SPACE PROPULSION 2012

7TH – 10TH MAY 2012
BORDEAUX
CONVENTION CENTRE
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SP2012 PRELIMINARY PROGRAMME

Sunday 6th May 2012

18:30-19:30	**Registration**
19:30-20:30	**Welcome Cocktail - PULLMAN HOTEL**

Monday 7th May 2012

8:30-9:30	**Registration**
9:30-10:30	**ESA-3AF CONFERENCE INTRODUCTION** M. SCHELLER, President, Association Aéronautique et Astronautique de France (3AF) J-J. DORDAIN, Director General, European Space Agency (ESA) C. FEICHTINGER, Executive Director, International Astronautical Federation (IAF) G. SACCOCCIA & P-G. AMAND, Conference Chairs
10:30-11:00	Coffee Break
11:00 - 12:30	**SESSION 1 - ROUND TABLE ON SPACE MISSIONS: MID AND LONG TERM POLICIES** Moderator: P. DE SELDING (SPACE NEWS) Invited Speakers: J-J. DORDAIN, Director General, European Space Agency (ESA) M. EYMARD, Director of Launchers, CNES S.SCIMEMI , Deputy, International Space Station, Human Exploration and Operations Mission Directorate, NASA C.QIUFA, Administrator, CNSA S. SCHLECHTRIEM, Director, DLR-Institute of Space Propulsion D. PARKER, Director of Technology and Programmes, UK Space Agency E.SAGGESE, President, Italian Space Agency
12:30 - 13:30	Lunch

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13:30 - 15:00	**SESSION 2 - AGENCY VIEWS ON PROPULSION FOR LAUNCHERS, SPACECRAFT AND EXPLORATION VEHICLES** Chairs:C.STAVRINIDIS, F.ROSSI (ESA) Invited Speakers: A. FABRIZI, Director of Launchers, European Space Agency (ESA) F.ONGARO, Director of Technical and Quality Management (ESA) M. EYMARD, Director of Launchers, Centre National d'Etudes Spatiales (CNES) B.K. SMITH, Director, Space Flight Systems, NASA Glenn Research Center D. THOMAS, Associate Director, Technical, Marshall Space Flight Center S.MOSOLOV, Director, Liquid Propulsion Center, Keldysh Research center, Russia
15:00 - 15:30	Coffee Break
15:30 - 17:30	**SESSION 3 - NEXT STEPS IN SPACE PROPULSION: AN INDUSTRIAL AND OPERATOR PERSPECTIVE** Moderator: J.P. TORTORA (EUROSPACE) Invited Speakers : L. LAURENT, Director of programmes, ARIANESPACE D BAIR, Chief Technical Officer, EUTELSAT Communications H.GILIBERT, Chief Technical Officer, Astrium Space Transportation C. LAZARO, Deputy Technical Officer, Thales Alenia Space H.AUSTRUY, Chief Excecutive Officer, Safran-SME A. ROHNE, Director of Propulsion, Astrium GmbH – Space Transportation R. MEYERS, General Manager, Aerojet Redmond-Operations K. ISHII, President of IHI Aerospace J.HENNIG, President, Moog Inc, Space & Defense Group V. MURASHKO, Director and General Designer of the Experimental Design Bureau "Fakel", Kaliningrad J.YATES, Strategy Board, UK Government P.G.LASAGNI, Chief Excecutive Officer, Avio Space M. SION, Vice President Space Engines, SNECMA
19:30 - 23:30	**Cocktail - Château Sogeant** **30 route de Cénac BP 7 - 33880 Saint Caprais de Bordeaux - Tel : 05.56.20.71.20**

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Tuesday 8th May 2012

09:00 - 10:00	**KEYNOTE SPEECHES** **Technologies for Space Exploration** G.SACCOCCIA, Head of Propulsion & Aerothermodynamics, ESA-ESTEC					
10:00 - 10:30	Coffee Break					
Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 1 - SC - Electric Propulsion Systems (Hal Effect Thrusters)	Session 2 - SC - Propulsion Components - Chemical	Session 3 - SC - Green Propulsion for Spacecraft	Session 4 - Space Transportation Roadmaps	Session 5 - ST - Solid propulsion 1	Session 6 - Overview of Current Programmes - Agencies
Chairmen	M.Andrenucci (ALTA) M.Patterson (NASA)	R.Voeten (MOOG-Bradford) N.Goody (ESA)	K.Anflo (ECAPS) M.Smith (ESA)	P. Fortunier (CNES) K. Okita (Jaxa)	D. Boury (SPS) G. Vigier (Astrium)	P-G. Amand (SAFRAN-SME/3AF) M.F. Rossi (ESA)
10:30 - 10:50	Alta's HT-400 D. DIGNANI - Alta SPA	Sentinel-3 propulsion subsystem calibrated trimming orifice design and qualification F. LAVERTY - Thales Alenia Space	Replacement of conventional spacecraft propellants with green propellants F. VALENCIA BEL - ESA	Enabling a national engine to meet the needs of future upper stage in-space ap WITHDRAWN J. LEAHY - NASA	Variations of solid rocket motor preliminary design for small TSTO launcher E. DUMONT - DLR	NASA Technology roadmap for in-space propulsion technology L. MICHAEL MEYER - NASA
10:50 - 11:10	Performances of a variable channel width hall thruster using xenon and krypton S. MAZOUFFRE- ICARE, CNRS	Experimental investigation of the catalyst life characteristics of the 4N hydrazine monopropellant thruster G. FUJII - JAXA	Regeneratively cooled liquid oxygen/methane technology development between C. GREENE - UTRC	H-IIA upgrade – Evolving plan of Japanese primary launch system M. ATSUMI - Space Systems	Overview of large solid rocket motor solutions for new generation launcher A. COPEY - Safran SPS	Overview of chemical propulsion activities M. FORD - ESA-ESTEC
11:10 - 11:30	PPS NG Hall effect thruster addressing extended propulsive mission V. VIAL - Snecma-Safran	Feasible study on ignition system candidates for HAN based propellant T. IIZUKA - Tokyo Metropolitan University	Determination of fluid properties of the green propellant FLP-106 and related material and component testing with regard to applications in space missions H. CIEZKI - DLR	Concept Study of Japan's Next Flagship Launch System,H-X K. OKITA - JAXA	Five-segment solid rocket motor development status A. PRISKOS - NASA-MSFC	Galileo FOC OCS: A joint US-European approach to monoprop systems for constellations M. MARCHIONNI - ESA
11:30 - 11:50	Next generation of thruster module assembly (TMA-NG) : advanced solution for electric orbit raising and station keeping A. LORAND - Snecma-Safran	Experimental study of cryogenic swirl flow at sub to supercritical condition S. CHO - Seoul National University	Two years of in-space demonstration and qualification of an ADN-based propulsion system on prisma K. ANFLO - ECAPS	NASA's Launch propulsion systems technology roadmap P. MC CONNAUGHEY - NASA	VEGA Solid stages post-static firing tests reconstruction : sensitivity analysis and data correlation E. CAVALLINI - University of Rome	Overview of NASA's in-space propulsion technology program for future science missions D. ANDERSON - NASA
11:50 - 12:10	Measurements of plasma properties in the plume of a hall effect thruster K. DANNENMAYER - ICARE, CNRS	MON Propellant tank reloading, decontamination and reloading WITHDRAWN S. MARTIAN - Thales Alenia Space	Development of a novel green propellant propulsion system M. DRUBE - Surrey Satellite Technology	Technology maturation in the frame of the FLPP high thrust liquid propulsion programme T. KACHLER - ESA-ESTEC	Very large monolithic motor project for European future launcher family D. BOURY - SPS	ESA Electric propulsion activities J. GONZALEZ DEL AMO - ESA
12:10 - 12:30	VUV radiation in a hall effect thruster used for the positioning of geostationary satellites L. DA SILVA - Instituto Superior Technico	Development and qualification of a silica free diaphragm for space propellant tanks R. BELLAROSA - MT Aerospace Satellite Products	Suggestion for the unified specific impulse as an alternative selection criterion for green propellants W. BOUAJILA - DLR	Main tendency of strategy of NPO energomash in current conditions V.S. SUDAKOV - NPO Energomash	Overview of safran activities on vega launcher D. BOURY - SPS	Current and planned activities for electric propulsion N. PUETTMANN - DLR
12:30 - 14:00	Lunch					

