DOCUMENT 2

### Recruitment strategy #§RSK-MGT-RM§#

The Recruitment and Gender Aspects Committee (RGA) will be responsible for ensuring fair and equal recruitment and hiring practices. Dr. F. De Domenico, chair of the committee, will organize the Online Course *Gender equality in recruitment and career progression* (M1). The RGA, in collaboration with the PC, will also address any misconduct-related issues, if necessary. The goal is to finalize the recruitment of all DCs by M6. This involves initiating the preparation of the DC descriptions for vacancies during the Grant Agreement negotiation phase. An open and transparent recruitment process will be established in accordance with the relevant EU Code of Conduct. The project aims to attract talented researchers from applied mathematics, applied physics, and engineering sciences. The initial recruitment source includes students at academic beneficiaries and associated partners, who will be encouraged to apply for positions at other beneficiaries, following the mobility rules for MSC Actions. Vacancy announcements will be posted on web portals, social network profiles (LinkedIn), and recruitment websites such as EURAXESS Researchers in Motion. Partners will circulate the advertisements to their international contacts, and vacancies will also be featured on relevant professional and engineering institution websites, such as the local sections of the Combustion Institute, ASME, AIAA, ETN, IAHE. The selection process will be transparent and open, leveraging support from RGA members to assist local representatives in defining the shortlist and arranging interviews, whether in person or via videoconferences. The criteria and methodology for ranking the shortlist entries and documenting interview results will adhere to employment law. When feasible, both academic and non-academic key individuals will participate in the selection process.

**5. Network organization**

As reported in Part-B1, the structure of the HyNOISE project is based on 7 WPs (Fig. 1). The proposed management for the HyNOISE programme is based on a horizontal organization structure, which will reduce the number of intermediate decision steps, making the management lean and efficient. Structure of the network organization is reported in Fig. 4. The Supervisory Board (SB) chaired by the Project Coordinator (PC), i.e., Prof. Davide Laera from POLIBA, contains several smaller committees. Each committee is responsible for organizing and enlisting the participation of the other network members to complete their objectives.

Financial Managementwill be primarily supported by the administrative staff of the project coordinator organization (POLIBA), that will operate the monitoring and reporting to the European Commission. The budgets of beneficiaries will be managed locally with the support of local dedicated teams that ensure the compliance with European Commission rules. Each local financial controller will be in direct contact with the PC’s financial team. The PC will then report to the SB, where the formal approval of the submission of the financial returns to the EU Commission will be taken. This includes any modifications due to unexpected and unforeseen changes in the researcher training activities.

**6. Supervisory board**

A Supervisory Board (SB) composed by the Scientist in Charge for each of the 12 beneficiaries is established. The main goal of the SB will be to ensure successful execution of the project in its main pillars: financial administration, recruiting, scientific/research, training, and dissemination. The SB will meet twice a year and will be chaired by the Project Coordinator (PC), Prof. Davide Laera (POLIBA). To limit travels, PC meetings will be virtual or synchronized with a training event. The PC will be responsible for all administrative aspects, the negotiation of the Grant with the European Commission and the overall financial management with the support of the dedicated staff at POLIBA. The experience maturated in the participation to EU projects and several national/regional projects is a warranty for the successful management of HyNOISE. In the following table, Supervisor and Co-supervisor of each DC is summarized. A representative of each of the 12 beneficiaries will be part of the Supervisory board.

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| **Doctoral Researcher** | **Main Supervisor** | **Gender** | **Co-supervisor** | **Gender** |
| DC1 | Prof. Thierry Schuller | M | Dr. Hyebink Kang | F |
| DC2 | Prof. Antoine Renaud | M | Prof. Sebastien Candel, Dr. Daniel Durox,Prof. Ronan Vicquelin | M, M, M |
| DC3 | Dr. Laurent Gicquel | M | Dr. Thierry Poinsot | M |
| DC4 | Prof. Artur Tyliszczak | M | Dr. Agnieszka Wawrzak | F |
| DC5 | Prof. James Dawson | M | Prof. Nicholas Worth | M |
| DC6 | Prof. Christian Oliver Paschereit | M | Prof. Alessandro Orchini | M |
| DC7 | Dr. Carmen Jimenez | F | Dr. Vadim Kurdyumov, Dr. Daniel Fernández Galisteo | M, M |
| DC8 | Dr. Andrea Gruber | M | Prof. James Dawson | M |
| DC9 | Prof. Davide Laera | M | Prof. Sergio Mario Camporeale | M |
| DC10 | Prof. Kilian Oberleithner | M | Dr. Thomas Kaiser | M |
| DC11 | Prof. Sergio Mario Camporeale | M | Prof. Davide Laera | M |
| DC12 | Prof. Matthew Juniper | M | - | - |
| DC13 | Dr. Francesca de Domenico | F | Prof. Arvind Gangoli Rao | M |
| DC14 | Dr. Lionel Hirschberg | M | Dr. Philip Ströer | M |
| DC15 | Prof. Wolfgang Polifke | M | Dr. habil. Camilo Silva | M |

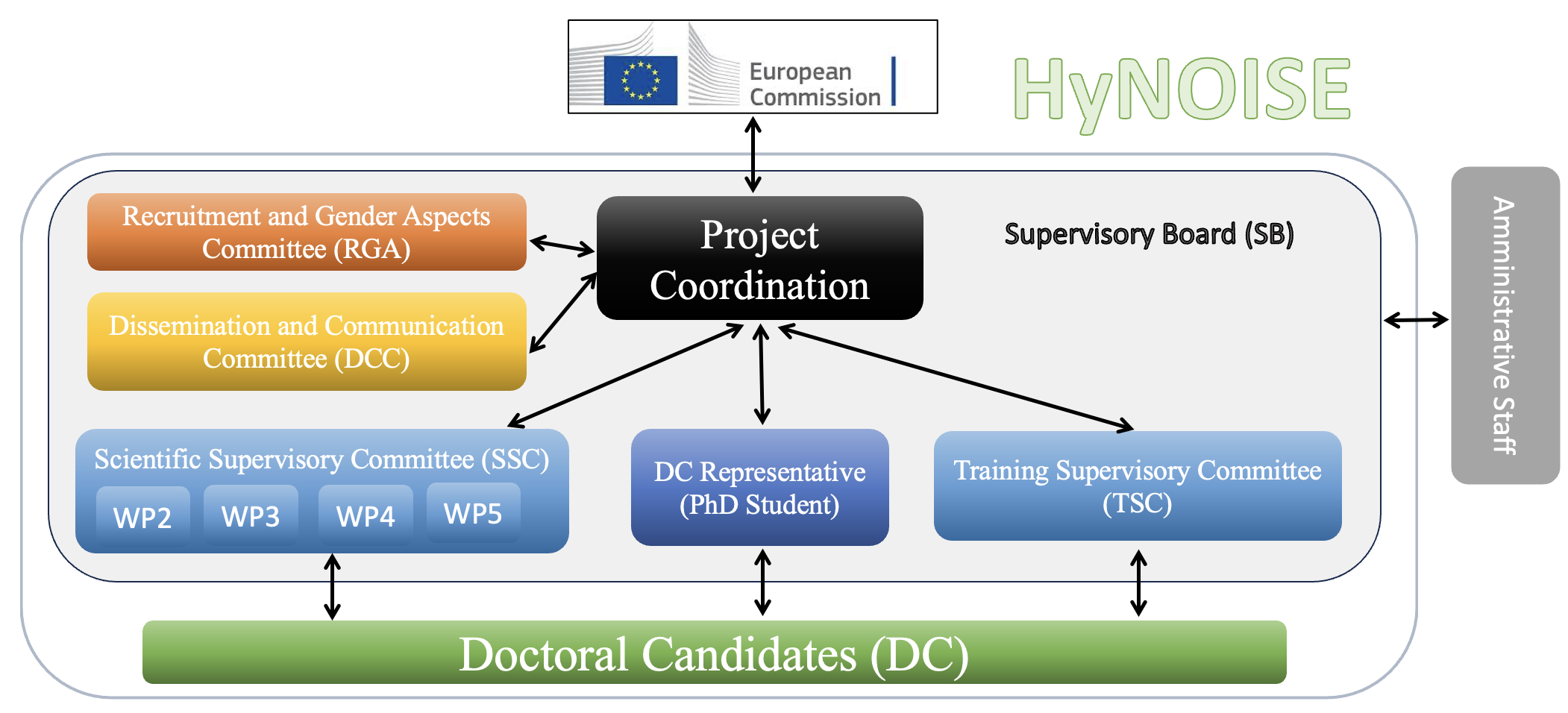


Fig. 4 - HyNOISE network organization

Important contribution to coordination and project management will arrive by Prof. Thierry Schuller (INPT) in charge as Chair of Training Supervisory Committee, supporting PC in the management of the training activities of the DCs (Courses, Workshops, Programmes). Dr. Francesca De Domenico (TU Delft) will act as Chair of the Recruiting and Gender Aspects Committee, thus ensuring a gender balanced mix of DCs, while Prof. Matthew Juniper (UCAM) will chair the Dissemination and Communication Committee (DCC). DCs will nominate a representative who will participate to SB meetings and will take care to report DCs requests about training and research, as well as to return to DCs the decisions taken by the SB. The primary tasks of the SB will be administered by the four committees outlined below:

The Scientific Supervisory Committee (SSC) will be responsible for the oversight, on-time completion, and coordination of the scientific work from the DCs. This will be chaired by PC and will be composed by representative of each WP leader, i.e., POLIBA, CNRS, TUB, CERFACS, to facilitate discussions among project components, ensure the highest quality research, and monitor the progress.

The Recruitment and Gender Aspects Committee (RGA) will be responsible for ensuring fair and equal recruitment and hiring practices. Dr. F. De Domenico, chair of the committee, will organize the Online Course *Gender equality in recruitment and career progression* (M1). The RGA, in conjunction with the PC, will also address any issues related to misconduct, should this be necessary.

The Training Supervisory Committee (TSC) will be responsible for monitoring and delegating the training activities. The committee will be composed of at least four members. The TSC will assist the local host for each event in the coordination and communication within the network and will endeavour to maximize the scheduling and timing efficiency of training events.

The Dissemination and Communication Committee (DCC) will be responsible for coordinating and enlisting the networks external communication activities. The DCC will be composed of both at least three members of the SB, as well as at least two DC members. The DCC will coordinate the network webpage and other web presence activities as described in Section 2. It will be responsible for coordinating any IPR issues and any necessary internal communication to the network regarding these issues. Lastly, they will coordinate the preparation of periodic reports of network progress (both internally and externally).

**7. Environmental aspects in light of the MSCA Green Charter**

Coherently with main objectives of the research, aimed at investigating physical processes to further limit environmental impact of thermal engines through the efficient use of hydrogen as fuel, HyNOISE partners will be strongly committed to respect the MSCA Green Charter. Two main routes will be followed acting on (i) a project level and on (ii) a partner level.

At the project level, the main goal will be to encourage PhD student’s mobility, to take advantage from the network opportunities, while ensuring at the same time the minimization of related environmental footprint. This will be achieved, for instance, by giving the priority to DCs for the in-person participation to project meetings and of course training, offering to permanent staff the chance to attend events virtually. Except in special cases, only one permanent researcher per partner will physically participate each project meeting, promoting the use of teleconferencing tools along with interactive meeting tools for remote people. The meeting organizations will follow low environmental footprint principles, encouraging sustainable forms of transportation and promoting meeting places with direct connections. Special care will be given to accommodation and catering, minimizing waste and garbage (promoting recyclable or biodegradable solutions). Furthermore, a choice of the HyNOISE consortium members is to concentrate all the in-person workshops in fewer but longer training events, conceived to find the right balance between sustainability and high-quality training (Section 2.3). With all these actions, travels within the project will be limited but more effective. To promote the development of greater awareness on environment sustainability and climate impact of human activities, multiple trainings will be organized within the consortium, e.g., the one lead by POLIBA on how to assess the carbon footprint of each PhD.

