

Tuesday 1st June

14:00	DR REICHERT (ESRF) - DR JOHNSON (ILL)
14:30	E. Capria (ESRF) - C. Boudou (ILL)
15:00	Break
15:30	T. Buslaps (ESRF) - T. Pirling (ILL)
16:00	E. Boller (ESRF) - A. Tengattini (ILL)
16:30	V. Honkimäki (ESRF) - T. Hansen (ILL)
17:00	Break
17:15	Quizz and virtual visits
18:00	End of session

Wednesday 2nd June

9:30	LAURENT PAMBAGUIAN (ESA)
10:15	Gilles GAILLARD (CEA)
10:45	Break
11:15	Elena Lopez (Fraunhofer IWS)
11:45	Ben Dutton (MTC)
12:15	Antonio Periñán Butrón (CATEC)
12:45	Lunch
13:15	
13:45	
14:00	PETER LEE (UNIV. COLLEGE LONDON)
14:45	Katia Artzt (DLR)
15:15	Sandra Cabeza (ILL)
15:45	Break
16:15	Molly Probert (Univ. of Bristol)
16:45	Sofiane Terzi (Novitom)
17:15	Pierre Lhuissier (SIMaP)
17:45	End of session

Thursday 3rd June

JONATHAN CORMIER (ENSMA)	9:00
Nicolas Lammens (Siemens)	9:45
Manuel Poncela (ArcelorMittal)	10:15
Break	10:45
Jonàs Martínez (INRIA)	11:15
Vincent Robin (EDF)	11:45
JEAN-YVES ESCABASSE (CEA)	12:15
Lunch	12:45
	13:15
	13:45
Discussion groups	14:00
	14:45
	15:30
Concluding remarks & closure	15:45

-  Large Scale Instruments for AM industry
-  Industrial consolidation of AM technologies & standardization
-  New approaches and achievements on AM-characterization
-  Simulation, new models and Non-Destructive Investigations
-  European Programmes

LARGE SCALE INSTRUMENTS

FOR AM INDUSTRY

Tuesday 1st June

CHAIR PERSONS | INTRODUCTION - SANDRA CABEZA

14.00 **Welcome - MARK JOHNSON (ILL) & HARALD REICHERT (ESRF)**

14.30 **E. Capria (ESRF) - C. Boudou (ILL)**

Access advanced characterisation techniques at the European neutron and synchrotron light sources

15.00 Break

CHAIR PERSONS | ELENA LOPEZ (FHF)

15.30 **T. Buslaps (ESRF) - T. Pirling (ILL)**

Mechanical strain & stress: mapping from surface to bulk and dynamic measurements

16.00 **E. Boller (ESRF) - A. Tengattini (ILL)**

Unique features and complementarity of x-rays synchrotron and neutron imaging techniques

16.30 **V. Honkimäki (ESRF) - T. Hansen (ILL)**

When neutron and synchrotron x-rays diffraction reveals the evolving structure of materials

17.00 Break

17.15 **Quizz and virtual visits**

*Short quizz about ILL, ESRF and Grenoble (approx. 10 min) and the possibility to win a gift!
Virtual visits of ILL instruments SALSA (strain scanner) and NeXT (radiography/tomography).
Approx. 15 min
Virtual visit of ESRF instruments. Approx 15 min.*

18.00 **End of session**

INDUSTRIAL CONSOLIDATION OF AM TECHNOLOGIES & STANDARDIZATION

Wednesday 2nd June

CHAIR PERSONS | DAVID WIMPENY (MTC)

9.30 LAURENT PAMBAGUIAN (ESA)

From Additive to Advanced, an overview of the Space Industry manufacturing challenges

10.15 Gilles Gaillard (CEA)

HUB FAMERGIE: Additive Manufacturing for Energy Industry

10.45 Break

11.15 Elena Lopez (Fraunhofer IWS)

Quality Management in Additive Manufacturing – Latest developments at Additive Manufacturing Center Dresden

11.45 Ben Dutton (MTC)

AM Inspection Progress at the MTC

12.15 Antonio Periñán Butrón (CATEC)

Qualification for flight: Manufacturing of L-PBF brackets/supports belonging to the Secondary Structure of JUICE spacecraft