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Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 7 - SC - Electric Propulsion Systems (Helicon and Hollow Cathode Thrusters)	Session 8 - SC - Propulsion Components - Electric	Session 9 - SC - Modelling - Chemical Propulsion	Session 10 - ST - Liquid propulsion Turbomachineries	Session 11 - ST - Nozzle Extensions and Thrust Vectoring Control	Session 12 - Overview of Current Programmes
Chairmen	D.Pavarin (Padua University) C.Edwards (ESA)	G.Matticari (Selex Galileo) J.Gonzalez del Amo (ESA)	J.Muylaert (Von Karman Institute) M. Ford (ESA)	F. Jean (Snecma) N. Ierardo (ESA)	U. Palmnas (VOLVO E. Gautronneau (SPS)	G.Saccoccia (ESA) N. Manesse (Snecma)
14:00 - 14:20	The effect of plasma source surface area on helicon double layer thruster performance T. HARLE - University of Surrey	Small GEO xenon propellant supply assembly : pressure regulation panel test results and comparison with EcosimPro predictions S. NACLERIO - IberEspacio	Numerical modeling of the thermal behavior of rafael hydrazine thrusters L. APPEL - Rafael	The cavitating pump rotordynamic test facility at Alta SPA : upgraded capabilities of a unique test rig L. TORRE - Alta SPA	Thrust shock vector control of an axisymmetric rocket nozzle via transverse gas injection V. ZMIJANOVIC - ICARE, CNRS	A study for Mars manned exploration D. DORNEY - NASA-MSFC
14:20 - 14:40	Design, development and characterization of the helicon plasma thruster of the EU FP7 HPH.com program D. PAVARIN - University of Padua	A new xenon flow control unit for micropropulsion WITHDRAWN T. HARMANN - AST	Improvement and validation of low g sloshing modelling for Spacecraft applications B. BUSSET - Astrium	Overview of the propellant electric pump (ISP-1 project) A. LEMAITRE - Snecma	VINCI Engine composite nozzle extension. Development status after the first test firing campaign T. PICHON - SPS	LISA Pathfinder micropropulsion subsystem : an overview of available European micropropulsion options P. BIANCO - Astrium
14:40 - 15:00	RF hollow cathode microthruster : simulation, plasma parameters and thrust measurements C. CHARLES - Australian National University	Weldless liners for high pressure storage COPV F. FERNANDES - Omnidea, Lda	Experimental characterization of the priming phase using a propellant line mock-up M. LEMA - Von Karman Institute	Compressible multi-phase and multi-scale cavitation model D. LIUZZI - University of Rome	The SWAN Vulcain 2 sandwich nozzle program, an option for improving ariane L. BROX - Volvo Aero Corporation	Development and qualification of the BepiColombo electric propulsion system H. GRAY - Astrium
15:00 - 15:20	A reduced-order model of a low-current orificed hollow cathode" and it will present a newly developed numerical model for the performance evaluation of hollow cathodes for Hall thruster applications R. ALBERTONI - Alta SPA	Interaction of pressurised xenon with elastomeric seals G. MORRIS - Astrium	Combustion mechanism of binary mixtures with energetic binder and active or inert filler S.A. RASHKOVSKIY - Institute for Problems in Mechanics RAS	High-speed permanent magnet motor to drive cryogenic pump L. DLUGIEWICZ - Mikroma	More electric launchers. A status of SRM electro-mechanical thrust vector control systems (EMTVC) D. DESCAMPS - SABCA	High power electric propulsion technology for space exploration (Hiper) : results and consolidation of scenarios T. MISURI - Alta SPA
15:20 - 15:40	Completion of HET and RIT characterization with atmospheric propellants D. DIGNANI - Alta SPA	Fibre reinforced titanium matrix composites for xenon propellant tanks S. KYLE-HENNEY - TISICS	Model of Ignition of conventional and nano aluminum particles covered with aluminum oxide film S.A. RASHKOVSKIY - Institute for Problems in Mechanics RAS	Set-up and testing activities at the FAST3 test stand for LCH4 turbopumps N. IERARDO - AVIO SPA	Thrust vector control flight preparation and flight data exploitation T. VANTHUYNE - SABCA	Prospects of dvina-TM unified transport module with electric propulsion V.G. PETUKHOV - RIAME
15:40 - 16:00	A hollow cathode thruster performance model D. FROLLANI - Mars Space	Modular Multi-application Electric Propulsion Diagnostic Package (MM-EPDP) for advanced characterization of the Electric Propulsion – spacecraft interactions G. MATTICARI - Thales Alenia Space	Validation program for propulsion system propellant tubing R. KILLINGER - Astrium	Space propulsion applications for high enthalpy solid hydrogen gas generation P. YVART - SME Safran	Simulation of the dynamic response of the electro-mechanical actuators of SRMs during the ignition transient application to P80 E. BANDELIER - SPS	The FP7 SPARTAN Program status and achievements G. PARISSENTI - Thales Alenia Space
16:00 - 16:30	Coffee Break					