Regarding the actions at the partner level, the DC will develop awareness on the environmental impact of their work, including the use of experimental resources, the electricity consumption of test benches and HPC architecture in a view to control and optimize the waste of consumed resources. Moreover, each partner commits in informing students about the low-carbon emission travel usages both for home to work and professional travels. The main but not exhaustive points are to prefer train over planes for short to moderate length travels and promote active mobility for commuting home to work. Priority will be given to students for the participation to workshops and conferences, for them to meet the scientific communities and promote themselves. Finally, for working meetings, the partners will promote teleconferencing and collaborative tools to remotely exchange and work with other partners.

**8. Participating Organizations**

For **beneficiaries**:

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| **Beneficiary Legal Name: INSTITUT NATIONAL POLYTECHNIQUE DE TOULOUSE (INPT)** | |
| **General Description** | The Institut de Mécanique des Fluides de Toulouse (IMFT) is a joint research unit (UMR 5502) under the supervision of INP Toulouse (INPT), CNRS and Paul Sabatier University. Research activities in fluid mechanics are conducted on physical models or by numerical simulations through dissertations or research contracts signed with various public or private partners. They have implications in the fields of transport, energy, processes, environment, and health. Research topics include transient and turbulent single-phase flows, the study of porous media, hydrology, geophysical flows and environmental engineering, multiphase flows and/or reactive flows. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Dr. Thierry Schuller** has more than 20 years expertise in combustion dynamics and combustion noise. He has been awarded an ERC Advanced Grant on hydrogen combustion (2023-2028). Has already supervised more than 25 PhDs and has more than 100 publications in peer reviewed journals.  **Dr. Hyebink Kang** holds a PhD from KAIST in experimental analysis of thermo-acoustic instabilities with hydrogen flames. She will co-supervise the PhD candidate on experiments in the MIRADAS test bench. |
| **Key Research Facilities, Infrastructure and Equipment** | The MIRADAS test bench equipped with the HYLON burner will be made available for the duration of the project. The setup is equipped with large optical access for flame visualization and laser diagnostics for flow characterization [Oztarlik et al. Combustion and Flame (2019), Aniello et al. Combustion and Flame (2023)]. It is also instrumented with a series of microphones along the setup and loudspeakers on the upstream side and downstream side for acoustic forcing. The test rig will be equipped with an upstream tunable acoustic boundary condition during the project. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by INPT. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | ERC-2012-ADG\_20120216 – “INTECOCIS” |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | Thierry Schuller is the PI of SELECT-H (ERC-2022-ADG / 101097984). He is work package leader in ICHARUS (HORIZON-MSCA-2022-DN-01-01 / 101120321). He is subtask leader in HESTIA (HORIZON-CL5-2021-D5-01-05 / 101056865). ERC-2023-SYG HYROPE. |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. S. Candel, D. Durox, S. Ducruix, A.L. Birbaud, N. Noiray and T. Schuller, Flame dynamics and combustion noise: progress and challenges, International Journal of Aeroacoustics (2009), 8:1-56 2. S. Ducruix, T. Schuller, D. Durox, S. Candel, Combustion dynamics and instabilities: Elementary coupling and driving mechanisms, Journal of Propulsion and Power (2003) 19: 722-734 3. A. Scarpato, N. Tran, S. Ducruix, T. Schuller, Modeling the damping properties of perforated screens traversed by a bias flow and backed by a cavity at low Strouhal number, Journal of Sound and Vibration (2012) 331:276-290 4. M. Merk, W. Polifke, R. Gaudron, M. Gatti, C. Mirat, T. Schuller, Measurement and simulation of combustion noise and dynamics of a confined swirl flame, AIAA Journal (2018) 56:1930-1942 5. T. Yahou, J.R. Dawson, T. Schuller, Impact of chamber back pressure on the ignition dynamics of hydrogen enriched premixed flames, Proceedings of the Combustion Institute (2023) 39: 4641-4650 |

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| **Beneficiary Legal Name: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)** | |
| **General Description** | The EM2C (Energétique, Moléculaire et Macroscopique, Combustion) is a laboratory of the CNRS located in CentraleSupélec (CS), which is part of the Université Paris-Saclay. It comprises about 100 people and focuses on the topics of combustion, plasmas, and heat and mass transfer. The team involved in the project is the combustion dynamics team created under the impulse of Prof. Sébastien Candel, renowned expert in the field of combustion instabilities. The team’s efforts focus on the experimental analysis and the reduced-order modelling of flame and combustor dynamics in configurations that are relevant for the fields of aerospace and energy production. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Antoine Renaud**, Assistant professor at CS specializing in combustion dynamics with a focus on aeronautics and energy applications,  **Prof. Sébastien Candel**, University professor emeritus, former president of the French Academy of Sciences, foreign member of the National Academy of Engineering of the United States. Has a broad experience in combustion, flame structures, turbulent combustion, cryogenic combustion, combustion dynamics and control, combustion instabilities, applications to energy and propulsion. Broad experience in aeroacoustics. Has authored or co-authored more than 230 articles. Trained a large number of students in aerospace sciences and engineering. Supervised 64 PhD students, currently co-supervising 2 PhDs. https://em2c.centralesupelec.fr/en/Sebastien\_Candel  **Dr. Daniel Durox**, Consulting engineer, former research engineer at CNRS, specialist in combustion, flame stabilization, thermo-acoustic instabilities, optical diagnostics, creation of combustion benches. He is author or co-author of more than 140 publications.  **Prof. Ronan Vicquelin**, Professor at CentraleSupélec, specialized in high-fidelity simulations and modelling of turbulent reactive flows. |
| **Key Research Facilities, Infrastructure and Equipment** | The X-ICCA platform is composed of three rigs called SICCA, TICCA and MICCA that share the same model of injection unit. This allows comparison between different boundary conditions as well as a relevant basis to measure flame describing functions and apply them to predict the instabilities in a full annular configuration. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by CS. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | The research team has been involved in several EU Research projects related to combustion dynamics. The most recent is the Innovative Training Network of the Marie Skłodowska-Curie Actions MSCA-2017-ITN Annulight. One ESR was enrolled at CS to work on azimuthal instabilities in MICCA-Spray, the liquid fuelled version of MICCA. |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | HORIZON-CL5-2021-D5-01-05 / 101056865 HESTIA |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Bourgouin, J. F., Durox, D., Schuller, T., Beaunier, J., & Candel, S. (2013). Ignition dynamics of an annular combustor equipped with multiple swirling injectors. Combustion and Flame, 160(8), 1398-1413. 2. Vignat, G., Durox, D., Renaud, A., & Candel, S. (2020). High amplitude combustion instabilities in an annular combustor inducing pressure field deformation and flame blow off. Journal of Engineering for Gas Turbines and Power, 142(1), 011016. 3. **Latour, V., Durox, D., Renaud, A. and Candel, S.** (2024) Experiments on symmetry breaking azimuthal combustion instabilities and their analysis combining acoustic energy balance and flame describing functions. *Journal of Fluid Mechanics*, 985, A31. 4. Rajendram Soundararajan, P., Durox, D., Renaud, A., & Candel, S. (2022). Azimuthal instabilities of an annular combustor with different swirling injectors. Journal of Engineering for Gas Turbines and Power, 144(11), 111018. 5. [5] Vaysse, N., Durox, D., Vicquelin, R., Candel, S. and Renaud, A. (2024) Analysis of thermo-acoustic instabilities induced by hydrogen swirling flames. Proceedings of ASME Turbo Expo 2024, ASME Paper GT2024-123877. |

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| **Beneficiary Legal Name: CENTRE EUROPEEN DE RECHERCHE ET DEFORMATION AVANCEE EN CALCUL SCIENTIFIQUE (CERFACS)** | |
| **General Description** | CERFACS is a research organization, supported by 7 shareholders (AIRBUS, CNES, EDF, Météo-France, ONERA, SAFRAN, TOTAL Energies) that aims to develop advanced methods for the numerical simulation of large scientific and technological problems of interest for research as well as industry. The main field of application of the CFD team is DNS and LES of unsteady compressible multiphase reacting turbulent flows in complex geometries, based on High Performance Computing. CERFACS has taken part in more than 30 French National projects and 15 European projects. CERFACS possesses its own computational machines and is used to be selected to compute on PRACE machines. |
| **Role and Commitment of key persons (including supervisors)** | **Dr. Laurent Gicquel** graduated from the State University of New York at Buffalo in 2001 with a PhD in Fluid Dynamics and Energy Sciences. He then joined the CERFACS combustion team before becoming senior researcher scientist at CERFACS. In 2005, he was delivered his HdR in the field of energy from INPT. Parts of his contributions and research actions are devoted to the development of LES tools and their transfer towards CERFACS’ industrial partners. This covers not only the context of combustors but also more recently turbomachinery. Recently promoted as sub-project leader of the CFD team, he is now involved in complex industrial problem resolutions. Author of more than hundred international journal publications and book chapters, L. Gicquel is also involved in the formation and training of PhD students as well as engineering students from ISAE and ENSHEEIT. In parallel, he has been involved in the evaluation and management of many international research projects as well as multiple bilateral projects with industries. Finally, he has been distinguished as a Fellow of the Combustion Institute in 2019.  **Dr. Thierry Poinsot** is a member of the French Academy of Sciences. He is a CNRS research director and a senior scientific advisor of the CERFACS CFD group. He is also a senior scientist at Stanford University and consultant in several companies and research centres. He obtained his PhD from Ecole Centrale de Paris in 1983 and his These d'Etat from Université d'Orsay in 1987. He teaches combustion in various places worldwide (Toulouse, Princeton, Tsinghua, Kanpur, CISM, VKI, Polytechnique). He has a huge tradition in the training and supervision of PhD students with more than thirty years of direct experience. Dr. Poinsot has authored more than 220 papers related to turbulent flames, unsteady combustion, active control, Direct and Large Eddy Simulation of reacting flows. With Prof. D. Veynante, he has co-authored the textbook “Theoretical and Numerical Combustion” (www.cerfacs.fr/elearning).  **Dr. Guillaume Daviller** is a research scientist at CERFACS since 2016. He obtained his PhD in Fluid Mechanics from ISAE-ENSMA in 2010, followed by four years as a postdoctoral fellow at Pprime Institute (CNRS Poitiers) and at CERFACS. In 2015, he was involved in the INTECOCIS ERC grant as a CNRS research scientist at IMFT (Toulouse). His key research interests are turbulence, aeroacoustics, and the simulations of unsteady compressible flows. He also has extensive knowledge in High-Performance Computing and aerodynamic flows on complex geometries. Current research activities include numerical methods, deep learning for turbulent flow modelling, turbomachinery’s aeroacoustics, and combustion-related noise. |
| **Key Research Facilities, Infrastructure and Equipment** | AVBP code (<https://www.cerfacs.fr/avbp7x/>). HPC CPU/GPU facilities. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by CERFACS. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | Concerning Marie Curie actions, CERFACS was coordinator of COPAGT, ECCOMET AND FLUISTCOM |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | (FP/2007-2013) / ERC Grant Agreement ERC-AdG 319067 INTECOCIS: thermoacoustics, MSCA-ITN: ANNULIGHT and MAGISTER |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | [1] P.W. Agostinelli, D. Laera, D. Chterev, I. Boxx, L. Gicquel and T. Poinsot “Large eddy simulations of mean pressure and H2 addition effects on the stabilization and dynamics of a partially premixed swirled-stabilized methane flame”, Combustion and Flame, 249, pp. 112592, 2023, doi:10.1016j.combustflame.2022.112592.  [2] P.W. Agostinelli, D. Laera, D. Chterev, I. Boxx, L. Gicquel and T. Poinsot “On the impact of H2-enrichment on flame structure and combustion dynamics of a lean partially-premixed turbulent swirling flame,” Combustion and Flame, 241, pp. 112120, 2022, doi:10.1016j.combustflame.2022.112120.  [3] V. Shastry, E. Riber, L.Y.M. Gicquel, B. Cuenot and V. Bodoc, “Large Eddy Simulations of complex multicomponent swirling spray flames in a realistic gas turbine combustor”, Proceedings of the Combustion Institute, Vol. 39, 2022, doi.org/10.1016/j.proci.2022.08.059.  [4] C. Pérez Arroyo, J. Dombard, F. Duchaine, L. Gicquel, B. Martin, N. Odier and G. Staffelbach, “Towards the Large-Eddy Simulation of full engine: Integration of a 360 azimuthal degrees fan, compressor and combustion chamber. Part II: Comparison against stand-alone simulations”, in GPPS Journal, Data-driven modelling and high-fidelity simulations Special Issue, pp. 17-33, May, 2021.  [5] L.Y.M. Gicquel, G. Staffelbach and T. Poinsot, “Large Eddy Simulation of Gaseous Flames in Gas Turbine Combustion Chambers,” Progress in Energy and Combustion Science, 38, 782-817, 2012. |