12.45 Lunch Break

NEW APPROACHES AND ACHIEVEMENTS ON AM-CHARACTERIZATION

Wednesday 2nd June

CHAIR PERSONS | LAURENT PAMBAGUIAN (ESA)

14.00 PETER LEE (UNIV. COLLEGE LONDON)

Quantifying dynamic phenomena during laser additive manufacturing using synchrotron imaging

14.45 Katia Artzt (German Aerospace Center -DLR)

Characterization methods for additive manufacturing: Influence of processing strategies on residual stresses, microstructure and defects in AM materials and components

15.15 Sandra Cabeza (ILL)

Neutron characterization towards safe structural application of AM components

15.45 Break

16.15 Molly Probert (Univ. of Bristol)

Mechanical properties in depth: in-situ stroboscopic measurements at SALSA

16.45 Sofiane Terzi (Novitom)

Assessing key microstructural and morphological features of AM parts using synchrotron tomography

17.15 Pierre Lhuissier (SIMaP)

Defects in metal additive manufacturing parts investigated by 4D imaging : genesis of formation and mechanical consequences

17.45 End of session

SIMULATION, NEW MODELS AND Non-DESTRUCTIVE INVESTIGATIONS

Thursday 3rd June

CHAIR PERSONS | GUILHEM ROUX (CEA)

9.00 JONATHAN CORMIER (ENSMA)

Creep and fatigue durability of Ni-based superalloys of processed by LPBF/LMD: application to Inconel 718, Waspaloy and René 65

9.45 Nicolas Lammens (Siemens)

Process-property-performance prediction for cradle-to-grave simulation of AM

10.15 Manuel Poncela (ArcelorMittal)

Residual stresses at steel SLM printed part, its distribution, mitigation and simulation

10.45 Break

11.15 Jonàs Martínez (INRIA)

Additive manufacturing of small-scale geometry with controllable elasticity

11.45 Vincent Robin (EDF)

Residual state induced by wire arc deposition : understand the origin, assess the distribution and predict the consequences

EUROPEAN PROGRAMMES

12.15 Jean-Yves Escabasse (CEA)

European programmes – Funding opportunities for academics and industry

12.45 Lunch Break

14.00 Discussion Groups

15.45 Concluding remarks & closure

Discussion Groups

How to share fundamental knowledge and how to join forces in order to tackle the most fundamental challenges in AM?

From micro to macro and fonctionnalisation?

From powder to a product in use?