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Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 13 - SC - Electric Propulsion Systems (Ion Thrusters)	Session 14 - SC - Cold Gas and Chemical Propulsion Systems	Session 15 - SC - Modelling - Electric Propulsion	Session 16 - ST - Solid propulsion 2	Session 17 - ST - Liquid propulsion Combustion Chambers and Cooling Technics	Session 18 - Overview of Current Programmes - Programmes and Companies
Chairmen	R.Killinger (ASTRIUM) B.Fallis (ESA)	D.Gale (ASTRIUM) M.Ford (ESA)	L.D'Agostino (ALTA) J.Longo (ESA)	M. Biagioni (Avio) E. Robert (CNES)	O. Haidn (DLR) M. Atsumi (MHI)	E. Abriat (Moog) A. De Lillis (ASI)
16:30 - 16:50	Performance and efficiency study of miniaturized inductive coupled ion thrusters H. NEUMANN - IOM Leipzig	Production and acceptance of the GAIA cold gas micro propulsion system : status of flight hardware activities and outlook on near future perspectives G. MATTICARI - Thales Alenia Space	Particle In cell simulation of FEEP thruster plume based on the PICPlus code L. PAITA - Alta SPA	Preparation, characterization and thermal stability of gamma alane AlH3 Y. BATONNEAU - LACCO, University of Poitiers	Design and testing status of closed cycle combustion devices within the future launcher preparatory programme R. STRUNZ - Astrium	Aerojet propulsion for next generation GEO comsat platforms C. FRED WILSON - Aerojet
16:50 - 17:10	Operation of the PEGASES thruster with Xe S. MAZOUFFRE - ICARE, CNRS	Engineering validation model for the Exomars bi-propellant propulsion subsystem S. PAVON - OHB-System AG	Electric propulsion plume impingement studies tools for GEO satellites A. DEMAIRE - OHB Sweden	Validation of a new numerical platform CEDRE for the simulation of solid rocket motor ignition transient T. PEVERGNE - SPS	Influence of coolant flow direction on flowfield and heat transfer characteristics in a regeneratively cooled thrust chamber H. NEGISHI - Japan Aerospace Exploration Agency	OHB System's propulsion achievements. Heritage and prospects M. PEUKERT - OHB System AG
17:10 - 17:30	Bepi-Colombo high power propulsion electronics challenges and performances J. PALENCIA - Astrium	Electrolytic decomposition of HAN monopropellant in microscale of Alumina-PDMS composite K.S. KOH - University of Nottingham Malaysia Campus	Simulation of interactions between spacecraft and electric thrusters using the SPIS tool M. WARTELSKI - Astrium	Iron oxide catalysts for composite solid rocket propellants A. REINA - Politecnico di Milano	Flowfield and heat transfer characteristics of a GH2/LOX calorimeter chamber with muliti-injector elements Y. DAIMON - Japan Aerospace Exploration Agency	Propulsion systems for Boeing's CST-100 Spacecraft T. LORIER - Pratt & Whitney Rocketdyne
17:30 - 17:50	Investigation of an RF ion source characteristics with discharge chambers made of different materials H. LOEB - Giessen University	Design and development of a dual mode bipropellant propulsion system for the European student moon orbiter L. FERRARIO - Politecnico di Milano	Simulation of the interactions between a hall thruster and the Dubai-Sat 2 low earth orbit satellite using SPIS J.Y. LEE - Korea Advanced Institute of Science and Technology	Internal ballistic model with erosion characterization for high performance SRMS E. CAVALLINI - University of Rome	Prediction of wall thermal behavior in regeneratively-cooled thrust chambers M. PIZZARELLI - University of Rome	Development and progress of a long life 1N monopropellant hydrazine thruster N. SOLWAY - AMPAC ISP
17:50 - 18:10	Development, integration and test of a power control unit for mini-RIT ion thruster L. CERUTI - SELEX GALILEO SPA	ESMO Cold gas propulsion system D. GIBBON - Stuttgart University	Experimental investigation of two interacting thruster-plumes downstream of the nozzles A. HOLZ - DLR	Experimental observation of carbon composite ablation under impact of alumina droplets P. FUZET - CNES-SPCTS	Accelerating fluid-structure interaction analyses applied to cooled rocket thrust chambers D.S.C. KOWOLLIK - Institute of Aircraft Design and Lightweight Structures	SGEO Development status and electric propulsion subsystem overview M. DE TATA - OHB System AG
	14:00 - 18:00 ESPSS Overview & Workshop Chaired by J. Steelant (ESA), Francesco Di Matteo (ESA) and Marco De Rosa (ESA)					