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| **Beneficiary Legal Name: POLITECHNIKA CZESTOCHOWSKA (CUT)** | |
| **General Description** | CUT is the largest state university in the region funded in the 1940s. It is the only technical university having full academic rights in the region, i.e., it has the right to confer the title of doctor and university professor (habilitated doctor). In nationwide rankings of the state institutions of higher education, CUT is among the top universities in Poland of a similar profile. Staff: 47 professors, 167 DSc, 372 PhD, approx. 15000 students. CUT hosts Doctoral School in different fields. CUT is a member of ERCOFTAC. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Artur Tyliszczak**, PhD, DSc – NATO Fellow 1999-2000 (von Karman Institute), Marie-Curie ITN Fellow 2010-2011 (Cambridge University), Senior Fulbright Commission Fellow (2022). Expert in CFD, numerical methods, turbulence modelling, combustion. Main contractor and participant of 7 EU projects (FP5-7, H2020, Horizon Europe), a number of national projects and PI in 4 national projects funded by National Science Center (Commitment 15%),.  **Ass. Prof. Agnieszka Wawrzak**, PhD, Expert in CFD, hydrodynamic instability and strongly unsteady combustion phenomena. Main contractor in 3 national projects and one EU Horizon Europe project. PI in one national project. |
| **Key Research Facilities, Infrastructure and Equipment** | Free and unlimited access to national computer resources within PL-Grid infrastructure (Cluster Eagle: 1178 nodes with 2 CPU 28 cores each (Intel Xeon E5-2697 v3)). Own computer cluster with 192 CPU with 24 cores each (Intel Xeon Platinum). A high-order in-house LES/DNS code for modelling gaseous and two-phase turbulent reactive flows. ANSYS, OpenFOAM and software for postprocessing. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by CUT. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | MyPLANET – (ITN-FP7), KNOCKY (H2020-MSCA-RISE-2015), IMAGE (H2020-MSCA-RISE-2017), BIOCO2 (PPI/APM/2019/1/00042/U/00001, Polish National Agency for Academic Exchange - NAWA), EnviSafeBioC (PPI/APM/2018/1/00029/U/001, NAWA)ANIMATE - Advanced Numerical Modelling and Experimental Research on Turbulent and Transitional Flows with Applications to Chemical, Power, Automotive and Aeroengine Industries (PPI/APM/2019/1/00062, NAWA) |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | HORIZON-CL5-2021-D5-01-05 / 101056865 HESTIA, two projects funded by the Polish National Sciene Center, grant no. 2020/39/B/ST8/02802, 2018/31/B/ST8/00762. |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Wawrzak A., Tyliszczak A.: Study of a Flame Kernel Evolution in a Turbulent Mixing Layer Using LES with a Laminar Chemistry Model, Flow, Turbulence and Combustion, 105:807-835, 2020. 2. Wawrzak A. Tyliszczak A.: A spark ignition scenario in a temporally evolving mixing layer, Combustion and Flame, 209:353-356, 2019. 3. Wawrzak A., Tyliszczak A.: Implicit LES study of spark parameters impact on ignition in a temporally evolving mixing layer between H2/N2 mixture and air, International Journal of Hydrogen Energy, 42:9815-9828, 2018. 4. Tyliszczak A., Boguslawski A., Nowak D.: Numerical simulations of combustion processing a gas turbine with a single and multi-point fuel injection system, Applied Energy, 174: 153-165, 2016. 5. Tyliszczak A.: LES-CMC study of an excited hydrogen jet. Combustion and Flame, 162:3864– 3883, 2015. |
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| **Beneficiary Legal Name: NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET (NTNU)** | |
| **General Description** | The Norwegian University of Science and Technology, NTNU, is the largest university in Norway, whose main profile is in natural sciences and engineering sciences, but also includes humanities, social sciences, economics, medicine, health sciences, educational science, architecture, entrepreneurship, art disciplines and artistic activities. The Department of Energy and Process Engineering is divided into four main research groups: Thermofluids, Sustainable Energy Systems, Industrial Processes and Industrial Ecology. Topics related to hydrogen combustion are based in the Thermofluids research group. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. James Dawson** is Professor in Fluid Mechanics in the Department of Energy and Process Engineering at NTNU. He received his PhD at Cardiff University, was postdoctoral research and then an EPSRC Advanced Research Fellow at the University of Cambridge. His research areas are in turbulent flows and combustion dynamics. Project coordinator and will supervise 1 ESRs. 10% total employment time.  **Dr. Andrea Gruber** is a Senior Research Scientist at SINTEF Energy Research and Adjunct Professor at the Department of Energy and Process Engineering of NTNU. He received his PhD from NTNU in 2006 and conducted research in Japan as Postdoc in 2007. Since 2004 Dr. Gruber has performed Direct Numerical Simulation of turbulent reactive flow configurations of industrial relevance and actively collaborated with the Combustion Research Facility at Sandia National Laboratories. Dr. Gruber will supervise 1 ESRs. 10% total employment time. |
| **Key Research Facilities, Infrastructure and Equipment** | The research project will be conducted at the turbulent combustion laboratory at NTNU and is supported by state-of-the-art laser diagnostics including high-speed chemiluminescence imaging, high- and low speed PLIF and PIV systems, laser Doppler anemometry systems, hot wires, and microphones. |
| **Status of Research Premises** | All the experimental research facilities are independent and fully owned by NTNU. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | James Dawson was the coordinator of the MSCA ITN ANNULIGHT (grant no. 765998), is part of ECCSEL (European Carbon Capture and Storage Lab Infrastructure), an ESFRI for research and training. ERC-2023-SYG HYROPE |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | James Dawson is currently involved in several Norwegian centres as supervisor of PhD students in hydrogen combustion. He is the coordinator of the ERC-2023-SYG HYROPE. |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Æsøy, E., Aguilar, J. G., Wiseman, S., Bothien, M. R., Worth, N.A., & Dawson, J. R. (2020) Scaling and Prediction of Transfer Functions in Lean Premixed H2/CH4-Flames. Comb. Flame, Volume 215, pp 269-282 2. Æsøy,E., Nyg ard, H., Worth, N.A., & Dawson, J. R. (2022) Tailoring the gain and phase of the flame transfer function through targeted convective-acoustic interference Comb. Flame, Volume 236 3. Aguilar, J. G., Æsøy, E., Dawson, J. R. (2022) Predicting the Influence of Hydrogen in Combustion Instabilities, Comb. Flame, 245 4. Yahou, T., Dawson, J. R., & Schuller, T. (2023) Impact of chamber back pressure on the ignition dynamics of hydrogen enriched premixed flames Proc. Combust. Instit. 39. |

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| **Beneficiary Legal Name: TECHNISCHE UNIVERSITAT BERLIN (TUB)** | |
| **General Description** | TUB is one of the largest technical universities in Germany, hosting more than 30,000 students, almost 20% being internationals. TUB also has a leading position in terms of gender aspects among German universities. The university’s seven faculties and its 40 institutes offer approximately 130 courses of study, from the fields of engineering and natural sciences, economics and business, planning sciences, humanities, and the social sciences. The Institute of Fluid Dynamics and Technical Acoustics (ISTA) within the Department of Mechanical Engineering and Transport Systems performs teaching and research related to fluid dynamics, acoustics, and combustion. The Chair of Fluid Dynamics and the Laboratory for Flow Instability and Dynamics are two independent research groups at the ISTA being active in research and development in experimental and numerical fluid dynamics. About 100 employees are working on advanced solutions of flow and combustion control and efficiency increasing methods to reduce CO2 and other pollutant emissions and noise. Beside fundamental research, development work is being performed for major companies in power generation as well as in transportation. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Christian Oliver Paschereit** is heading the Chair of Fluid Dynamics at the Hermann-Föttinger-Institut, TU Berlin since 2003. His research and teaching cover a broad spectrum of topics related to fluid mechanics and combustion technology: flow and combustion control, gas turbine technology, ultra-low NOx combustion, thermoacoustics, and pressure gain combustion. His work in industry on clean, efficient, and reliable gas turbines had major impact during the commissioning of several new gas turbine families. The developed methods and technologies paved the way for ultra-low emission gas turbine systems and are to a large extend state of the art of nowadays power generation technology. Future technologies like ultra-wet gas turbine cycles and the integration of constant volume combustion into gas turbines complete his profile.  His scientific and technology achievements are demonstrated by more than 500 journal and conference publications. The research has not only academic interest but is also important for industrial applications documented in over 80 patent publications. Several best paper awards, many research prices, the Silver Medal of the Combustion Institute, two ERC Advanced Grants – the highest European research price – and a Proof-of-Concept Grant underline his competence in combustion and fluid dynamics.  Oliver Paschereit will contribute with his outstanding expertise on the topics above to the success of the project. **Prof. Kilian Oberleithner** is heading the Laboratory for Flow Instabilities and Dynamics, ISTA, TU Berlin since 2018. His research focuses on linear modelling of coherent structures in multiphysics complex turbulent flows including experimental and numerical methods, aiming to bridge fundamental research with pressing engineering problems within the field of green hydrogen combustion, aeroacoustics and wind and hydro power. His scientific achievements are illustrated in over 85 peer-reviewed journals articles and the silver medal of the Combustion Institute. In the last 9 years, he graduated 11 PhD students and supervises 12 PhD students. **Prof. Alessandro Orchini** holds the Chair of Nonlinear Thermo-Fluid Mechanics at ISTA, TU Berlin, since 2021. His research focuses on the modelling of the interactions between acoustic, combustion and flow phenomena by combining sophisticated physics-based theoretical models with experimental data. His work is published in over 40 peer-reviewed journal and conference articles. Prof. Orchini is actively involved in the planning of the research of the ERC AdG HYPOTHESis, and he is a beneficiary of the Research and Innovation Action ACHIEVE. He has supervised/is supervising 5 PhD students, including an ESR in the Marie Curie ITN ANNULIGHT. **Dr. Thomas Ludwig Kaiser** is the group leader and head of development of linearized methods at the Laboratory for Flow Instabilities and Dynamics, ISTA at TU Berlin. In this context it is his goal to make the methodology of linearized mean field analysis, a tool used predominantly in academia, applicable to real world, particularly industrial configurations. While his research is dedicated to dynamics of turbulent flows, his main focus is the application of linearized mean field analysis to laminar and turbulent reacting flows. PHD in 2018 (IMFT Toulouse), 10 years’ experience combustion modelling with focus on linearized methods, author of 25 peer-reviewed journal articles and recipient of two ASME best paper awards. 5 years of co-supervision experience. He is currently co-supervising 3 PhD students. |
| **Key Research Facilities, Infrastructure and Equipment** | Combustion experiments spanning fundamental laminar flames over micro gas turbines to full-scale heavy-duty combustors. A unique transverse forcing facility allows measurement of flames transfer functions at different wave fields. A generic combustion rig inside an anechoic chamber is available for combustion and jet noise measurements. Labs are equipped with LDA, high-speed PIV, PLIF, chemiluminescence systems, comprehensive acoustic measurement devices as well as emission analysers. For linear modelling of turbulent flames, a world-unique, highly versatile multiphysics inhouse developed linearized reacting flow solver is available. Moreover, an in-house cluster and national HPC resources are available for large scale computations and optimization studies. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by TUB. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | Under FP 7, TUB was/is a partner in 9 Innovative Training Networks, of which one is coordinated by TUB, hosted 13 Marie Curie Individual Fellowships, and run a post-doc fellowship programme supported under the COFUND programme (IPODI). The university has won 10 ERC-Grants. As core partner of two EIT KICs (Climate and EIT Digital), TUB is responsible for a set of education and innovation activities within the consortia: ANNULIGhT (ITN, 765998), Biorapid (ITN, 643056), SynCrop (ITN, 764591), ConCO2rde (ITN EJD, 955740) , C-PlaNeT (ITN EJD, 859885), FoodSci (ITN EJD, 722166) , FogGuru (ITN EID, 765452) |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | Under Horizon 2020, the TUB is hosting 14 Individual Fellowships, and successfully applied for 20 Innovative Training Networks, one is coordinated by TUB: ITN-ETNs: CBIM (860555), LIGHTCAP (860613), TEAMAero (860909), TOD-IS-RUR (956030), QUANTIMONY (956548), QUDOT-TECH (861097), INSPIRE (956803), VisIoN (764461); ITN-EID ROMSOC (765374) (Coordination TUB); ITN EJD - PLENOPTIMA ( 956770); DN-2021 AQTIVATE (101072344), The EU commission awarded the TUB 18 ERC Grants from 2014 to date. Under Horizon Europe, we have been granted 3 Postdoctoral Fellowships and 1 Doctoral Network:  Prof. Oberleithner currently holds six research grants from the German Research Foundation (>2.4 M EUR) and two industry related projects funded by the Ministery of Economic Affairs and Climate Action (>1.3 kEUR). Prof Oberleithner participates in the EU grant ACHIVE (RIA). Prof. Paschereit coordinates of participates in the EU grants: FLOATECH (H2020-EU.3.3. - SOCIETAL CHALLENGES- Secure, clean and efficient energy), INSPIRE (ITN), ACHIEVE(RIA) ERC Advanced Grant HYPOTHESIS |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Kaiser, T. L., Varillon, G., Polifke, W., Zhang, F., Zirwes, T., Bockhorn, H., & Oberleithner, K. (2023). Modelling the response of a turbulent jet flame to acoustic forcing in a linearized framework using an active flame approach. Combustion and Flame, 253, 112778. 2. Herff, S., Pausch, K., Nawroth, H., Schlimpert, S., Paschereit, C. O., & Schröder, W. (2020). Impact of burner plenum acoustics on the sound emission of a turbulent lean premixed open flame. International Journal of Spray and Combustion Dynamics, 12, 1756827720956906. 3. Mean flow data assimilation based on physics-informed neural networks. J von Saldern, JM Reumschüssel, TL Kaiser, M Sieber, K Oberleithner, Physics of Fluids 34 (11) 4. A Orchini, SJ Illingworth, MP Juniper (2015) [Frequency domain and time domain analysis of thermoacoustic oscillations with wave-based acoustics](https://www.cambridge.org/core/journals/journal-of-fluid-mechanics/article/frequency-domain-and-time-domain-analysis-of-thermoacoustic-oscillations-with-wavebased-acoustics/F5F8052F4F23B52D2381E0F941B71719). Journal of Fluid Mechanics 775, 387-414. 5. Ostermann, F., Woszidlo, R., Nayeri, C. N., & Paschereit, C. O. (2019). The interaction between a spatially oscillating jet emitted by a fluidic oscillator and a cross-flow. Journal of Fluid Mechanics, 863, 215-241. |

