldschmidt)</i> |

WE1a: Waveguide Components and Filters

Chairs: Martin Schneider and Klaus Solbach

8:30 – 9:50, Wednesday, March 27, 2019, Schiller-Saal

- PAGE 214
WE1a-1
08:30 **Realization of Folded W-Band Waveguide Filters with Additional Asymmetric Resonant Transmission Zeros**
(Daniel Miek, Michael Höft)
- PAGE 218
WE1a-2
08:50 **Low-Dispersive Transition from Circular Metallic to Circular Dielectric Waveguides at W-Band Frequencies**
(Andre Meyer, Kristina Krüger, Joshua Obermeyer, Martin Schneider)
- PAGE 222
WE1a-3
09:10 **Additive Manufacturing Developments for Satellite Antenna Applications from C- to Ka-Band**
(P. Kohl, M. Kilian, A. Schinagl-Weiß, C. Hartwanger)
- PAGE 226
WE1a-4
09:30 **Automated Generation of High-Order Modes for Tests of Quasi-Optical Systems of Gyrotrons for W7-X Stellarator**
(T. Ruess, K.A. Avramidis, G. Gantenbein, Z. Ioannidis, S. Illy, J. Jin, F.-C. Lutz, A. Marek, S. Ruess, T. Rzesnicki, M. Thumm, D. Wagner, J. Weggen, J. Jelonnek)

WE1b: Millimeter-Wave Integrated Circuits

Chairs: Michael Schlechtweg and Herbert Zirath

8:30 – 9:50, Wednesday, March 27, 2019, Silcher-Saal

- PAGE 229
WE1b-1
08:30 **60-GHz SiGe-BiCMOS Power Amplifier with 14.7dBm Output Power and 18dB Power Gain**
(Ali Ferchichi, Sami Ur Rehman, Corrado Carta, Frank Ellinger)
- PAGE 232
WE1b-2
08:50 **260GHz Broadband Power Amplifier MMIC**
(Benjamin Schoch, Axel Tessmann, Arnulf Leuther, Sandrine Wagner, Ingmar Kallfass)
- PAGE 236
WE1b-3
09:10 **An Active Gate-Pumped Transconductance Upconverter for Terahertz Frequencies**
(Christopher M. Grötsch, Sandrine Wagner, Ingmar Kallfass)
- PAGE 240
WE1b-4
09:30 **Continuous 360° Vector Modulator with Passive Phase Generation for 140GHz to 200GHz G-Band**
(Paul Stärke, Vincent Rieß, Corrado Carta, Frank Ellinger)

WE2a: Hybrid Amplifiers and Oscillators

Chairs: Renato Negra and Rüdiger Quay

10:20 – 11:40, Wednesday, March 27, 2019, Schiller-Saal

- PAGE 244
WE2a-1
10:20 **AlGaN/GaN High Electron-Mobility Varactors on Silicon Substrate**
(Raul Amirpour, Dirk Schwantuschke, Peter Brueckner, Ruediger Quay, Oliver Ambacher)
- PAGE 248
WE2a-2
10:40 **A Broadband and High-Efficiency Push-Pull Power Amplifier with Dual-Input and Planar Output Balun**
(Carsten Zang, Felix Auer, Michael Kamper)
- PAGE 252
WE2a-3
11:00 **1kW 13.56MHz Class-D¹ Power Stage with 90% Drain Efficiency**
(Zihui Zhang, Xuan Anh Nghiem, Renato Negra, Georg Boeck)
- PAGE 256
WE2a-4
11:20 **Design Approach for Compact Rotary Travelling-Wave Oscillator Based on Lumped Phase Shift Networks**
(Bhaskar Shivanna, Ahmed Hamed, Mohamed Saeed, Suramate Chalermwisutkul, Renato Negra)

WE2b: Characterization and Modeling of Integrated-Circuit Components

Chairs: Markus Groezing and Matthias Rudolph

10:20 – 11:20, Wednesday, March 27, 2019, Silcher-Saal

- PAGE 260
WE2b-1
10:20 **RF-Noise Model Extraction Procedure for Distributed Multiport Models**
(Felix Heinz, Dirk Schwantuschke, Matthias Ohlrogge, Arnulf Leuther, Oliver Ambacher)
- PAGE 264
WE2b-2
10:40 **On the Variation in Short-Open De-Embedded S-Parameter Measurement of SiGe HBT up to 500GHz**
(Chandan Yadav, Sebastien Fregonese, Marina Deng, Marco Cabbia, Magali De Matos, Thomas Zimmer)
- PAGE 268
WE2b-3
11:00 **Three-Port S-Parameter Based Characterization of Integrated Bridged-T-Coils**
(Oner Hanay, Jule Hulsmann, Renato Negra)
-

WE3: Closing Session & Keynote 5

Chair: Jascha Selbarth

11:50 – 1:00, Wednesday, March 27, 2019, Schiller-Saal

- KEY-5
B#5 **Title to be Announced**
(Heike Riel)