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08:30 - 09:00	**KEYNOTE SPEECH** **Taking the Next Step: Innovative Uses of Nuclear Energy for Space** S.HOWE, Director, Center for Space Nuclear Research					
Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 19 - SC - Electric Propulsion Systems (PPTs and Electrothermal Thrusters)	Session 20 - SC - Chemical Propulsion Systems - General	Session 21 - SC - Modelling - Electric Propulsion	Session 22 - ST - Liquid propulsion Combustion 1	Session 23 - ST - Solid propulsion 3 & Pressure oscillations	Session 24 - ST - Hypersonic Propulsion
Chairmen	R.Meyers (Aerojet) M.Andrenucci (ALTA)	J.M.Autric (Astrium) C.Hunter (ESA)	E.Ahedo (Madrid University) M.Martinez Sanchez (MIT)	M. Habiballah (Onera) G. Langel (Astrium)	P Cloutet (SAFRAN SME) E. Robert (CNES)	M. Sippel (DLR) S. Triqueneaux (Air Liquide)
09:00 - 09:20	Effect of Inductive Coil Geometry on the Performance of a Pulsed Inductive Plasma Thrusters A.K. HALLOCK - NASA	Description of the propulsion architecture for the Exomars EDL Demonstrator Module (EDM) F. DE DINECHIN - Thales Alenia Space	Advanced simulation of magnetic nozzles for plasma thrusters E. AHEDO - Universidad Politécnica de Madrid	Thermodynamic analysis of liquid core presence in supercritical injection D. BANUTI - DLR	Ariane 5 SRM pressure and thrust oscillations A. ESNAULT - SPS	Design of the gas sub-system for LEA S. TRIQUENEAUX - Air Liquide
09:20 - 09:40	Ablative pulsed plasma thruster for the small satellite " Soyuz-Sat-O " V. TYUTIN - RIAME	Further development of the ATV 200N bipropellant thruster S. KRAUS - Astrium	Hall thruster lifetime modeling with an axisymmetric PIC model WITHDRAWN I. HOI - Tech-X Corporation	Validation of turbulent combustion models for 3D-Simulations of liquid H2-O2 rocket combustors B. IVANCIC - Astrium	Reduction of SRM pressure oscillations through the use of bevelled fuel grains J. ANTHOINE - ONERA	Design and optimization of a small scale M=8 scramjet propulsion system T. LANGENER - ESA-ESTEC
09:40 - 10:00	Assessment of the plasma characteristics during the discharge of an ablative pulsed plasma thruster T. SCHÖNHERR - University of Tokyo	Exomars trace gas orbiter reaction control system R. LESCOUZERES - OHB System AG	Three-dimensional fully kinetic particle-in-cell model of hall-effect thruster F. TACCOGNA - CNR	Large eddy simulation of bluff-body stabilised jets and nonpremixed flames N. SALVADOR - INPE	Segmented SRM pressure oscillation demonstrator-POD-X program E. GAUTRONNEAU - SPS	Development of high-speed airbreathing propulsion technologies and its application in space transportation systems WITHDRAWN F. FALEMPIN - MBDA
10:00 - 10:20	Development of 125 mN and 250 mN Resisto-jet Thrusters A. PASSARO - Alta SPA	IXV Reaction control system O. MAILLAN - Thales Alenia Space	FEM Analysis of hall thrusters F. SHAFIEI - Sharif University of Technology	Experimental flashing jet thermal characterization by non intrusive optical techniques M.R. VETRANO - Von Karman Institute for Fluid Dynamics	SRM Aero-acoustics resonance numerical simulation by means of Q1D model E. CAVALLINI - University of Rome	Pre-cooler design and development for combined-cycle engines R. BOND - Reaction Engines
10:20 - 10:40	Design and performance study of a low thermal inertia resistojet model A. KOBIERA - Warsaw University of Technology	Progress towards realisation of a 1.1 kN apogee engine for interplanetary propulsion L. NAICKER - Ampac-ISP	Model for predicting the performance of a hall effect thruster fed with non-conventional propellants T. MISURI - Alta SPA	Identification of high temperature dusted flows by means of local disturbance method I. KUZNETSOV - Baltic State Technical University	An experimental investigation of relationship between local burning rate and isochrone surface during slurry casting process of solid propellant grains H. HASEGAWA - NOF Corporation	Injector layout optimization for the LAPCAT MR2 Mach 8 Cruiser J.J. VELLARAMKALAYIL - University of Stuttgart
10:40 - 11:10	Coffee Break					

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Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 25 - SC - Propulsion Components - Electric	Session 26 - SC - Chemical Propulsion Systems - Flight Testing and Experience	Session 27 - SC - Advanced Propulsion Systems	Session 28 - ST - Liquid propulsion Stages	Session 29 - ST - Hybrid propulsion 1	Session 30 - ST- Launcher's Attitude Control Systems 1
Chairmen	V.Kim (Riame) S.Mazouffre (ICARE-CNRS)	M.Pessana (Thales Alenia Space) D.Gibbon (SSTL)	L.Johnson (NASA) E.Gengembre (ESA)	S. Bianchi (Air Liquide) K. Schäffer (DLR)	P. Gautier (SAFRAN-SME) M. De Rosa (ESA)	N. Girard (CNES) R. Strunz (Astrium)
11:10 - 11:30	MEMS Flow control module for Ion engines J. BEJHED - NanoSpace	Japanese new 1N monopropellant thruster qualification test results H. IKEDA - IHI Aerospace	Electric solar wind sail : current status, flight testing and roadmap P. JANHUNEN - Finnish Meteorological Institute	Cryogenic propulsion stage configuration in support of NASA's multiple design reference missions S. HANNA - NASA	An updated roadmap for hybrid propulsion S. HENRY - SME	Experimental and analytical demonstration of increased temperature limits for the hydrazine propelled roll and attitude control for the VEGA launcher V. BOMBELLI - Astrium
11:30 - 11:50	Influence of borosil composition of the dishcarge chamber on the HET performance J. IBARZO - Tecnalia	Qualification tests results for 4N thrust long life monopropellant thrusters T. NAGAO - IHI Aerospace	Electric sail propulsion for asteroid touring mission U. KVELL - Tartu Observatory	A simplified model for upper stage performance parameter calculation E. ROSENKO - Astrium	Design and development at ONERA of a hybrid rocket motor P. PREVOT - ONERA	GRASP : Status and future of green propellants C. SCHARLEMANN - University of Applied Sciences Wiener Neustadt
11:50 - 12:10	Investigation of the SPT discharge chamber erosion rate dependency in thruster operation mode V. KIM - RIAME	Verification test results of Astrium's 22N Non-ITAR bipropellant thruster for lunar lander application S. KRAUS - Astrium	Propulsion using electrodynamics L. JOHNSON - NASA	Development of a new generation of space liquid rocket engines, on the basis of a pneumopump propellant supply system V. SHNYAKIN - Yuzhnoye SDO	The development of the hybrid rocket for bloodhound SSC D. JUBB - The Falcon Project	Conceptual study of a HPGP reaction control system for a launcher upper stage D. WELBERG - Astrium
12:10 - 12:30	A new active control method for power processing unit of a 20mN class hall thruster H. OSUGA - Mitsubishi Electric Corporation	Qualification of alphabus platform chemical propulsion system T. AUTRIC - Astrium	Augmentation of solar thermal propulsion systems via phase-change thermal energy storage and thermal-electric conversion D.B. SCHARFE - ERC	Self-pressurizing saturated propellant feed systems with heat transfer P. TIAGO - Omnidea	Numerical Simulations of an H2O2 Vortex Hybrid Rocket Motor F. BARATO - CISAS, University of Padova	HPGP Thruster demonstrator development for launcher upper stage reaction control system K. ANFLO - ECAPS
12:30 - 12:50	Power processing unit activities E. BOURGUIGNON - Thales Alenia Space	Feasibility study and on-ground demonstration test results of electric-motor powered centrifugal pump-fed monopropellant propulsion system A. TOKAJI - IHI Aerospace	Introducing the magnetic field reconnection thruster G. PAPADOPOULOS - Thales Alenia Space	Staged combustion cycle rocket engine design trade-offs for future advanced passenger transport M. SIPPEL - DLR	Technology demonstrators for hybrid rocket propulsion in Europe S. SOLLER - Astrium	Thermal or catalytic decomposition of energetic ionic liquids. Can we get oxygen? C. KAPPENSTEIN - LACCO, University of Poitiers
12:50 - 14:00	Lunch					