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| **Beneficiary Legal Name: CENTRO DE INVESTIGACIONES ENERGETICAS MEDIOAMBIENTALES Y TECNOLOGICAS (CIEMAT)** | |
| **General Description** | CIEMAT is the largest public centre for research in energy in Spain. CIEMAT’s Fluid Mechanics and Combustion Modeling group was created in 2004 and its expertise in theoretical and numerical analysis on non-reacting and reacting flows. We have developed numerical tools for cost-effective numerical analysis of combustion problems, allowing the fast computation of steady-state solutions and their global stability analysis. We also use high-order finite-differencing parallel DNS solvers with simplified or detailed chemical kinetics and species transport. We use these numerical simulations tools to advance in the understanding of problems of ignition, extinction, and stability of laminar flames, with a special focus on hydrogen laminar flames. |
| **Role and Commitment of key persons (including supervisors)** | **Dr. Carmen Jiménez** holds a PhD in Fluid Mechanics (1998, U. of Zaragoza), and was later a Marie Curie postdoctoral researcher at CERFACS and INPT (Toulouse, France). She obtained a "Ramón y Cajal" research fellowship and joined the CSIC in Zaragoza, Spain (2001-2004), where she started new research projects related to Large Eddy Simulations of Combustion. Since May 2005, she is a senior researcher at CIEMAT. Her work focuses on the numerical analysis and simulation combustion processes, using high performance computing. Her recent activity covers subjects such the study of the dynamics and stability of laminar flames, with emphasis in intrinsic (thermo-diffusive) and acoustic instabilities, the characterization of combustion in small scale devices and the reduction of chemical kinetics mechanisms. She has also been a lecturer at Universidad Carlos III de Madrid from 2006 to 2013. She has been an IP in 6 National and European projects and a team member in about 20 more. **Dr. Vadim Kurdyumov** is the leader of the Fluid Mechanics and Combustion Modelling group at CIEMAT. H holds a PhD from the Institute of Mechanical Problems in Moscow and was later postdoctoral research at the Polytechnical University of Madrid and a visiting researcher at Veracruz University in Mexico. He joined CIEMAT in 2004 and has created and led a group devoted to the numerical analysis of fluid mechanics and combustion problems. His research lines include but are not limited to laminar premixed and non-premixed flames, flame structures, stability, and natural and forced convection. He has been an IP in more than 15 Regional and National projects and is the author of more than 80 papers in JCI international journals.  **Dr. Daniel Fernández Galisteo** is a junior researcher at CIEMAT since 2010. He graduated from Universidad Carlos III de Madrid, receiving his BSc in Mechanical Engineering (2005) and his PhD in Mathematical Engineering (2009) in the fluid mechanics and combustion field, with Prof. Antonio Sánchez as advisor. His dissertation addressed the chemical structure of lean hydrogen-air deflagrations. During his PhD, Daniel enjoyed short stays at the University of California at San Diego, working with Prof. Forman Williams in the structure of premixed hydrogen-air flames. In 2013, he enjoyed a stay at University of Southern California to work with Prof. Paul Ronney in the dynamics of confined flames. His research is mainly focused on the numerical simulation and the analytical study of fundamental combustion processes: flame instabilities, flame dynamics, confined flames, chemical kinetics reduction. He has participated in 10 competitive research projects, and he is PI in one of them. |
| **Key Research Facilities, Infrastructure and Equipment** | Computing facilities at CIEMAT: Xula cluster 190 nodes - 8096 cores - IB HDR 200 - 192 GB RAM/core / Turgalium cluster 36 nodes - 1440 cores - IB HDR 100 - 192 GB RAM/core - 24 NVIDIA Volta. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by CIEMAT. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | The research team has been involved in several EU Research projects related to combustion simulation and modelling:  HPC4E (High Performance Computing for Energy 689772 H2020), MYPLANET (Massively Parallel Simulations of Combustion and Pollutant Prediction, FP7-PEOPLE-2007-1-1-ITN (210781)),TIMECOP-AE (Towards Innovative Methods for Combustion Prediction in Aero Engines (AST5-CT-2006 030828, VI PM)), TLC: Towards Lean Combustion (AST4-CT-2005-012326 VI PM), LESCO2 (LESSCO2: Large Eddy Simulation Techniques to Simulate and Control by Design of Cyclic variability in Otto cycle engines (NNE5-2001-00495, V PM )). |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** |  |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Jiménez C. & Kurdyumov V.N., Flame-acoustics interaction for flames propagating from the open to the closed end of a channel: effects of heat losses and the Lewis number, Combustion and Flame 246, 112371 (2022). 2. Jiménez C., Fernández-Galisteo D. & Kurdyumov V.N., Flame-acoustics interaction for symmetric and non-symmetric flames propagating in a narrow duct from an open to a closed end, Combustion and Flame 225, 499-512 (2021). 3. Dejoan A., Jiménez C. & Kurdyumov V.N, Critical conditions for non-symmetric flame propagation in narrow channels: Influence of the flow rate, the thermal expansion, the Lewis number and heat-losses, Combustion and Flame 209, 430-440 (2019). 4. Jiménez C. & Kurdyumov, V., Propagation of symmetric and non-symmetric lean hydrogen-air flames in narrow channels: Influence of heat losses, Proceedings of the Combustion Institute 36, 1559-1567 (2017). 5. Jiménez C., Haghiri A., Brear M., Talei M. & Hawkes E., Sound generation by premixed flame annihilation with full and simple chemistry, Proceedings of the Combustion Institute 35, 3317-3325 (2015). |

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| **Beneficiary Legal Name: POLITECNICO DI BARI (POLIBA)** | |
| **General Description** | POLIBA is a public research university located in Bari, Italy. It is one of the largest in the south of Italy and currently has more than 11,000 students enrolled. Among others, POLIBA houses the Department of Mechanics, Mathematics and Management (DMMM). DMMM carries out higher education, research and technology transfer activities at its Bari and Taranto sites. The DMMM stands out for excellence in industrial research in the areas of mechatronics, energy, aerospace, industry 4.0, enabling technologies and sustainable development. DMMM received the prestigious "Department of Excellence" award from the Italian Ministry of University and Research (MUR) for the five-year periods 2018-2022 and 2023-2027. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Davide Laera** – Associate professor (tenure-track) at Politecnico di Bari, DMMM. PhD in Mechanical engineering in 2016 from Politecnico di Bari (Bari, Italy) in thermoacoustics. More than 6 years’ research experience in numerical combustion, developing advanced and massively parallel software for high-fidelity LES of turbulent reacting flows with a focus on: decarbonized combustion (hydrogen and ammonia), two-phase flame, pressure gain combustion (CVC and RDE) and thermoacoustic instabilities. He has authored almost 30 peer-reviewed journal articles and he supervised the research activities of several interns (15+) and PhD students (10+). **Prof. Sergio Mario Camporeale** Full Professor of Energy Systems and Fluid Machinery at Politecnico di Bari, Department of Mechanics, Mathematics and Management, Coordinator of the MSc Programme in Mechanical Engineering, Rector's Delegate for Training and Education. More than 30 years of research experience in energy systems, combustion, and renewable energy with a focus on offshore wind and wave energy. PI of research programmes and industrial consultant in the field of thermoacoustic instabilities. Responsible for several research projects funded by the Italian Ministry of University and Research (MUR). Author or co-author of more than 50 peer-reviewed journal articles and 100 conference papers. Over the years, he has supervised more than 100 interns and more than 20 PhD students. |
| **Key Research Facilities, Infrastructure and Equipment** | High performance computer facility in addition to National (Italian) and International (EuroHPC) resources. Software (AVBP, ANSYS Fluent) for large eddy simulation of compressible (reactive) flows. Software COMSOL Multiphysics for frequency domain (stability) analysis of aero- and thermo-acoustic systems. Each graduate student is enrolled in POLIBA Graduate School, which offers cross-disciplinary and soft-skill training (scientific writing, time & project management, etc.).Impedance tube to perform acoustic measurements with bias and grazing flow. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by POLIBA. CIEMAT. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | Co-supervisor of ESR in H2020-MSCA-ITN-2017 ANNULIGHT and MAGISTER. H2020-MSCA-ITN-2019 OPTAPHI. H2020-SPACE-2018-2020 ADE. H2020-MSCA-NIGHT-2020/2021 - ERN-Apulia2 - European Researchers' Night Apulia |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | Associate Partner in H2020-MSCA-ITN-2020 INSPIRE.  HORIZON-CL5-2021-D2-01-08 - D. Laera is member of the TRANSITION Consortium.  ANR 2022 TOHREAU – Simulations of OH\* light emission from H2/air flames in real burners. D. Laera associated member of consortium.  MOST - National Center for Sustainable Mobility through collaboration with 24 universities, the CNR and 24 large companies, has the mission of implementing modern, sustainable and inclusive solutions for the entire national territory. POLIBA is leader of activities of Spoke 14: Hydrogen and New Fuels.  NEST (Network 4 Energy Sustainable Transition) has the primary mission to build a competent Italian leadership capable of supporting the growth of new generation of energy technologies, researchers and research infrastructures for a future sustainable and resilient energy sector. For the NEST, POLIBA is Hub. |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Detomaso, N., Hok, J. J., Dounia, O., D. Laera and Poinsot, T. (2023). A generalization of the Thickened Flame model for stretched flames. Combustion and Flame, 258, 113080. 2. Aniello, A., D. Laera, Marragou, S., Poinsot, T., Schuller, T. and Selle, L. (2023). Influence of pilot H2 injection on methane-air swirled flame stabilization and acoustic response. Combustion and Flame, 253, 112749. 3. D. Laera, P. W. Agostinelli, L. Selle, T. Schuller, L. Gicquel and T. Poinsot. Stabilization mechanisms of CH4 premixed swirled flame enriched with a non- premixed hydrogen injection. Proceedings of Combustion Institute - 2021 (4), 6355-6363 4. Capurso, T., Stefanizzi, M., Torresi, M., & Camporeale, S. M. (2022). Perspective of the role of hydrogen in the 21st century energy transition. Energy Conversion and Management, 251, 114898. 5. Camporeale, S. M., Fortunato, B., & Campa, G. (2011). A finite element method for three-dimensional analysis of thermo-acoustic combustion instability. |

