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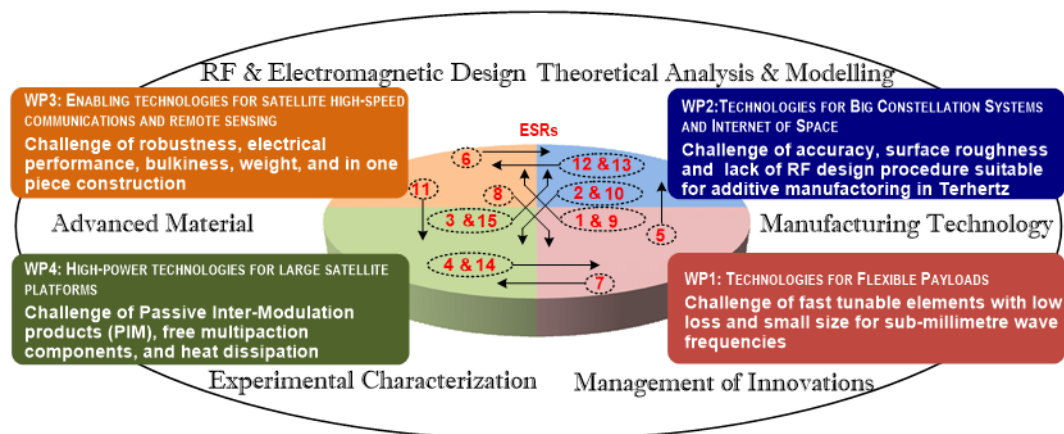
D8.4: Student Led TESLA meeting

Version: 0.2



D8.4 Student- led TESLA meeting

Agenda for One-day event (virtual): 9th Dec. 2021 (all times UK times)



Welcome and Introduction: 9:00 -9:10 General Chair: Luke Robins (ESR rep) , Adviser: Prof. Jason Hong <J.Hong@hw.ac.uk>

Session 1 (WP1 - Technologies for Flexible Payloads) 9:10 – 10:30

Chair/co-chair: El Mehdi Messaoudi/ Abdulrahman Widaa
Adviser: Prof. Michael Höft <Michael.Hoelt@tf.uni-kiel.de>
Speakers (20 min. each incl. Q/A): ESRs 1, 5, 7, 9

10-min break

Session 2 (WP2 -Technologies for Communications Systems and Internet of Space) 10:40 – 12:00

Chair/co-chair: Enrique López Oliver/ Abdul Sami
Adviser: Prof. Cristiano Tomassoni <cristiano.tomassoni@unipg.it>
Speakers (20 min. each incl. Q/A): ESRs 2, 10, 12, 13

1-hour break

Session 3 (WP3 – Enabling technologies for Satellite High Speed communications & Remote Sensing) 13:00 – 14:00

Chair/co-chair: Arash Arsanjani / Mohammad Mehrabi Gohari
Adviser(s): Prof. Joachim Oberhammer <joachimo@kth.se>/Dr. Oleksandr Glubokov <glubokov@kth.se>
Speakers (20 min. each incl. Q/A): ESRs 6, 8, 11

10-min break

Session 4 (WP4 – High Power technologies for Large Satellite Platforms) 14:10 – 15:30

Chair/co-chair: Elvira Saab Llatas / Jabir Hussain
Adviser: Prof. Vicente E. Boria Esbert <vboria@upv.edu.es>
Speakers (20 min. each incl. Q/A): ESRs 3, 4, 15,14

10-min break

Round-table (discussion) 15:40 – 16:00 Chair/co-chair: Abhishek Sharma / Chad Bartlett

Moderator: Abdul Rehman (TBC) ,Advisers: Prof. Miguel Angel Gómez Laso <mangel.gomez@unavarra.es, Prof. Nicolas Delhote <nicolas.delhote@xlim.fr>

Publicity: Yifang Wei / Armin Karimi / Bassel Youzkatli Adviser: Dr Teschl, Reinhard <reinhard.teschl@tugraz.at>

Session 1 (WP1 - Technologies for Flexible Payloads) 9:10 – 10:30

Chair/co-chair: El Mehdi Messaoudi/ Abdulrahman Widaa (TBC)

Advisor: Prof. Michael Höft <Michael.Hoeft@tf.uni-kiel.de>

Title: Beamforming Network Based on Active Phased Array
Name(s): <u>Yifang Wei (ESR1)</u> ; Professor Jiasheng Hong
Affiliation(s): Heriot-Watt University (HWU)
Abstract/Summary: This research project is about the MIMO beamforming system based on phase and gain controlled antenna array. The talk will highlight the research results about the feeding network, substrate-integrated coaxial-line (SICL)-to-waveguide transitions, waveguide antenna array and the beamforming system sample will be demonstrated.