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14:00 - 15:30	INTERNATIONAL GREEN PROPULSION PANEL					
15:30 - 16:00	Coffee Break					
Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 31 - SC - Electric Propulsion (Cubesat and Nanosat Applications)	Session 32 - SC - Propulsion Components - General	Session 33 - SC - Modelling - Chemical Propulsion (Focus on ECOSIMPRO)	Session 34 - ST - Liquid propulsion Cooling Technics	Session 35 - ST - Hybrid propulsion 2	Session 36 - ST - Liquid propulsion. Mechanical and Life
Chairmen	B.Sanders (TNO) J.Muylaert (VKI)	A.Demaire (OHB Sweden) S.Hyde (ESA)	M.Onofri (University of Rome) M.De Rosa (ESA)	M. Meyer (NASA) P. Alliot (SPS)	L. Galfetti (Polimi) H. Blanchard (SAFRAN-SME)	P. Danous (Snecma) T. Kachler (ESA)
16:00 - 16:20	An electric propulsion module for cubesats C. SCHARLEMANN - Fotec	Demonstration of new ultrasonic flowmeter propulsion applications R. MATTHIJSSEN - Bradford Engineering	EcosimPro numerical simulations for Exomars EDM propulsion design and operational analyses F. LAVERTY - Thales Alenia Space	Simulation of liquid and transcritical cooling films in rocket combustion chambers C. HOEGLAUER - Astrium	Modeling of metallized solid fuel hybrid propulsion system A. MAKLED - MTC	Progress and perspectives in the life duration prediction of liquid rocket engines components Presented by A. DU TERPRE - Snecma
16:20 - 16:40	A µPPT for Nano-satellite application : Design and preliminary experimental results A. MINGO PEREZ - University of Southampton	He and Xe electronic regulator preliminary sizing for UPS and PPS propulsion systems on satellite. Comparison with mechanical M. LYSZYK - Thales Alenia Space	Adaptation of the ESPSS/ECOSIMPRO platform for the design and analysis of liquid propellant rocket engines J. MORAL - EcosimPro	Experiments on film cooling in a GOX/Kerosene rocket combustion chamber C. KIRCHBERGER - Technische Universität München	Labscale characterization of solid fuels for hybrid propulsion L. GALFETTI - Politecnico di Milano	High cycle fatigue testing of structural materials in high pressure hydrogen atmosphere M. BRUCHHAUSEN - JRC-IET
16:40 - 17:00	MicroThrust MEMS electrospray emitters – integrated microfabrication and test results C. RYAN - Queen Mary University of London	Study of electronic pressure regulator for telecommunications satellite applications J. STANOJEV - OHB Sweden	Analysis of bepicolombo dual-mode propulsion system through an EcosimPro model V. DA RONCO - Astrium	Experimental investigation and CFD-simulation of the film cooling in O2/CH4 subscale combustion chamber D. SUSLOV - DLR	Chemically modified and nano-composite polymeric substrates as novel fuels for hybrid propulsion P. JOSEPH - University of Ulster	Influence of anisotropic damage on the lifetime prediction of regeneratively cooled nozzle structure V. TINI - RWTH Aachen University
17:00 - 17:20	Breadboard development & test of a micro system technology electric propulsion system B. SANDERS - TNO	Satellite propellant volume gauging using gas injection P. RANGSTEN - NanoSpace	Effects of a satellite mission on the propulsion subsystem C. KOPPEL - Kopoos Consulting	Experimental study of methane heat transfer characteristic in regenerative cooling channels H. KAWASHIMA - Japan Aerospace Exploration Agency	Regression rate study in a small hybrid rocket engine using N2O/paraffin propellant K. BOUGHABA - Université Libre de Bruxelles	Modeling of the internal hydrogen embrittlement effects on the fatigue life of a structure using a commercial F.E. program W. BOUAJILA - DLR