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| **Beneficiary Legal Name: THE CHANCELLOR MASTERS AND SCHOLARS OF THE UNIVERSITY OF CAMBRIDGE (UCAM)** | |
| **General Description** | UCAM is one of the leading scientific research institutions worldwide and is regularly ranked in the top 5 universities. The Engineering Department is the highest-ranking department of its type in the UK. It is an integrated department, with several cross-disciplinary collaborations. The department has 180 members of staff, 700 post-doctoral researchers and a similar number of graduate students. A sizable fraction of the activity, involving 70 staff in the university, revolves around fluid mechanics, aeroacoustics and combustion, with a correspondingly large number of PhD students. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Matthew Juniper** is Professor of Thermofluid Dynamics in the Engineering Department. He completed his PhD in Cryogenic Combustion from Ecole Central Paris in 2001 and was appointed Lecturer in Combustion at the Engineering Department in 2003. His research interests are in flow instability, adjoint-based sensitivity analysis, shape optimization, physics-based Bayesian inference accelerated with adjoint methods, and programmable inference. He is Associate Editor of the Journal of Fluid Mechanics and has held visiting fellowships/professorships at Ecole Central Lyon, the Institute for Advanced Studies at TU Munich, KTH/Nordita Stokholm, IIT Madras, and the Center for Turbulence Research Summer Program at Stanford University. He was a recipient of an ERC Starter Grant, has participated on 5 Marie Curie ITNs, and has supervised or co-supervised 6 Marie Curie ECRs. He has graduated 20 PhD students and supervised another 4. Several previous members of his group are now full professors (Illingworth at Melbourne, Li at Hong Kong Inst. Sci. Tech, Magri and Rigas at Imperial College London, Tammisola at KTH Stockholm). Professor Juniper's role will be to supervise the fellow, to provide research direction, technical input, and to manage administrative matters. Professor Juniper's immediate research group contains around 6 researchers, whose skills will be invaluable to the additional support and training of the fellow. The Energy Group is also assisted by an experienced team of administrators familiar with Marie-Curie and other EU projects. |
| **Key Research Facilities, Infrastructure and Equipment** | The group has a fully automated highly-instrumented laboratory scale thermoacoustic test rig, which will be used for this project. Diagnostics include 8 probe microphones, 4 free-standing microphones, a high speed camera, and several dozen thermocouples, which allow the rig to be well characterized to within known measurement error. The group has significant software and computational facilities available to the project. The software includes a differentiable (to 1st and 2nd order) thermoacoustic network model that is used to assimilate data from the automated rig, a differentiable (to 1st order) thermoacoustic Helmholtz solver written in the Finite Element code DolfinX (previously known as FEniCS), and codes for calculation of local and global hydrodynamic instabilities in reacting flows. These codes run on individual high-performance workstations within the group and on the High Performance Computing cluster at Cambridge University. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by UCAM. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | ANADE (Marie Sklodowska-Curie grant agreement No 289428)  SSEMID (Marie Sklodowska-Curie grant agreement No 675008)  MAGISTER (Marie Sklodowska-Curie grant agreement No 766264)  ANNULIGHT (Marie Sklodowska-Curie grant agreement No 765998)  ALORS (ERC Starter Grant No 259620) |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | SSECOID (Marie Sklodowska-Curie grant agreement No 955923 ) |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. M. Juniper, Machine Learning for Thermoacoustics in Machine Learning and its Application to Reacting Flows Eds: Nedunchezhian Swaminathan and Alessandro Parente, Springer, ISBN 978-3-031-16250-3 2. M. Juniper, R. I. Sujith, Sensitivity and nonlinearity in Thermoacoustics, Annual Review of Fluid Mechanics, 50, 661–689, 3. M. Juniper, M. Yoko, Generating a physics-based quantitatively-accurate model of an electrically-heated Rijke tube with Bayesian inference, Journal of Sound and Vibration 535, 117096, 4. A. Kontogiannis, S. V. Elgersma, A. J. Sederman, M. Juniper, Joint reconstruction and segmentation of noisy velocity images as an inverse Navier–Stokes problem, Journal of Fluid Mechanics 944, A40, 5. Y. Sun, U. Sengupta, M. Juniper, Physics-informed Deep Learning for Simultaneous Surrogate Modelling and PDE-constrained Optimization, Computational Methods in Applied Mechanics and Engineering 411, 116042 |

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| **Beneficiary Legal Name: TECHNISCHE UNIVERSITEIT DELFT (TU Delft)** | |
| **General Description** | The Aerospace Engineering department at TU Delft consistently achieves a place among the top 10 global aerospace engineering schools, as recognized in the 2023 QS and Shanghai Rankings. At the core of TU Delft's mission is a dedication to creating a positive societal impact, underpinned by a strong commitment to sustainability. Worldwide, TU Delft's Aerospace Engineering is renowned for its innovative teaching methodologies, pioneering research endeavours, cutting-edge laboratories and facilities, and revolutionary advancements. It boasts a faculty of 124 professors, 332 Ph.D. candidates, and a diverse community of 2,900 undergraduate and graduate students. Notably, it stands as one of the world's largest aerospace engineering communities and the largest in Europe, encompassing a wide array of scientific disciplines, including space, aeronautics and related fields like wind energy. |
| **Role and Commitment of key persons (including supervisors)** | **Dr. Francesca De Domenico**. Assistant Professor in Sustainable Aircraft Propulsion. She obtained her PhD in Engineering at the University of Cambridge (UK) in 2019. Her PhD thesis ‘Behaviour of Accelerating Entropy spots’ focused on thermoacoustics (indirect noise) and laser diagnostics developments for high pressure environments. During her PhD, she spent 5 months at King Abdullah University of Science and Technology KAUST) working on developing non-linear laser diagnostics techniques (such as Laser Induced Grating Spectroscopy) for reacting flows application. Her PhD research was awarded several prices, including the Amelia Earhart Fellowship for the 30 best female PhD candidates in aerospace engineering worldwide, and the Lefebvre price for the best PhD thesis in combustion physics in the UK. In 2019, she was awarded a Junior Research Fellowship by Gonville and Caius College (University of Cambridge). This fellowship enabled her to embark on independent research, while also expanding her expertise to the realm of bioengineering. Since 2022, she has been an integral part of the academic community at TU Delft, where she started as an Assistant Professor. In this role, she is at the helm of establishing a ground-breaking Green Propulsion Lab, which serves as a hub for the development of innovative propulsion technologies for environmentally friendly aeroengines. She was recently awarded a VENI grant (personal grant) from NWO, along with two Horizon grants bestowed by the European Commission (HYLENA and ACHIEVE). Within these grants, she assumes the role of local coordinator, further highlighting her leadership and expertise in propelling the field of sustainable aircraft propulsion forward.  **Prof Arvind Gangoli Rao** is a full professor in the Faculty of Aerospace Engineering at TU Delft and chair of the Sustainable Aircraft Propulsion group. Prof. Gangoli Rao obtained his masters and PhD in aerospace engineering at the Indian Institute of Technology, Bombay. He later worked at Technion, Israel as a post-doctoral researcher before joining TU Delft as an assistant professor in 2008. Prof. Gangoli Rao is a specialist in aircraft propulsion and has worked on a variety of problems related to gas turbines and novel propulsion systems for aircraft, especially ones dealing with the usage of alternative energy sources. He has authored around 80 publications in various scientific journals and conferences. Prof. Gangoli Rao has been involved in several other EU projects and was also the coordinator of the EC funded AHEAD project and Dutch funded APPU project along with Safran, Airbus and Rotterdam Airport. He is the Dutch representative International Society of Air Breathing Engines (ISABE). He is also a member of the ACARE (Advisory Committee for Research and innovation in Europe) working group on Energy and Environment. Prof. Gangoli Rao has been recently appointed as the Academic Portfolio Director for the theme “Future of Transportation” at the Delft Extension School. |
| **Key Research Facilities, Infrastructure and Equipment** | LASER SYSTEMS: Fs-laser: Coherent Astrella (35 fs pulse, 1000 Hz repetition rate) and rotational-vibrational CARS setup; 10 Hz PIV and PLIF system; High-speed PIV system; systems, Exhaust gas analyser;  BURNERS and INFRASTRUCTURE: Infrastructure for experiments with H2, lines tested for 8 bars; Swirl-stabilised burner with Axial Air Injection; FLOX combustor. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by TU Delft. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | The research team has been involved in several EU Research projects related to:  HOPE (Horizon Europe) The HOPE project investigates an integrated aircraft propulsion system comprising two multi-fuel ultra-high bypass ratio (UHBR) turbofan engines, a fuel cell based auxiliary propulsion and power unit (FC-APPU) driving an aft boundary layer ingestion (BLI) propulsor based on existing tube-wing aircraft configuration (2023);  APPU (Dutch National Fund) The APPU project looks at the use of hydrogen in a gas turbine based auxiliary propulsion and power system. |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | VENI (NWO). Development of a novel measurement tool for measuring NOx emission and flashback propensity of hydrogen flames (personal grant, Dr F. De Domenico, 2024);  HYLENA (Horizon Europe) investigation of a combined SOFC-GT cycle for powering the next generation of airplanes (2024 - ..);  ACHIEVE (Horizon Europe, Clean Hydrogen Partnership) investigation of the properties of blends of H2 and ammonia for gas turbines (2024). |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. De Domenico, F., Rolland, E., Hochgreb, S., Detection of direct and indirect noise generated by synthetic hot spots in a duct, Journal of Sound and Vibration, Volume 39, 2017, pages 220-236, 2. De Domenico, F., Rolland, E., Hochgreb, S., A generalised model for acoustic and entropic transfer function of nozzles with losses, Journal of Sound and Vibration, Volume 440, 2019, Pages 212-230, 3. De Domenico, F., Rolland, E., Rodrigues, J., Magri, L., & Hochgreb, S. (2021). Compositional and entropy indirect noise generated in subsonic non-isentropic nozzles. Journal of Fluid Mechanics,910, A5. 4. De Domenico, F., Lowe, S. M., Fan, L., Williams, B. A. O., Hochgreb, S. (2019). High Frequency Measurement of Temperature and Composition Spots With LITGS. Journal of Engineering for Gas Turbines and Power, 141(031003), 1–11; 5. De Domenico, F., Guiberti, T. F., Hochgreb, S., Roberts, W. L. (2019). Tracer-free laser-induced grating spectroscopy using a pulse burst laser at 100 kHz, Opt. Express 27, 31217-31224 |