Title: Novel technologies for miniaturized passive components with tuning capabilities
Name: <u>El Mehdi Messaoudi (ESR5)</u> ; Professors Jorge D. Martínez and Vicente E. Boria
Affiliation: ITEAM, Universitat Politècnica de València (UPV)
Abstract/Summary: The research project focuses on exploring novel planar/hybrid technologies for implementing miniaturized RF components and sub-systems with reconfiguration capabilities. The presentation will include the results of miniaturised filters in multilayer substrate integrated waveguide technology with tuning capabilities.

Title: Novel tunable components for satellite communication
Names: <u>Abdulrahman Widaa ESR7</u> , Michael Höft.
Affiliation: Kiel University (CAU)
Abstract/Summary: Tunable RF front-end components are playing key role in the next-generation flexible satellite payloads because of their significant advantages in comparison with the conventional fixed configurations. In the same context, the employment of high-Q, compact, and low-loss tunable filters with efficient tuning means becomes more and more essential. This talk will introduce different TM-mode DR filter tuning techniques for future satellite communication. The first results of the presented mechanisms/filters demonstrate many interesting advantages for future flexible satellites including compact size, wide tuning capabilities, simple configurations, and high quality factors.

Title: 3D MEMS devices for low loss, low weight reconfigurable satellites
Name(s): <u>Armin Karimi ESR9</u> , <u>Joachim Oberhammer</u> , <u>Oleksandr Globokov</u>
Affiliation(s): KTH Royal Institute of Technology
Abstract/Summary: This research project aims to develop novel switching and tuning concepts and mechanisms for satellite communication and remote sensing applications, enabling a new generation of miniaturized, low-weight, low-loss, frequency-agile reconfigurable systems. The applications include reconfigurable antennas, switchable filter banks, multiplexers, and to a more significant extent, any reconfigurable component in the system chain. The proposed components are compatible with the standard silicon micromachining process, which enables compact and integrable devices.

Session 2 (WP2 -Technologies for Communications Systems and Internet of Space) 10:40 – 12:00

Chair/co-chair: Enrique López Oliver/ Abdul Sami (TBC)

Adviser: Prof. Cristiano Tomassoni cristiano.tomassoni@unipg.it

Title: Relax Fabrication Tolerances in Rectangular Waveguide Filters
Names: <u>Abdul Sami (ESR2)</u> ; Professor Miguel Laso, Dr. Ivan Arregui
Affiliation: Public University of Navarre (UPNA)
Abstract/ Summary: The title of my thesis is microwave and millimeter-wave components aiming for simple fabrication. My talk will be focused on fabrication tolerances in waveguide filters. The usefulness of the filter structures with relaxed fabrication for the space industry and the methods to achieve such topologies will be discussed.

Title: Challenges and optimisation approach for LCM of a stepped impedance filter
Name(s): <u>Luke Robins ESR10</u> ; Reinhard Teschl
Affiliation(s): Graz University of Technology (TU Graz)
Abstract/Summary : The process-specific requirements and optimisation challenges of using Lithography-based Ceramics Manufacturing (LCM) to implement a stepped impedance are presented and discussed. A brief overview of the process will be provided, some initial experimental results discussed and final results after the implementation of test solutions presented.

Title: High performance miniaturized components for aerospace applications
Name: <u>Abdul Rehman ESR-12</u> , Supervisor: Prof. Cristiano Tomassoni
Affiliation: University of Perugia (UNIPG)
Abstract/Summary: This talk is about filter designs with wide spurious free range. Although filter size is not reduced itself, but indeed this will allow to realize light weight communication payload by avoiding the use of low pass filters. By applying proposed method for spurious suppression, filter designs using different technologies (waveguide TM cavity, Substrate integrated waveguide SIW)) will be discussed.

Title: Use of additive manufacturing (AM) for microwave components for space applications
Name(s): <u>Enrique López Oliver ER13</u> ; Professor Cristiano Tomassoni
Affiliation(s): University of Perugia (UNIPG)
Abstract/Summary (2-3 sentences): This project concerns the design of microwave filters for space applications made with additive manufacturing (AM) techniques. This talk will highlight the results of some 3D-printed waveguide filters, giving an idea of some of the current capabilities that can be achieved thanks to the flexibility that AM provides.