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Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 37- SC - Electric Propulsion (Field Emission Thrusters)	Session 38 - SC - Propulsion for Cubesat and Nanosat Applications and Studies	Session 39 - SC - Financial and Operational Related Aspects	Session 40 - ST - Liquid propulsion Combustion 2	Session 41 - ST - Hybrid Propulsion 3	Session 42 - ST - Liquid Engines 1
Chairmen	S.Pottinger (University of Southampton) D.Estublier (ESA)	F.Wilson (Aerojet) D.Di Cara (ESA)	Z.Zuckerman (Rafael) F.Valencia Bel (ESA)	G. Ordonneau (Onera) M. Valorani (University of Rome)	O. Orlandi (SAFRAN SME) T. Shimada (Jaxa)	P. Alliot (SPS) A. Lekeux (Cnes)
17:20 - 17:40	FEEP Thruster characterization as a function of the emitter hydraulic resistance L. PAITA - Alta SPA	Propulsion module for LEO smallsats P. SMITH - Ampac-ISP	Evolving modularity approach to space propulsion solutions, creates opportunities to shorten design time and reducing cost & risk S. ADLER - Rafael	CFD Simulation of the GCH4/GO2 Mascotte test bench P. GRENARD - ONERA	Lab-scale motor firing results on advanced solid fuels for hybrid propulsion C. CARMICINO - University of Naples Federico II	Transient simulation of the RL-10A-3-3A rocket engine F. DI MATTEO - University of Rome
17:40 - 18:00	Surface electrical resistivity of randomly caesium contaminated FEEP ceramic L. PAITA - Alta SPA	Desorbitation of the nanosatellite robusta B. PEEV - University Pierre and Marie Curie	Making the case for green versus toxic propellant selections C. JOHNSON - NASA WITHDRAWN	Numerical simulation of trans-critical diffusion flame in a rocket engine model combustor Y. MIZOBUCHI - Japan Aerospace Exploration Agency	Test results from small-scale hybrid rocket testing JER RONNINGEN - Nammo Raufoss	Evaluation of the potential application of a multiple use turbo machine starter in a gas generator cycle rocket engine W.H. KITSCHE - German Aerospace Center
18:00 - 18:20	Time of flight measurement on the plume of the Cs slit FEEP thruster L. PAITA - Alta SPA	Advanced fluidic equipment and components for micro and small propulsion applications: review of the development, qualification and flight hw manufacturing/acceptance activities at TAS-I G. MATTICARI - Thales Alenia Space	A strategy to minimize dynamic residuals during in-orbit operations of bepicolombo dual-mode propulsion system L. BISI - Astrium	Redundant ignition system development overview for the VINCI engine W. KWAN - Aerospace Propulsion Products	Solid modulated propulsion for space exploration P. YVART - SME Safran	Selection of the propellant of a multiple use turbo machine starter in a cryogenic gas generator cycle rocket engine W.H. KITSCHE - German Aerospace Center
18:20 - 18:40	Ionic liquid FEEP beam characterization S. MARCUCCIO - Alta SPA	Micropropulsion system with closed-loop regulated thrust for CubeSats H. JOHANSSON - NanoSpace	Results of the cool gas fenerator test on board of proba-2 and development towards future space applications B. SANDERS - CGG Technologies	Experimental and numerical analysis of ignition in a GO2/GCH4 Co-axial injector at ambient and low pressures M. VALORANI - University of Rome	CFD Simulation of liquid injection in hybrid rockets M. LAZZARIN - CISAS, University of Padova	Influence of liquid oxygen environment on the tribological behaviour of PCTFE/440C steel contact S. CAUTAIN - SUPMECA - LISMMA
	16:00 - 18:30 Green Propulsion Workshop - European Working Group Session Presentation and discussion on REACH, Clean Space Initiative and key topics from the European Space Technology Harmonisation process					
20:30 - 00:00	**Gala Dinner - Palais de la Bourse - 19 Palais de la Bourse, Bordeaux**					

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Room	SC1	SC2	SC3	ST1	ST2	Amphi C
	Session 43 - SC - Electric Propulsion Systems (Electrothermal Thrusters and Studies)	Session 44 - SC - Propulsion Components - Chemical Propulsion	Session 45 - SC - Nuclear Propulsion	Session 46 - ST - Liquid engines 2	Session 47 - ST - Hybrid Propulsion 3	Session 48 - Exploration
Chairmen	H.Neumann (IOM Leipzig) M.Auweter-Kurtz (Stuttgart University)	P.Smith (Ampac) K.Kajiwara (Jaxa)	G.Schmidt (NASA) G.Saccoccia (ESA)	J. Breteau (ESA) D. Chaves (Moog)	J. Ronningen (Nammo) A. Delillis (ASI)	Y. Traissac (SAFRAN-SME) H. Ellerbrock (Astrium)
09:00 - 09:20	Development of an annular-geometry ion engine M. PATTERSON - NASA	A porous metal electrospray array for space propulsion applications C. COFFMAN - Massachusetts Institute of Technology	Overview of ISTC funded projects in space propulsion area T. RYZHOVA - International Science & Technology Center	Thermochemical study of liquid propellant combinations for space applications R. AMRI - Centre of Space Techniques	The Patterns of streamwise vortex on the fuel surface in hybrid rocket combustion C. LEE - Konkuk University	Appraisal of initiated ESA propulsion developments for exploration missions H. ELLERBROCK - Astrium
09:20 - 09:40	The design, development, manufacture and test of an electric propulsion system for small spacecraft M. POLLARD - Surrey Satellite Technology	Basic design of demise propellant tank upon re-entry K. KAJIWARA - JAXA	Modular aneutronic fusion engine Dr. G. PAJER - Princeton Satellite Systems	Preliminary study on a throttleable 1.5-6 kN MMH/NTO European medium thrust engine R. ARNOLD - Astrium	Injection effects in hybrid rocket engines M. KOBALD - Deutsches Zentrum für Luft- und Raumfahrt e.V.	Propulsion system for the European lunar lander, development status and breadboarding activities M. RIEHLE - Astrium
09:40 - 10:00	A new orbit control algorithm for power processing control unit of a 20mN class ion thruster H. OSUGA - Mitsubishi Electric Corporation	Development and qualification status of Astrium's new non-ITAR bipropellant 10N thruster flow control valve M. WOLF - Astrium	Nuclear thermal propulsion for advanced space exploration M. HOUTS - NASA	Technical data and development status of the RD861K engine V. SHULGA - Yuzhnoye SDO	Through a 1D modeling of liquefying fuel regression rates in hybrid rockets J.Y. LESTRADE - CNES	Overview of the in-space propulsion (ISP-1) project P. ALLIOT - Snecma
10:00 - 10:20	Combining low-thrust and manifold dynamics for vertical lyapunov orbits missions C. FINOCCHIETTI - University of Pisa	Vacuum-arc plant and technology for deposition of MoSi2-NbSi2 coatings V. NADTOKA - Yuzhnoye SDO	High-power thermal simulator development for non-nuclear testing of nuclear systems J. PEARSON - NASA WITHDRAWN	Two-component liquid-propellant low-thrust propulsion system for third stage of Cyclone-4 LV Y. SHOVKOPLYAS - Yuzhnoye SDO	Multi-physics numerical simulation of combustion processes in hybrid rockets A. MAZZETTI - Politecnico di Milano	End-to-end flight test for planetary landing, an unprecedented approach in Europe G. PARISSENTI - Thales Alenia Space
10:20 - 10:40		Modelling of fluid motion in spacecraft propellant tanks - Sloshing Dr N. FRIES - Astrium		Results of first phase of qualification test of two-component liquid-propellant low-thrust engine for third stage of Cyclone-4 LV V. DURACHENKO - Yuzhnoye SDO	Fuel combustion modelling in hybrid engine M. PREVOST - ONERA	
10:40 - 11:10	Coffee Break					