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| **Beneficiary Legal Name: UNIVERSITEIT TWENTE (UT)** | |
| **General Description** | The University of Twente is based on a campus and provides training and research in technical sciences, social sciences, and business administration. Some 3,300 scientists and other professionals working together on cutting-edge research and inspiring education for more than 9,000 students. The university encourages students to develop an entrepreneurial spirit. |
| **Role and Commitment of key persons (including supervisors)** | **Lionel Hirschberg (male);** Role: ESR’s daily supervisor (co-promotor); Since April 2023, Dr. Hirschberg works as an assistant professor in Prof. Kees Venner’s Engineering Fluid Dynamics (EFD) group at the UT. At the Eindhoven University of Technology (in the Netherlands), he earned an Applied Physics MSc degree with the specialization “physics of transport in fluids.” Said MSc degree was awarded with the prestigious mention “cum laude,” which is the highest MSc-degree distinction one can attain in the Netherlands. In addition, under Prof. Thierry Schuller’s tutelage, he obtained a PhD degree in Fluid Mechanics from Université Paris-Scalay (France). To obtain this degree, he investigated self-sustained pressure pulsations in solid rocket motors. This PhD research project, which started on February 1st 2016 and cumulated in Hirschberg’s public PhD defense on January 16th 2019, was a collaboration between: ArianeGroup (France), CentraleSupélec (Université Paris-Scalay; France) and the von Kármán Institute for Fluid Dynamics (Belgium). From May 2019 to April 2021, he was a DLR-DAAD Postdoctoral Fellow at the German Aerospace Center (DLR) in Berlin-Charlottenburg. During his stay at the DLR, he focused—through experimental & theoretical-development efforts—on advancing the fundamental understanding of what is referred to as indirect combustion noise. Starting in May of 2021 until March 2023, he worked at Imperial College London—where he investigated aeroacoustic properties of a single perforation in a finite-thickness plate. Hirschberg gave invited talks about his research on indirect combustion noise for: University of Warwick’s Fluid Dynamics Research Centre Seminar, the Fluid Dynamics Division of the Mexican Physical Society’s Enzo Levi Seminar 2022, and Keele University’s Physics seminar.  **Jan Withag (male),** Role: ESR's daily supervisor consultant, Dr. Withag holds a MSc and a PhD degree in Mechanical Engineering, both obtained at the University of Twente. Dr. Withag completed his MSc degree in Turbulent Combustion Modelling at Siemens Turbomachinery Lincoln (UK). Modelling work was performed on the noise prediction of a lean-premixed turbulent flame. Subsequently, Dr. Withag obtained a PhD. in Sustainable Energy Technology at the University of Twente. The research focused on experimental and theoretical work on the process of supercritical gasification of wet biomass, involving high-pressure experiments, thermodynamic modelling and the CFD design of a heat exchanger. After his time at university, Dr. Withag worked in several roles in industry, mainly focusing on R&D, CFD and product development tasks. Products varying from radial compressors, combustors, axial gas turbines and radial gas turbines. Presently, Dr. Withag holds the position of researcher/lecturer within the Engineering Fluid Dynamics group (EFD) at the UT. His teaching duties include courses on Transport Phenomena, Fluid Mechanics of Turbomachines and Computational Fluid Dynamics.  **Kees Venner (male),** Role: ESR’s thesis director (promotor); Prof. Venner is the chair of the Engineering Fluid Dynamics Group (EFD), which is part of the department of Thermal and Fluid Engineering (TFE) in the Engineering Technology Faculty (ET) at the UT. He holds a PhD degree from UT in the area of Thin layer flow/Lubrication and Multigrid/Multilevel methods (obtained in 1991). He’s held visiting scientist and postdoctoral positions at the Weizmann Institute of Science, Rehovot, Israel, and at Imperial College, London, UK. Venner has 30+ years of expertise in theoretical and applied research. He’s led and continues to lead research projects in different areas of Fluid Dynamics, among which: aeroacoustics, rotating-flow machines, microfluidics, functional-material Fluid Dynamics. Author of 100+ papers published in international journals. h-factor 41 (google), 34 (Scopus). He authored a book titled: "Multilevel methods in Lubrication (Elsevier). Starting October 1st 2023, Venner will head TFE.  **Jim Kok (male),** Role: auxiliary consultant, Dr. Kok obtained his PhD degree at this university in 1989 on the subject of dynamics of gas bubbles moving through liquid. Subsequently, he became a member of faculty. Kok’s research covers the fields of combustion dynamics, acoustics, heat transfer and thermodynamics. Specific applications studied are gas turbine engine power generation and propulsion. The main theme is pressurized and atmospheric combustion of sustainable fuels in gas turbine (aero) engines and furnaces and boilers. Fuels can be: low-calorific gases, NH3, H2 or jet fuel. Important phenomena studied are combustion stability, transient combustion behavior and emission of toxic species His teaching duties include courses on turbulent combustion theory, modeling and analysis for gaseous fuels and liquid fuels.  **Artur Pozarlik (male):** Role auxiliary consultant, PhD received in 2010 on the subject of fluid-structure interaction in gas turbines from the University of Twente. His research foci are experimental and numerical investigation of: multiphase processes, combustion of renewable fuels, atomization and spray drying. Supervisor of more than 30 postgraduates. Coordinator of the HERMES project.  Philip Ströer (male), Role: auxiliary consultant; Dr. Ströer holds a Bachelor’s and a Master’s degree from Leibniz University of Hanover. He was honored with the Karl-Doetsch young scientist prize from the Niedersächsisches Forschungszentrum für Luftfahrt (NFL) for his Master’s thesis. His academic journey continued as he pursued a PhD at TU Braunschweig and the German Aerospace Center’s Institute of Aerodynamics and Flow Technology, under the guidance of Prof. Cord-Christian Rossow and Prof. Rolf Radespiel. Notably, his doctoral thesis earned him a distinguished grade (“summa cum laude”) and was recognized with the STAB prize from the German Aerospace Aerodynamics Association (STAB), of the German Society for Aeronautics and Astronautics (DGLR). Dr. Ströer has extensive expertise in advancing numerical methods and applying computational fluid dynamics software in the high-performance computing (HPC) context. Presently, he holds the position of Assistant Professor within the Engineering Fluid Dynamics Group (EFD) at the UT. |
| **Key Research Facilities, Infrastructure and Equipment** | The Thermal Fluid Engineering (TFE) department’s computational clusters. Moreover, the UT has easy access to SURF; viz., the Netherlands’ national High-Performance Computing (HPC) infrastructure. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by UT. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | The research team has been involved in several EU Research projects related to Aeroacoustics, Combustion & Thermoacoustics: LIMOUSINE, MAGISTER. |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | ENODISE, zEPHYR |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Hirschberg, L., et al., “Experimental investigations of indirect noise due to modulation of axial vorticity and entropy upstream of a choked nozzle,” Journal of Sound and Vibration, Vol. 532, May 2022, pp. 116989. 2. Hirschberg, L., et al., “Swirl-nozzle interaction experiment: quasi-steady model-based analysis,” Experiments in fluids, Vol. 62, No. 175, 2021, pp. 1–16. 3. Hirschberg, L., and Hulshoff, S. J., “Lumped-Element Model for Vortex–Nozzle Interaction in Solid Rocket Motors,” AIAA Journal, Vol. 58, No. 7, May 2020, pp. 3241–3244. 4. Hirschberg, L., et al., “Influence of Nozzle Cavity on Indirect Vortex- and Entropy-Sound Production,” AIAA Journal, Vol. 57, No. 7, March 2019, pp. 3100–3103. 5. Hirschberg, L., et al., “Analytical Model for the Prediction of Pulsations in a Cold-Gas Scale-Model of a Solid Rocket Motor,” Journal of Sound and Vibration, Vol. 19, April 2018, pp. 452–468. |

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| **Beneficiary Legal Name: TECHNISCHE UNIVERSITAET MUENCHEN (TUM)** | |
| **General Description** | Consistently featured as one of the highest-ranked universities in Germany in the QS World University Rankings®, Technical University of Munich (Technische Universität München), also known as TUM, was founded in 1868 and is a member of the TU9, an association of nine of Germany’s most prestigious technical universities. TUM has 15 academic departments/schools and around 40,000 students on campus, of which over 30% are international. It calls itself The Entrepreneurial University and aims to foster a supportive environment for budding entrepreneurs. There are around 200 degree programs available including a wide selection of English-taught courses and programs. |
| **Role and Commitment of key persons (including supervisors)** | **Prof. Wolfgang Polifke**, Professor of Thermo-Fluid Dynamics. PhD in 1990 from City University of New York. 35+ years research experience with expertise in thermoacoustic instabilities, (turbulent) premixed combustion, and multi-phase flows. 25+ years supervision experience with 40+ completed doctoral degrees. 280+ refereed publications listed in SCOPUS. 10+ patents. Fellow of the Combustion Institute. 9 years industrial research (ABB Switzerland).  **Dr. habil. Camilo Silva** Senior Researcher / Lecturer. Ph.D. in 2010 in Mathematics and Thermoacoustics from U. Montpellier, France. 10 years supervision. 50+ refereed publications listed in SCOPUS. |
| **Key Research Facilities, Infrastructure and Equipment** | High performance computing facilities of the Leibniz Rechenzentrum (see https://www.lrz.de). Software (AVBP, OpenFOAM, ANSYS Fluent, StarCCM+) for large eddy simulation of compressible (reactive) flows. Software packages "taX" (<https://gitlab.lrz.de/tfd/tax>) and “felicitaX” for frequency or time domain (stability) analysis of aero- and thermo-acoustic systems. Toolbox for reduced order model (acoustic scattering matrices or flame transfer functions, etc.) system identification from time series data. Toolbox for uncertainty quantification of thermoacoustic stability analysis.  Each graduate student is enrolled in TUM Graduate School, which offers cross-disciplinary and soft-skill training (scientific writing, time & project management, etc.). High quality office workspace with desk, PC/laptop for each researcher. Modern library and information services, with extensive range of specialist journals as well as databases available on-line. Campus accommodation for visiting scientists. Counselling service for staff and students. Language courses for foreigners. |
| **Status of Research Premises** | All the research facilities are independent and fully owned by TUM. |
| **Previous Involvement in Research and Training Programmes, including H2020 ITN** | The research team has been involved in several EU Research projects related to thermo- and aeroacoustics (AETHER, FlowAirs, TANGO, ANNULIGHT), high performance computing (MyPlanet), machine learning (MAGISTER), hydrogen combustion (POLKA).  Numerous research projects funded by DFG (German Research Council), e.g., priority programme SFB TRR 40 “Technological foundations for future space transportation systems”.  Several research projects funded by AG Turbo (research association for turbomachinery co-funded by industry and Federal Ministry of Economic Affirss and Climate Action, BMWK), e.g., AG Turbo CooreFlex – “Technological foundations for the development of gas turbine technology with increased operational flexibility”. |
| **Current Involvement in Research and Training Programmes, including H2020 ITN** | AG Turbo InnoTurbine – “Technological foundations for the development of gas turbine technology with increased operational flexibility (BMWK)” |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Eder, A. J.; Dharmaputra, B.; Désor, M.; Silva, C. F.; Garcia, A. M.; Schuermans, B.; Noiray, N.; Polifke, W. Generation of Entropy Waves by Fully Premixed Flames in a Non-Adiabatic Combustor with Hydrogen Enrichment. J. Eng. Gas Turbines Power 2023. 2. Garcia, A. M.; Le Bras, S.; Prager, J.; Haeringer, M.; Polifke, W. Large Eddy Simulation of the Dynamics of Lean Premixed Flames Using Global Reaction Mechanisms Calibrated for CH4-H2 Fuel Blends. PHYS FLUIDS 2022, 34 (9), 10. 3. Meindl, M.; Silva, C. F.; Polifke, W. On the Spurious Entropy Generation Encountered in Hybrid Linear Thermoacoustic Models. Combustion and Flame 2021, 223, 525–540. 4. Merk, M.; Gaudron, R.; Silva, C.; Gatti, M.; Mirat, C.; Schuller, T.; Polifke, W. Prediction of Combustion Noise of an Enclosed Flame by Simultaneous Identification of Noise Source and Flame Dynamics. Proceedings of the Combustion Institute 2019, 37, 5263–5270. 5. Strobio Chen, L.; Bomberg, S.; Polifke, W. Propagation and Generation of Acoustic and Entropy Waves Across a Moving Flame Front. Combust. Flame 2016, 166, 170–180. |