– **MODERATORS** | FRANK BRÜKNER - BEN DUTTON - RANGGI RAMADHAN

Group A : Qualification and Standardization

– **MODERATOR** | HANNA LEEMREIZE - ENNIO CAPRIA - MOHAMED FARES SLIM

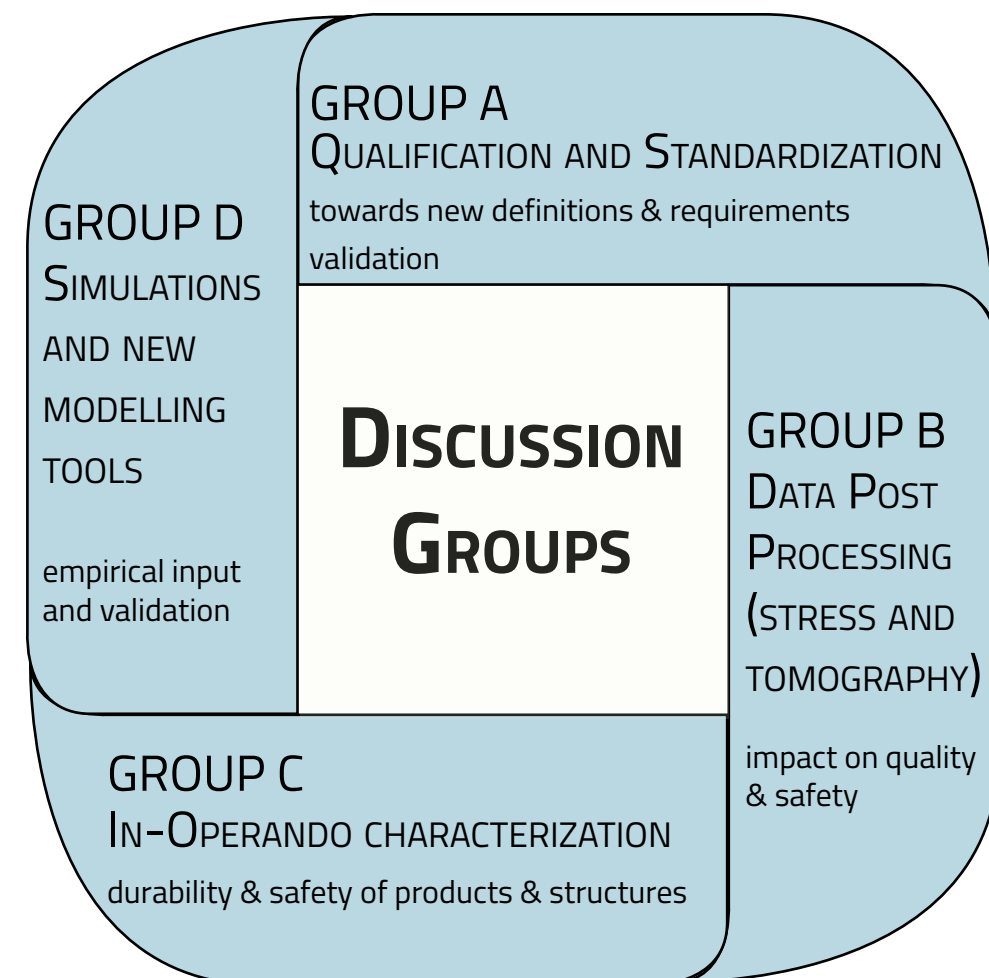
Group B : Data Post Processing (stress and tomography)

– **MODERATORS** | PETER LEE - SANDRA CABEZA - CARLOTTA GIACOBBE (ESRF)

Group C : In-Operando characterization

– **MODERATORS** | VINCENT ROBIN - JUAN MANUEL MARTINEZ - THILO PIRLING (ILL)

Group D : Simulations and new modelling tools



BIOGRAPHIES



KATIA ARTZT
RESEARCH ASSOCIATE AT THE GERMAN AEROSPACE CENTER



KATIA ARTZT | GERMAN AEROSPACE CENTER – INSTITUTE OF MATERIALS RESEARCH – RESEARCH GROUP MATERIALS DESIGN

Dr. Katia Artzt studied Material Science at the University of Stuttgart. In her PhD thesis she investigated oxide ceramic matrix composites at the Ruhr-Universität Bochum and the German Aerospace Center in Cologne. Since 2016 Dr. Artzt is focusing on metal additive manufacturing.

She has specialized in process-materials properties-performance relationships. With her thorough background in materials research and processing technology, Dr. Artzt aims to transfer the understanding from fundamental studies to complex additively manufactured components.



SANDRA CABEZA
CO-RESPONSIBLE SCIENTIST – SALSA DIFFRACTOMETER



SANDRA CABEZA | INSTITUT LAUE LANGEVIN

Dr. Sandra Cabeza Sanchez holds a PhD in Materials Science on Magnesium Powder Metallurgy, with a background as Aerospace Engineer specialised on structural materials. Currently she has been appointed as scientist at ILL Diffraction group as co-responsible of SALSA strain diffractometer, in close collaboration with the Industrial Liaison Unit.

For the past five years, Dr Cabeza has focused on the characterization of additive manufactured materials and their structural integrity, in particular at synchrotron and neutron sources, challenging established hypothesis and proposing the new generation of in-situ of experiments. She has leaded and contributed to ISO standards, European and industrial collaboration projects, together with the supervision of master and PhD students..