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	Session 49 - SC - Electric Propulsion (HEMPT and Field Emission Thrusters)	Session 50 - SC - Propulsion Components - General	Session 51 - SC - AIV Issues - General	Session 52 - ST - Liquid engines 3	Session 53 - ST - Solid propulsion 4	Session 54 - ST - Launcher's Attitude Control Systems 2
Chairmen	N.Puetmann (DLR) V.Ruby (Busek)	M. Lyszyk (Thales Alenia) C.Hunter (ESA)	R.Blott (Partnership Ltd.) A.Bulit (ESA)	K. Schäffer (DLR) F. Jean (Snecma)	J. Thepenier (SAFRAN-SME) J. Gigou (ESA)	N. Girard (CNES) P. Yvart (SAFRAN-SME)
11:10 - 11:30	Alta's FT-150 FEEP - overview and development status L. PAITA - Alta SPA	Electronic pressure regulator development and test results P. SMITH - Ampac-ISP	Determination of Xe Ion velocities by Laser induced fluorescence in the near field plasma of a small power Ukrainian HET Thruster T. GIBERT - GREMI	System engineering of the European stage combustion demonstrator score-d P. DANOUS - SNECMA	BOOST TP - A new step in high performance thermoplastic composite structure B. DEFOORT - Astrium	Development of a cold gas attitude control system for a lander demonstrator K. ODIC - Astrium
11:30 - 11:50	Alta's FEEP glass emitter design, manufacturing and test characterization L. PAITA - Alta SPA	Parametric study of spacecraft plug cluster nozzle I. MASUDA - JAXA	Propulsion Lab (EPL) J. GONZALEZ DEL AMO - ESA	From paper to production to test : an update on NASA's J-2X engine for exploration H. KYNARD - NASA	Two-phase flow modeling to simulate alumina droplet impingements on solid rocket motor (SRM) nozzle V. FROMENT - SPS	Testing of a liquid oxygen/liquid methane reaction control thruster in a new altitude rocket engine test facility M. MEYER - NASA
11:50 - 12:10	Overview, qualification and delivery status of the HEMPT based ion propulsion system for SmallGEO S. WEIS - Thales Electron Devices	Generic fill and drain valve delta-qualification D. AVERY - Ampac-ISP	New developments related to the advanced electric propulsion diagnostic system H. NEUMANN - IOM	An End-to-End High Fidelity Numerical Simulation of the LE-X Engine - Innovative Evaluation Methodology of Combustion Chamber Hazard - N. TANI - JAXA	Ensuring solid propellants long term availability for spacecrafts and launchers L. CHAMBRAS LAFUENTE - SME	Advanced solid propulsion technologies for attitude control systems P. CAUBET - SPS
12:10 - 12:30	Development and qualification status of the HEMP thruster and the hollow cathode neutralizer for the ion propulsion system on SmallGEO M. SCHIRRA - Thales Deutschland	European latch valve developments R. MATTHIJSSEN - Bradford Engineering	In-situ EP thruster characterization with a thermocamera H. NEUMANN - IOM	Experimental investigation of brazilian liquid rocket engine W.F. ALVES - Institute of Aeronautics and Space	Twin screw process demonstration technology activities for new generation launcher applications S. SAINT MARTIN - SME-Safran	Studies of the processes of gasification liquid propellant for designing the rocket engine on scheme "gas-gas" for autonomous on-board deorbiting system of separating part stages of space launcher vehicle on orbits of the utilization V. TRUSHLYAKOV - OmSTU
12:30 - 12:50	Progress in the endurance testing of HEMPT ion propulsion module for SmallGEO A. LAZURENKO - Thales Electron Devices	Status of pyrovalve manufacturing at EADS Astrium and assessment of design evolutions for future spacecraft needs M. WOLF - Astrium	XPS Plasma propulsion system on AlphaBus & AlphaSat M. LYSZYK - Thales Alenia Space	Manufacturing and testing status of the LM10-MIRA LOX-LNG demonstrator L. ARIONE - AVIO	Verification of image processing method for X-ray CT image to obtain orientation data of AP particles K. KITAGAWA - Japan Aerospace Exploration Agency	On the development and successful application of a thrust modulation module for the FUSEX hybrid rocket motor J. HIJLKEMA - ONERA
12:50 - 14:30	Lunch					