For **associated partners:**

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| **Associated Partner Legal Name: TECHNISCHE UNIVERSITAET GRAZ (TU Graz)** | |
| **General description** | Graz University of Technology is a public research university located in Styria, Austria. It was founded in 1811 and is the oldest science and technology research and educational institute in Austria. It currently comprises seven faculties and is a public university. It offers 19 bachelor's and 35 master's study programmes (of which 19 are in English) across all technology and natural sciences disciplines. Doctoral training is organised in 14 English-speaking doctoral schools. The university has more than 16,000 students, and around 1,800 students graduate every year. The Graz University of Technology and the University of Graz co-operate in teaching and research of natural sciences. |
| **Key Persons and Expertise** | Woisetschläger, Jakob, Ao.Univ.-Prof. Dipl.-Ing. Dr.techn.  ORCID: 0000-0002-7057-761X  https://scholar.google.at/citations?user=skHPJ6YAAAAJ&hl=de |
| **Key Research Facilities, Infrastructure and Equipment** | * A test rig for swirl-stabilised, methane fired flames including a liner for low to intermediate powers with full optical access. * Laser Vibrometers * Stereoscopic particle-image-velocimetry (PIV) * Intensified CCD camera for spectroscopy and chemiluminescence * A Photron FASTCAM SA-1 high-speed camera system * A complete software package for interferometric data analysis and optical tomography http://optics.tugraz.at (software IDEA)   Algorithms for Background Oriented Schlieren (BOS) |
| **Previous and Current Involvement in Research and Training Programmes** | All the research facilities are independent and fully owned by Graz University of Technology (TU Graz). |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | The research team has been involved in several EU Research projects related to EU – ReSiSTant: Large Riblet Surface with Super Hardnesss, Mechanical and Temperature Resistance by Nano Functionalization  EU – Alfa-Bird: Alternative Fuels and Biofuels for Aircraft Development (2008) EU – NEWAC: New Aero Engines Core concepts (2006)  Listing of current programs FWF I 2544 D-A-CH / TU Dresden: Full-Field Laser Vibrometry for Combustion Diagnostics FWF I 5392 D-A-CH / TU Dresden: FOUR-DIMENSIONAL MEASUREMENT OF THERMOACOUSTIC OSCILLATIONS |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. J. Gürtler, F. Greiffenhagen, J. Woisetschläger, R. Kuschmierz, J. Czarske (2020) Seedingless measurement of density fluctuations and flow velocity using high-speed holographic interferometry in a swirl-stabilized flame, Optics and Lasers in Engineering, 106481, 2. F. Greiffenhagen, J. Peterleithner, J. Woisetschläger, A. Fischer, J. Gürtler, J. Czarske (2019) Discussion of laser interferometric vibrometry for the determination of heat release fluctuations in an unconfined swirl-stabilized flame, Combustion and Flame 201:315-327 3. F.Greiffenhagen, J.Woisetschläger, J.Gürtler, J.Czarske (2019) Quantitative measurement of density fluctuations with a full-field laser interferometric vibrometer, Experiments in Fluids 61:9 (15pp) 4. J. Peterleithner, N.V. Stadlmair, J. Woisetschläger, T. Sattelmayer (2016) Analysis of Measured Flame Transfer Functions With Locally Resolved Density Fluctuation and OH-Chemiluminescence Data, Journal of Engineering for Gas Turbines and Power, 138, 031504 (9pp) 5. T. Leitgeb, T. Schuller, D. Durox, F. Giuliani, S. Köberl, J. Woisetschläger (2013) Interferometric determination of heat release rate in a pulsated flame, Combustion and Flame 160: 589–600 |

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| **Associated Partner Legal Name: UNIVERSITÉ DE SHERBROOKE (UdeS)** | |
| **General description** | UdeS is one of the largest universities in Québec, with the largest research growth in Canada, hosting about 40,000 students, almost 10% being international. UdeS has eight faculties, three training centres and six research institutes and 24 research centres including two international research laboratories with CNRS, the French institute of research. Among the latter, the CRASH-UdeS (Centre for Research in Acoustics-Signal-Human) brings together about thirty professors from different faculties of UdeS - engineering, medicine and health sciences, and humanities - as well as associate members from other universities. It covers all aspects of acoustics and has an international CNRS laboratory with the French laboratories LAUM (Le Mans), Ecole Centrale de Lyon and INSA Lyon. It hosts about 80 students, mostly in the PhD program. |
| **Key Persons and Expertise** | **Prof. Stéphane Moreau** obtained his engineering degree and MSc from ISAE-Supaéro (France) in 1988. He then got his PhD in Mechanical Engineering with a minor in Aeronautics and Astronautics from Stanford University in 1993. He then worked for a start-up company AC2 on plasma physics in 1994 where he developed the plasma micro-thruster concept used nowadays on most satellites. He then worked for a year at the turbo-engine builder Snecma (now Safran Aircraft Engines) on nozzle designs. Late 1995, he joined the automotive Tier-1 supplier Valeo where he worked for 13 years on engine cooling fan system design and promoted simulation in all branches of the company. He then joined the Mechanical Engineering faculty of Université de Sherbrooke in 2009 as an associate Professor. He became a full professor in 2011. His research topics include aeroacoustics, turbomachinery design and CFD (Computational Fluid Dynamics). He has more than 550 scientific publications with more than two third in aeroacoustics with significant contributions in analytical noise modelling, experimental noise measurements and large scale numerical aeroacoustics simulations noticeably for engine applications (requiring high power computing for instance). |
| **Key Research Facilities, Infrastructure and Equipment** | UdeS hosts the largest acoustic laboratory (included in the CRASH) in Canada. It has several unique facilities: a large semi-anechoic room coupled with a reverberant room, a sound field reproduction room and a world-class low noise acoustic wind tunnel. It also has several listening, recording and mixing studios. The aeroacoustics group is also among the largest users of high-power computing resources in Canada (clusters grouped under the Digital Research Alliance of Canada). |
| **Previous and Current Involvement in Research and Training Programmes** | Prof. Moreau is the holder of three industrial research Chairs covering all aspects of aeroacoustics, 2 in Canada (NSERC till 2013 in collaboration with Bombardier, PWC and Bell, and the current Chair in Aeroacoustics at UdeS with Airbus, Safran and Valeo) and 1 in France (ANR-ADOPSYS with Safran). He has also been associated partner in 2 previous Marie-Curie ITN grants: SMARTANSWER and zEPHYR. |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. M. Leyko, S. Moreau, F. Nicoud, T. Poinsot, “Numerical and analytical prediction of the indirect noise in a supersonic nozzle,” Journal of Sound and Vibration, 330 (16), 2011. 2. C.F. Silva, M. Leyko, F. Nicoud, S. Moreau, “Assessment of combustion noise in a premixed swirled combustor via LES,” Computers and Fluids, 78, 2013. 3. I. Duran, S. Moreau, T. Poinsot, “Analytical and numerical study of direct and indirect combustion noise through a subsonic nozzle,” AIAA Journal, 51 (1), 2013. 4. I. Duran, S. Moreau, “Solution of the quasi one-dimensional linearized Euler equations using flow invariants and the Magnus expansion,” Journal of Fluid Mechanics, 723, 2013. 5. T. Livebardon, S. Moreau, L. Gicquel, T. Poinsot, E. Bouty, “Combining LES of combustion chamber and an actuator disk theory to predict combustion noise in a helicopter engine,” Combustion and Flames, 165, 2016. 6. M. Ferand, T. Livebardon, M. Sanjose, S. Moreau, “Numerical prediction of far-field combustion noise from aeronautical engines,” Acoustics, 1, 2019. |

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| **Associated Partner Legal Name: UNIVERSIDAD CARLOS III DE MADRID (UC3M)** | |
| **General description** | UC3M was established on 5 May 1989. From the outset, it was intended to be a relatively small, innovative, public university, providing teaching of the highest quality and focused primarily on research.  UC3M´s mission is to contribute to the improvement of society through teaching of the highest quality and cutting-edge research in line with stringent international guidelines. The University aspires to excellence in all its activities, with the aim of becoming one of the top universities in Europe.  The university actively encourages the personal development of all those connected to the higher education community. All our activities are guided by the values of merit, ability, efficiency, transparency, fairness, equality and respect for the environment. It hosts more than 23 500 students and offers 113 Master’s degrees and 24 PhD programs. |
| **Key Persons and Expertise** | **Prof. Mario Sánchez Sanz** obtained his degree in Mechanical Engineering at the Universidad Carlos III de Madrid in 2002. He joined the PhD program of this university, obtaining his doctorate in May 2007 in the Mathematical Engineering program under the supervision of prof. Antonio Sanchez and prof. Amable Liñán.  After his graduation in May 2007, he moved to the School of Aeronautics of the Polytechnic University of Madrid with a postdoctoral fellowship "Juan de la Cierva". In November 2007 he got a position as an assistant professor that he abandoned in September 2011. During that time, he was awarded two times with the "Jose Castillejo" postdoctoral fellowship (2008 and 2010) for research stays abroad, that he used to initiate a research collaboration with the mechanical departments of Yale University and the University of California at Berkeley. In 2023 he obtained a Fulbright fellowship to spend 4 months in the University of California in San Diego. He has been the director of the Fluid Mechanics PhD program at UC3M since June 2017 to September 2024. His research topics include aeroacoustics, experimental and numerical combustion and fluid mechanics.  **Prof. Eduardo Fernández Tarrazo** holds a 6-year degree in Aeronautical Engineering (1989) from the School of Aeronautics in Madrid. After his graduation, he worked for Pratt & Whitney (East Hartford, Connecticut) as part of Iberia Airlines engineer training program. Back in Spain, he worked as Research Engineer at the National Establishment for Aerospace Research (INTA) until 2007, both before and after completing his PhD.  He obtained a PhD in Aeronautical Engineering, under the supervision of Prof. Amable Liñán, in 2003. His dissertation dealt with non-premixed flame fronts propagation (diffusion flame anchoring near an injector and diffusion flame propagation over solid fuels).  **Prof. César Huete** received his 5-year degree in Mechanical Engineering at the University of Castilla-La Mancha (UCLM) in 2007. He earned his PhD at the same university in connection with UNED in 2012. The thesis, supervised by Prof. Gustavo Wouchuk, was focused on the theoretical study of the interaction of shock waves with weak turbulent flows. After completing his PhD, he moved to the University Carlos III de Madrid. There, he focused on the interaction of thin detonation waves with turbulent flows. Subsequently, in 2013, he moved the University of California San Diego (UCSD), where he worked alongside Professors Forman A. Williams and Antonio L. Sánchez. This research at UCSD encompassed investigations into the interaction of detonations with small-scale turbulent flows, the impact of weak shocks on transonic mixing layers, and the **i**gnition of reactive mixing layers through oblique shock impingement, supported by a project grant from Fundación Iberdrola España. Presently he is working at the combustion group at UC3M. |
| **Key Research Facilities, Infrastructure and Equipment** | • A test rig for high pressure combustion with full optical access.  • Microphones and pressure transducers  • Stereoscopic particle-image-velocimetry (PIV)  • A Photron FASTCAM Nova S12 1000k camera system  • Dozen thermocouples,  • Vertical and horizontal Schlieren set-up |
| **Previous and Current Involvement in Research and Training Programmes** | PI of 5 projects related to combustion and flame-acoustic interaction.  PI of 3 projects related to hydrogen combustion safety with AIRBUS.  All the research facilities are independent and fully owned by University Carlos III (UC3M). |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | [1] M. Rubio-Rubio, F. Veiga-López, D. Martínez-Ruiz, E. Fernández-Tarrazo, M. Sánchez Sanz. “Suppression of thermoacoustic instabilities by flame-structure interaction”,  Proceedings of the Combustion Institute 39 (2023), 1577-1585  [2] E. Flores-Montoya, V. Muntean, M. Sánchez-Sanz, D. Martínez-Ruiz. “Non-adiabatic modulation of premixed flame thermoacoustic frequencies in slender tubes”, Journal of Fluid Mechanics 933 (2022), A50  [3] F. Veiga-López, D. Martínez-Ruiz, M. Kuznetsov, M. Sánchez-Sanz.  “Thermoacoustic analysis of lean premixed hydrogen flames in narrow vertical channels”, Fuel 278 (2020) 118212  [4] F. Veiga-López, D. Martínez-Ruiz, E. Fernández-Tarrazo, M. Sánchez-Sanz. “Experimental analysis of oscillatory premixed flames in a Hele-Shaw cell propagating towards a closed end"  , Combustion and Flame 201 (2019) 1-11  [5] D. Martínez-Ruiz, F. Veiga-López, M. Sánchez-Sanz. “Premixed-flame oscillations in narrow channels”, Physical Review Fluids 4 (2019), 100503 |