BIOGRAPHIES



JONATHAN CORMIER
ASSOCIATE PROFESSOR & RESEARCHER



JONATHAN CORMIER | ENSMA

Dr Jonathan Cormier completed his PhD thesis on the “Non-isothermal creep at high and very high temperature of the Ni-based single crystal superalloy MC2” in 2006, at ISAE-ENSMA - the National Higher French Institute of Aeronautics and Space. The following year, he becomes Associate professor at ISE-ENSMA, with lectures covering various topics such as Resistance of Materials, Creep, Experimental Analysis in Mechanics,

Mechanical Properties of Metallic Materials and High Temperature Materials. He’s the (co)author of 120 publications since 2005, including 89 articles in international peer-reviewed journals. He’s the laureate of several awards, lately acknowledged with the IMR Lee Hsun Young Scientist Award 2020. Dr Cormier is also the editor of the 'Metallurgical and Materials Transactions A' journal since September 2016.



BENJAMIN DUTTON
TECHNICAL SPECIALIST



BEN DUTTON | MTC

Dr Ben Dutton is a Technical Specialist at the MTC with 16 years’ experience in NDT. He possesses a valuable combination of academic and industrial experience with proven expertise in integrating design and manufacturing functions. His PhD was in laser ultrasound and EMAT’s (both non-contact ultrasonic methods) but through his professional career he has gained experience in most NDT methods (contact ultrasound including phased array, X-ray radiography and computed tomography, eddy current, thermography and shearography).

As a Technical Specialist at the MTC, he is leading projects where in-situ inspections are required for PBF, DED and laser welding. He is also very active in post build NDT inspection projects mainly for AM, and leads the quality for AM standards strategy at the MTC. He has been involved in projects in the following sectors: Aerospace, Space, Automotive, Transportation (Rail) and Medical. Project portfolio includes single client, MTC CRP (Core Research Program), UK government supported such as Innovate UK and European such as H2020. He is very actively leading and participating in the development several international NDT standards for AM. Finally, he is part of the ASTM AM Center of Excellence team at the MTC.

BIOGRAPHIES



JEAN-YVES ESCABASSE

PROGRAMME MANAGER 3D ARCHITECTURES



JEAN-YVES ESCABASSE | CEA

Jean-Yves Escabasse, Manager Funded Projects, 3D Architectures, studied chemistry in Bordeaux where he made his engineering diploma and thesis in chemistry. He has more than 35 years of experience in R&D and Innovation within several materials industry sectors, with positions held in companies and research institutes, and responsibilities in product and process development, team management, regulatory affairs, IPR issues, sales and marketing, large project management.

He has coordinated many multinational projects in FP7, H2020 and ERA-NET programmes, in particular, recently, the on-going FoF-08 project DIMOFAC "Digital Intelligent Modular Factories" (GA 870092). He is currently in charge of funded projects in the "3D Architectures" Team of CEA Liten.



GILLES GAILLARD

AM ENGINEER



GILLES GAILLARD | CEA

Gilles GAILLARD joined CEA in 2002. For the first ten years, he was in charge of projects in the field of nuclear energy, including developments of materials, processes and equipment in powder metallurgy and casting.

He then joined the CEA-Liten in 2015. His projects are now focused on metal additive manufacturing and mainly on the link between the process and the material properties (microstructure and mechanical properties).

BIOGRAPHIES



ANTONIO PERINAN BUTRON

HEAD OF ADDITIVE MANUFACTURING UNIT



ANTONIO PERIÑÁN BUTRÓN | CATEC

Bachelor in Mechanical Engineer by the University of Cadiz (2009) and M.Sc. in Product Design, University of Seville (2012). Performed his M.Sc. thesis for design and development of innovative assembly connectors at FADA-CATEC (2011). After that, Mr. Periñán has joined the M&P division with focus on design and fabrication for metal and thermoplastic fabrication processes by additive manufacturing technologies, especially for powder bed laser technologies for metals.

Also, Mr. Periñán is deeply involved in all related steps of the technology within the manufacturing chain including design and optimization, post processes like thermal modification, surface post-treatments, machining, quality issues, etc. He has also knowledge in NDT methods like X-ray computed tomography and industrial radiography, between others.



NICOLAS LAMMENS

RESEARCH ENGINEER



NICOLAS LAMMENS | SIEMENS DIGITAL INDUSTRIES SOFTWARE

Nicolas Lammens is currently a Research Engineer in the Additive Manufacturing RTD team of Siemens Digital Industries Software, where his main activities are focused towards development of AM-enhanced fatigue predictions. In its efforts to advance the state-of-the-art and deliver industry-ready solution to its partners, Siemens Digital Industries Software fosters strong national and international collaborations with academia.