Session 3 (WP3 – Enabling technologies for Satellite High Speed communications & Remote Sensing) 13:00 – 14:00

Chair/co-chair: Arash Arsanjani / Mohammad Mehrabi Gohari (TBC)

Adviser(s): Prof. Joachim Oberhammer <joachimo@kth.se>/Dr. Oleksandr Glubokov
glubokov@kth.se

Title: Millimetre Hardware for the Next Generation of Satellite Communications
Name(s): <u>Chad Bartlett ESR6</u> , Michael Höft
Affiliation(s): Kiel University (CAU)
Abstract/Summary: By pushing forward the design aspects and manufacturability of microwave components in the higher frequency ranges, namely W-band (75 – 110 GHz) and beyond, new frequency-band allocations can be designated for up-coming radar, mobile communication and satellite systems. This presentation focusses on presenting state-of-the-art and recent research on advanced W-band waveguide filters. The small size and features require on the one hand high precision-manufacturing, while on the other hand, requires low geometrical complexity adapted to the design-rules of the intended technology to be used. Advanced configurations for the realization of multi-band solutions and the utilization of higher order modes for advanced performance will be discussed. Results of filters manufactured with high-precision CNC milling as well as SLA 3D-printing will be presented.

Title: Silicon micromachined high Q-factor millimeter- and submillimeter-wave filters
Name(s): <u>Mohammad Mehrabi Gohari (ESR8)</u> ; Oleksandr Glubokov; Joachim Oberhammer
Affiliation(s): Div. Micro and Nanosystems, KTH Royal Institute of Technology
Abstract/Summary: In this presentation, an approach to reduce the influence of underetching in silicon micromachined filters will be presented. Underetching is an unavoidable effect of the silicon micromachining fast-etching rate Bosch process that shifts the resonant frequency of cavities and changes the coupling coefficient between the resonators. The proposed method is employed to overcome drawbacks of the huge underetching in large cavities of W-band filters. In addition, a novel high Q-factor narrowband (0.5%) filter with a center frequency of 183GHz will be introduced.

Title: Design of mm-wave passive components in semi-planar technology
Name: <u>Arash Arsanjani ESR 11</u> ; Reinhard Teschl; Wolfgang Bösch
Affiliation: Graz University of Technology (TU Graz)
Abstract/Summary: The next generation of satellite telecommunication systems requires low-profile, low-cost, and high-performance components. The implementation of microwave components with the help of additive manufacturing might achieve some of these requirements. This presentation will cover the main challenges of the fabrication of semi-planar slow-wave microwave components with the help of additive manufacturing.

Session 4 (WP4 – High Power technologies for Large Satellite Platforms) 14:10 – 15:30

Chair/co-chair: Elvira Saab Llatas / Jabir Hussain (TBC)

Adviser: Prof. Vicente E. Boria Esbert <vboria@upv.edu.es>

Title: Design and fabrication of additively manufactured filter for high-power applications	
Name(s): <u>Jabir Hussain (ESR3)</u> ; Prof. Txema Lopetegi; Prof. Israel Arnedo Gil; Prof. Miguel A. G. Laso	
Affiliation(s):	Public University of Navarre (UPNA)
Abstract/Summary: The talk will focus on the design and fabrication of low pass filters, for high-power applications, in rectangular waveguide technology with smooth-profiled variations along its height. It will demonstrate the feasibility of the design technique to facilitate fabrication using additive manufacturing. It will also establish the high-power capability of the filter using multipactor breakdown analysis.	

Title: Reconfigurable Filters for High power satellite application	
Name(s): <u>Abhishek Sharma (ESR4)</u> , Santiago Cogollos Borrás, Vicente Enrique Boria, Marco Guglielmi	
Affiliation(s): ITEAM, Universitat Politècnica de València (UPV)	
Abstract/Summary: The concept of a Reconfigurable filter provides the feasibility to adapt numerous frequency range as per the system requirements. The presentation will be focused on the recently explored tuning topologies and will include the recent results of the filter prototype.	

Title: Multiphysics analyses for high power dielectric devices	
Name(s): <u>Bassel YOUZKATLI (ESR15)</u> ; Doctor Nicolas DELHOTE	
Affiliation(s): University of Limoges (UNILIM)	
Abstract/Summary (2-3 sentences): In the frame of the PhD project “Development of optimization tools for RF components position”, multiphysics analyses are realized on high power passive components such as dielectric resonator cavities and filters in order to assess and optimize their overall electromagnetic-thermal-structural performance thus defining the choice of dielectric materials to be selected for high power applications.	

Title: Developing AlN based materials for improving the RF payloads and RF technologies heat performances	
Name(s): <u>Elvira Saab-Llatas (ESR 14)</u> , Nicolas Pradeilles, Olivier Rapaud, Alexandre Maître	
Affiliations: IRCER-University of Limoges (UNILIM)	
Abstract/Summary: Thermal conductivity and dielectric loss tangent are key properties of materials that impact the RF payload performance. In this talk, we examine some of the intrinsic and extrinsic factors that impact the aforementioned properties in AlN-based materials. Experimental results of the effect of some of these factors (such as raw materials purity, additives and manufacturing process) on spark plasma sintered pellets will be presented.	