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| **Associated Partner Legal Name: UNIVERSITÉ PARIS-SACLAY (UPSaclay)** | |
| **General description** | **Université Paris-Saclay (UPSaclay)** is one of the leading French and European universities, rated 15th in the 2023 Shanghai ranking and recognised for the quality of both its educational programmes and teaching staff. The university also boasts high international visibility thanks to the reputation of its 275 research laboratories and their teams and provides outstanding daily support for the integration and development of 65,000 multicultural students. UPSaclay is composed of 10 constituent faculties, 4 graduate schools, a prestigious mathematics institute - Institut des Hautes Études Scientifiques, and works with 6 of the most prestigious French research organisations (CEA, CNRS, INRAE, INRIA, Inserm and Onera). UPSaclay is a leading institution located in a vast region ideal for studying, working and lifestyle. Université Paris-Saclay currently represents 13% of France’s research potential. Located in the south of Paris on vast sites that stretch across Paris, Orsay, Évry and Versailles, Université Paris-Saclay benefits from a strategic geographical and socio-economic position that is strengthened by its international visibility.  **University Paris-Saclay** will participate and contribute to the research, innovation and training activities as planned in this project. In particular, the University Paris-Saclay will be involved in delivering a Doctoral Degree and in ensuring personalized scientific supervision of highest quality as well as collective training.  **Tuition fees for the PhD research, training and/or PhD degree programme will be covered by the beneficiary recruiting the PhD from his project budget.** |
| **Key Persons and Expertise** | The **Doctoral College of UPSaclay** is in charge of coordinating and pooling the activities of its 20 Doctoral Schools, which provide training for both scientific and complementary skills for PhD students enrolled. Its goal is to define a common doctoral policy and implement high standards and effective governance. It offers a unique doctoral studies’ programme to 5,000 PhD students and delivers one common doctoral degree. The doctoral students of the project will be registered in the Doctoral School "Physics in Ile de France". **Sylvie Pommier is the Vice President of UPSaclay, in charge of the Doctoral programmes.** |
| **Key Research Facilities, Infrastructure and Equipment** | All recruited researchers of this MSCA-DN enrolled in the UPSaclay Doctoral College will have access to a comprehensive catalogue on doctoral seminars and courses of transversal, disciplinary and general educational programmes.  The Doctoral students of UPSaclay benefit from an exceptional scientific environment, including equipment and infrastructure such as Synchrotron, ImaGif, Neurospin, 12 infrastructures included in the ESFRI Roadmap, and several FABLab. |
| **Previous and Current Involvement in Research and Training Programmes** | **Previous ITN Projects**: **INDEED** (722176), **TubInTrain** (860070), **WALL** (608031); **Current ITN/DN projects**: **Evomet** (955951), **T-OP** (955575), **MagnEfi** (860060).  Current Cofund: **Demythif.AI** (101127936) |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | Doctoral Charter for doctoral students based on European recommendations: https://www.universite-paris-saclay.fr/en/research/doctoral-charter |

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| **Associated Partner Legal Name: SAFRAN AIRCRAFT ENGINES (SAE)** | |
| **General description** | Safran Aircraft Engines designs, develops, produces and markets, alone or in cooperation, engines for civil and military aircraft, satellites and space vehicles. Safran Aircraft Engines also offers airlines, armed forces and aircraft operators a complete range of services for their engines and fleet management.  A part of the international high-tech Safran group, the design, development and production capabilities are behind some of the most innovative technological advances in the world. The company Research & Technology contributes to the ambitious objectives of the aeronautics industry in terms of respect for the environment, by making it possible to develop ever more economical and silent engines. |
| **Key Persons and Expertise** | **Dr. Yoann Méry** is head of the combustion team at Safran Aircraft engines which develops combustion chambers and afterburners for civil and military aircrafts. He is a combustion and thermoacoustics expert. He is author and co-author of several journal and conference papers on thermoacoustics and has contributed to the supervision of several PhD students. |
| **Key Research Facilities, Infrastructure and Equipment** | Several full-scale turbofan engines test benches. |
| **Previous and Current Involvement in Research and Training Programmes** | Safran Aircraft Engines was part of several European research programs, for example:   * JETSCREEN, MERMOSE on Sustainable Aviation Fuel * TLC, IMPACT-AE, LEMCOTEC which focused on the development of Lean Burn combustion chamber technology (with special interest on combustor acoustic response) |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | [1] Y. Méry, Dynamical response of a perfectly premixed flame and limit behaviour for high power density systems, Combustion and Flame (2018)  [2] F. Ni, F. Nicoud, Y. Méry, G. Staffelbach, Including flow-acoustic interactions in the Helmholtz computations of industrial combustors, AIAA Journal (2018)  [3] M. Gonzalez-Flesca, P. Scouflaire, T. Schmitt, S. Ducruix, S. Candel, Y. Méry, Reduced order modeling of combustion instabilities in liquid rocket engines, AIAA Journal (2018)  [4] F. Lacombe, Y. Méry, Mixed Acoustic-Entropy Combustion Instabilities in a Model Aeronautical Combustor: Large Eddy Simulation and Reduced Order Modeling, Journal of Engineering for Gas Turbines and Power (2017)  [5] Y. Méry, Impact of heat release global fluctuations and flame motion on transverse acoustic wave stability, Proceedings of the Combustion Institute, 2016  [6] Y. Méry, L. Hakim, P. Scouflaire, L. Vingert, S. Ducruix, S. Candel, Experimental investigation of cryogenic flame dynamics under transverse acoustic modulations, Comptes Rendus Mécanique 341 (1), 100-109 (2013) |

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| **Associated Partner Legal Name: Ansaldo Energia (AE)** | |
| **General description** | Ansaldo Energia is a full-service provider of proven, flexible solutions for the power generation industry. With its well-established know-how, the company covers every stage in the design, construction, commissioning, servicing and maintenance of heavy-duty gas turbines. Ansaldo Energia has worked and is already working in solutions for using hydrogen as fuel in the gas turbines of the fleet. |
| **Key Persons and Expertise** | **Dr. Giovanni Campa**, combustor thermoacoustic engineer in Ansaldo Energia for 11 years. Main expertise in industrial and computational thermoacoustics. Key person and supervisor of PhD students in two former MSCA projects (TANGO and POLKA). Supervisor of several PhD and MSc students. Author and co-author of several journal and conference papers. 2 industrial patents.  ORCID: 0009-0000-2016-5337  **Dr. Alberto Amato**, combustor modelling engineer in Ansaldo Energia for 10 years. Main expertise in numerical simulation of flame dynamics. Supervisor of several PhD and MSc students. Author and co-author of several journal and conference papers.  SCOPUS: 57214392935 |
| **Key Research Facilities, Infrastructure and Equipment** | Numerical models have been developed and are in continuous evolution to be able to reproduce all the relevant mechanisms for flame stabilization and for detecting the flame dynamics. Some experimental tests have been done both in laboratory scaled rigs and in commercial engines with small amounts of hydrogen in the fuel blend. |
| **Previous and Current Involvement in Research and Training Programmes** | FP7-PEOPLE-2012-ITN - TANGO – Grant agreement ID: 316654  H2020-MSCA-ITN-2018 - POLKA – Grant agreement ID: 813367  HORIZON-JTI-CLEANH2-2022-04-04 - FLEX4H2 – Grant agreement ID: 101101427 |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Kutkan, H, Amato, A, Campa, G, Tay-Wo-Chong, L, & Æsøy, E. "LES of Turbulent Premixed CH4/H2/Air Flames With Stretch and Heat Loss for Flame Characteristics and Dynamics." Proceedings of the ASME Turbo Expo 2022. V03BT04A021. 2. Kutkan, H., Amato, A., Campa, G., Ghirardo, G., Tay Wo Chong, L., & Æsøy, E. (2022). “Modeling of Turbulent Premixed CH4/H2/Air Flames Including the Influence of Stretch and Heat Losses”. Journal of Engineering for Gas Turbines and Power, 144(1). 3. Iurashev, D., Campa, G., Anisimov, V. V., & Cosatto, E. (2017). “Two-step approach for pressure oscillations prediction in gas turbine combustion chambers”. International Journal of Spray and Combustion Dynamics, 9(4), 424-437. |

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| **Associated Partner Legal Name: ROLLS-ROYCE DEUTSCHLAND LTD & CO KG (RRD)** | |
| **General description** | Rolls-Royce Deutschland Ltd & Co KG (RRD) is part of the Rolls-Royce Aerospace Group and is responsible for the design, development, certification, manufacture, service and overhaul of aero-engines with the particular focus on large business jet applications. RRD is a leading partner in major European and national research projects supporting the development of future clean and quiet aero engines. With the recent certification of the new Pearl propulsion system family significant improvements have been achieved to lower the emissions and noise footprint of a business jet engine.  Within its combustion section of the Hot End department, RRD develops and optimizes advanced combustion concepts based on conventional RQL and lean burn concept, for kerosene and alternative fuels (SAF and Hydrogen) for the next generation aero-engines. In this context, the Rolls-Royce group supports the so-called University Technology Centers, in which RRD strongly interacts with universities and research institutes worldwide. |
| **Key Persons and Expertise** | **Dr. Claus Lahiri** is leading the global thermoacoustics team within the Rolls-Royce Group. He brings along more than 16 years of experience in thermoacoustics covering aero-engine development and academic research.  **Dr. Ruud Eggels** is the manager of the combustion method section within the ES-2 Combustion and Turbine Subsystem department at RRD. The section is responsible for research, numerical combustion, experimental investigations, and combustor technology development. He is well-known in the combustion community and coordinates the so-called Universities Technology Center, in which RRD strongly interacts with universities and research institutes worldwide. He has already co-supervised a lot of doctoral works. |
| **Key Research Facilities, Infrastructure and Equipment** | HPC facilities, experimental facilities (low TRL up to full engine testing) |
| **Previous and Current Involvement in Research and Training Programmes** | The research team has been involved in several EU Research projects related to thermoacoustics, hydrogen combustion and low emission combustion: HESTIA, RECORD, IMPACT-AE, SOPRANO, ESTIMATE |
| **Relevant Publications/datasets/ softwares/ Innovation Products/ other achievements** | 1. Reinhardt, H., Alanyalioglu, C., Fischer, A., Lahiri, C., and Hasse, C. "A Hybrid, Runtime Coupled Incompressible CFD-CAA Method for Analysis of Thermoacoustic Instabilities." ASME. J. Eng. Gas Turbines Power. March 2023; 145(3): 031003. 2. Alexander J. Eder, Andre Fischer, Claus Lahiri, Max Staufer, Ruud Eggels, Camilo F. Silva, and Wolfgang Polifke. “Identification of the dynamics of a turbulent spray flame at high pressure”. Symposium on Thermoacoustics in Combustion, 11-14 September 2023, ETH Zurich, Zurich, Switzerland, 2023. 3. Fischer, A. & Lahiri, C. "Ranking of Aircraft Fuel-Injectors Regarding Low Frequency Thermoacoustics Based on an Energy Balance Method." ASME Turbo Expo 2021, GT2021-59561. 4. Eggels, R.L.G.M. “The application of combustor LES within industry”, Proceeding of the ERCOFTAC Workshop Direct and Large Eddy Simulation 10, Cyprus, 2015, ERCOFTAC Series, 2018C. 5. Lahiri, F. Bake, “A review of bias flow liners for acoustic damping in gas turbine combustors” Journal of Sound and Vibration, Volume 400, 2017, Pages 564-605. |

**END PAGE**

MARIE Skłodowska-CURIE ACTIONS

**Doctoral Networks (DN)**

**Call:** **HORIZON-MSCA-2024-DN-01-01**

PART B

HyNOISE

**This proposal is to be evaluated as:**

**[DN]**