Prior to joining Siemens, Nicolas held a post-doctoral position at Ghent University, investigating AM polymer fatigue for bio-medical applications subsequent to obtaining a PhD degree in materials science for research on optical fiber sensing for structural health monitoring..

BIOGRAPHIES



PETER LEE

PROFESSOR OF MATERIALS SCIENCE



PETER LEE | UNIVERSITY COLLEGE LONDON

Peter holds the Royal Academy of Engineering Chair in the Emerging Technology of Additive Manufacturing. He is a Professor of Materials Science at University College London, but his group is based at the Research Complex at Harwell, where the UK’s Synchrotron, Neutron and Laser sources are located. His research focusses on the computational simulation and X-ray imaging of materials at a microstructural level. He was one of the pioneers of multi-scale and through process modelling (now termed ICME), working at Alcan on the prediction of defects in light alloy components for companies such as Ford and Rolls-Royce.

Peter is an avid experimentalist, developing nano-precision rigs that replicate the processing and service performance of materials on synchrotron beamlines, enabling us to see inside materials in 3D as they change in time. He has developed a series of additive manufacturing machines (both powder bed and Directed Energy Deposition blown powder) that work on synchrotron beamlines at Diamond Light Source, ESRF and APS. His work is revealing how microstructures evolve in processes ranging from additive manufacturing to volcanic eruptions. His experimental techniques and open-source codes have been exploited internationally by aerospace, automotive, energy and biomedical companies to solve important engineering challenges – from developing additive manufactured human joint replacements to aerospace components.



PIERRE LHUISSIER

RESEARCHER



PIERRE LHUISSIER | SIMAP - CNRS - UNIV. GRENOBLE ALPES

Researcher of the CNRS in the laboratory of Science and Engineering of Materials and Processes (SIMAP) of University Grenoble Alpes, my research is mainly focused on elaboration and hot forming of light alloys and on architected materials mechanical properties. I operate intensively in situ and operando characterisation by micro/nano-tomography or SEM/EBSD to disclose the underlying mechanisms.

As a consequence, I conduct developments on data acquisition procedures, sample environments and data treatments (images analysis, digital volume correlation, features evolution...). I also use powder bed fusion additive manufacturing (EBM and SLM) to elaborate architected materials and especially lattice structures in which I investigate the relationships between building parameters, defect magnitude, local deformation and mechanical properties.

BIOGRAPHIES



ELENA LOPEZ

HEAD OF DEPARTMENT AT THE ADDITIVE MANUFACTURING CENTER DRESDEN



ELENA LOPEZ | FRAUNHOFER IWS

Dra. Elena Lopez studied chemical engineering at the Universidad de Valladolid and Friedrich-Alexander-Universität Erlangen-Nürnberg. She finished her PhD thesis about the topic of plasmachemical etching of silicon solar wafers at the Technische Universität Dresden.

After focusing on CVD technologies, she moved to Printing and Additive Manufacturing technologies in 2014. She is the Head of Department for Additive Manufacturing at the Additive Manufacturing Center Dresden (AMCD) at Fraunhofer IWS. Nowadays she leads a big consortium named Agent-3D with more than 100 companies involved.



JONÀS MARTÍNEZ

JUNIOR RESEARCHER



JONÀS MARTÍNEZ | INRIA

Jonàs Martínez is a junior researcher at INRIA (France). He received a Ph.D. degree from Universitat Politècnica de Catalunya in 2013, and was awarded an ERCIM postdoctoral fellowship.

His current recent research lies at the intersection between Additive Manufacturing (AM), computational geometry, and computer graphics, with an emphasis on the study of random geometry with applications in AM..

BIOGRAPHIES



LAURENT PAMBAGUIAN

ENGINEER - MATERIALS AND PROCESSES SECTION



LAURENT PAMBAGUIAN | EUROPEAN SPACE AGENCY - MECHANICAL DEPARTMENT

Dr. Laurent Pambaguan received a PhD on “Mechanical behaviour of interfaces in Metal Matrix Composites” in 1994 from ONERA, The French Aeronautic Lab. He did two post docs in Spain on heterogeneous deformation of aluminium alloys and in Austria on metal matrix composites.

In 1999 he has been recruited as Engineer in the Materials and Processes Section of the European Space Agency and focussed on addressing the development of advanced materials and processes for the future ESA missions. He has been the first to develop Additive Manufacturing Technologies at ESA and is expanding his expertise on this topic since 2004.



MOLLY PROBERT

MECHANICAL ENGINEERING (PHD)



MOLLY PROBERT | UNIVERSITY OF BRISTOL

Currently studying for a PhD with the Solid Mechanics Research Group at the University of Bristol. My main area of research has focused on the effects of residual stress on crack propagation and subsequent fracture in elastic plastic materials.

During the course of my research I have been involved in a variety of neutron diffraction experiments to characterise stress fields in metallic specimens subject to residual stressed during fatigue cracking and fracture.

BIOGRAPHIES



VINCENT ROBIN

EXPERT RESEARCH ENGINEER



VINCENT ROBIN | EDF

Since 2016, Vincent ROBIN is an expert research engineer working for different projects related to manufacturing and repair for nuclear power plant equipment at EDF Group Research Center. These research activities concern the understanding of physical phenomena involved during material processing and the assessment of consequences on equipment fitness for service. Material characterization, process monitoring and simulation of manufacturing processes are the main topics of interest applied to : ingot casting, forging and heat treatment, arc welding and repair, additive manufacturing and surfacic mitigation processes. Vincent ROBIN is a graduated engineer in mechanical engineering since 1998. He obtained a PhD in 2009. This R&D work was prepared at the same time than its professional activity which started in 1998.

The title of the thesis is “From the numerical modeling of manufacturing processes and welding in particular to the mechanical behavior of weldments”. After ten year of working in the field of scientific software development for manufacturing process and fracture mechanics simulation at ESI Group within the framework of R&D projects and industrial studies for different part of the industry (nuclear power, transportation, defense...), he decided to work more intensively for the nuclear industry. Since 2008 he has been working for Framatome (formerly AREVA Nuclear Power) in the mechanical engineering department as a numerical simulation specialist. He was expert in the manufacturing domain and in charge of R&D projects in the field of fabrication (e.g. welding, machining, additive manufacturing...), fracture mechanics and materials. In 2016, he has joined EDF Group Research Center as an expert research engineer working for different projects related to manufacturing and repair for nuclear power plant..

BIOGRAPHIES



MANUEL SÁNCHEZ PONCELA

R&D ENGINEER



MANUEL SÁNCHEZ PONCELA | ARCELORMITTAL GLOBAL R&D

Currently working at the Additive Manufacturing department of ArcelorMittal Global R&D (Asturias, ES). My research is focused on studying steel microscopic and macroscopic behavior during 3D printing at different technologies and post-processing for tuning the microstructure and mitigate residual stresses inherent to the fabrication process.

I am an industrial engineer by the Polytechnic Schools of Gijón (ES) and Grenoble INP (FR), with a further specialization in material science by LMU and TUM universities (Munich, GR). Before joining ArcelorMittal, I have been working at CEA Cadarache: studying the relaxation cracking with numerical simulation of austenitic steel welding and FRM II as data analyst of residual stresses in welding.



SOFIANE TERZI

MATERIALS ENGINEER



SOFIANE TERZI | NOVITOM

Sofiane Terzi holds a Ph.D. in Metallurgy obtained at the French Alternative Energies and Atomic Energy Commission (CEA) and INP Toulouse on mechanical behaviour at high temperature of Nickel-based alloys. He has over 10 years of experience as scientific researcher working successively at the SIMAP laboratory, the University of Queensland and the European Space Agency in the field of Metallurgy.

His main area of expertise concerns the solidification of light alloys including in-situ experiments on tomography beamlines at ESRF. He was also involved in one of the early major European projects focused on Additive Manufacturing (AMAZE) of metallic materials where his principal input was on the understanding of mechanical properties of AM materials. He is currently the technical manager of the material and process 3D characterisation activity at Novitom.