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	Session 55 - SC - Electric Propulsion (Ion and Hall Effect Thrusters)	Session 56 - SC - 3. Production and Manufacturing Issues	Session 57 - SC - New and Green Propellants in Chemical Propulsion	Session 58 - ST - Liquid Propulsion Stages 2	Session 59 - Future Propulsion	Session 60 - 11. Technology Building Blocks for Future Spacecraft Propulsion Systems
Chairmen	C.Koppel (Kopoos Consulting) G.Popov (Riame)	R.Killinger (Astium) M.Wolf (Astrium)	I.Coxhill (Ampac-ISP) C. Kappenstein (LACCO)	M. Meyer (NASA) P. Fortunier (CNES)	JF Guery (SAFRAN-SME) C. Lardier (Air & Cosmos)	G.Schmidt (NASA) N. Manesse (Snecma)
14:30 - 14:50	Electric propulsion system design impacts resulting from dual thruster operations for the BepiColombo mission H. GRAY - Astrium	Additive layer manufacturing for integrated propulsion systems S. BARLEY - EADS Innovation Works	Low cost production and characterization of hydroxylammonium nitrate (HAN) monopropellant K.S. KOH - The University of Nottingham Malaysia Campus	Choice of Helium storage for A5ME upper stage F. MASSON - CNES	E-Plus: Electric Propulsion equipped Launchers Upper Stage P. PERGOLA - Alta SPA	High power nuclear electric propulsion roadmap R.J. BLOTT - Space Enterprise Partnerships
14:50 - 15:10	Autonomous operation of the electric propulsion system for the BepiColombo mission H. GRAY - Astrium	Industrial organisation of propulsion subsystem for satellites constellation M. BATTISTEL - Thales Alenia Space	Overview of the development of ADN-based propellants N. WINGBORG - FOI, Swedish Defence Research Agency	Heat exchange and pressure drop in a sloshed tank T. HIMENO - University of Tokyo	Development of continuous detonation wave concept and its application to space launcher WITHDRAWN V. FALEMPIN - MBDA	Electric propulsion transit analyses for short stay Mars missions J. DANKANICH - NASA
15:10 - 15:30	Performance characterisation of the T6 gridded ion thruster for BepiColombo A. GRUBISIC - Flux Engineering	Additive manufacturing advantages for space propulsion M. SMITH - ESA-ESTEC	Thruster on the oxyhydrogen composition obtained directly on the board of satellite from water V.A. MENSHIKOV - International Committee on IGMASS Project Implementation (ICPI)	Cryogenic propellant storage and transfer technology demonstration for long duration in-space missions M. MEYER - NASA	Notional roadmap for developing nuclear propulsion systems for human space exploration U. KAMATH - Boeing	Benefits of the annular gridded-Ion engine J. DANKANICH - NASA
15:30 - 15:50	Hollow cathode thruster characterisation at low flow rates D. LAMPROU - University of Surrey	Combustion chamber design for additive manufacturing S. HYDE - ESA	The structural effect of substituted barium hexaaluminate catalysts on the decomposition of N2O as a propellant T. ZHANG - Dalian Institute of Chemical Physics, Chinese Academy of Sciences	Depressurisation tests of cryogenic liquid in low gravity environment J. LACAPERE - Air Liquide	Trajectory and cost analysis of microwave rocket launches A. ARNAULT - University of Tokyo, Ecole Centrale Paris	High power electric propulsion for a flexible space exploration architecture P. PERGOLA - Alta SPA
15:50 - 16:10	HT100: Cathode coupling test and endurance D. DIGNANI - Alta SPA	A design optimisation study of a generic bi-propellant injector for additive manufacturing S. HYDE - ESA	Research and development of HAN (HydroxylAmmonium Nitrate) based monopropellant thruster N. AZUMA - JAXA	New key technologies matured for the A5ME and next generation launchers S. BIANCHI - Air Liquide	Zooming capabilities of the 1D ESPSS propulsion simulation tool with 3D-CFD solvers : implementation and validation J. PRAUSE - ESA-ESTEC	Propulsion options for fast HERRO missions to Mars R. GEORGE SCHMIDT - NASA
16:10 - 16:40	Coffee Break					

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	Session 61 - SC - Electric Propulsion (MPD Thrusters and Studies)	Session 62 - SC - Electric Propulsion (Studies)	Session 63 - SC - Green Propulsion for Spacecraft - Hydrogen Peroxyde	Session 64 - ST- Liquid Propulsion High Frequency Unstabilities	Session 65 - ST - Liquid Propulsion Testing	Session 66 - Theoretical Performance vs Status of Technology: How to Push the Limits + Future Propulsion
Chairmen	M.Coletti (University of Southampon) J.Marcos (Technalia)	J.Polk (JPL) H.Leiter (Astrium)	A.Musker (Deltacat) L.D'Agostino (Alta)	O. Haidn (DLR) P. Danous (Snecma)	F. Masson (CNES) S. Bianchi (Air Liquide)	S. Henry (SAFRAN-SME) A.Demaire (OHB)
17:00 - 17:20	Performance characterization of a 100-kW-class applied-field MPD thruster R. ALBERTONI - Alta SPA	Superconductor coils to generate the magnetic field of a hall effect thruster J. IBARZO - Tecnalia	A study of ignition delay for a 300 N hydrogen peroxide bipropellant thruster A. MUSKER - Deltacat	Acoustic Energy Content Investigated as a Function of Operational Conditions for LOX/GH2 with and Without External Forcing WITHDRAWN I. WEBSTER - DLR	Ground testing for upper stage qualification K. SCHÄFER - DLR	Identification of thrust components in the Helicon Double Layer Thruster C. CHARLES - Australian National University
17:20 - 17:40	Insert temperature measurements of a 180A hollow cathode for the HIPER Project M. COLETTI - University of Southampton	3-Dimensional mapping of the plasma properties in the plume region of the quad confinement thruster A. KNOLL - University of Surrey	Development model of a green 1N Bi-propellant thruster for attitude control A. WOSCHNAK - Fotec	Experimental study of the combustion-acoustics coupling in liquid rocket engine high-frequency instabilities Y. MERY - Snecma	Pump fed hydrogen peroxide rocket propulsion testing S. MEYER - Purdue University	Attitude and orbit control systems for GEO bird only based on electric propulsion A. DEMAIRE - OHB Sweden
17:40 - 18:00	Thrust stand performance measurements of a high-power gallium electromagnetic thruster R. THOMAS - NASA	Plasma propulsion with electronegative gases. A status update A. AANESLAND - CNRS-Ecole Polytechnique	Development of a hydrogen peroxide/ethanol thruster for the advanced re-entry vehicle W.P.W. WIELING - Delft University of Technology	Response of a combusting LOx jet to a transverse acoustic oscillation J. HARDI - DLR	Experimental investigation of phase-change behaviour in a water-ice heat accumulator setup for cryogenic application J. RICCIUS - DLR	Design of a new liquid propellant for space launchers : synthesis, process and propulsive performances A.J. BOUGRINE - Laboratoire Hydrazines et Composés Energétiques Polyazotés
18:00 - 18:20	Cold start cathode with wide range of operation A. LOYAN - National Aerospace University	Solar electric propulsion vehicle demonstration to support future space exploration missions K. BRYAN SMITH - NASA	Performance of a 2N microthruster using hydrogen peroxide and a mixed oxide bulk catalyst R. VIEIRA - INPE	Numerical and analytical study on the acoustic structure in a cylindrical rocket chamber during oscillation T. SHIMIZU - Japan Aerospace Exploration Agency	Steady-state and transient simulation of test bench flow phenomena R. BEHR - Astrium	FAST20XX Hybrid Propulsion Technologies: Objectives and Status R. MOLINA - ESA/ESTEC
18:20 - 18:40	A new flexible magnetic circuit for a hall thruster : results from the first campaign in the Pivoine-2G ground-test facility L. GARRIGUES - Laplace-CNRS	Comparison of computed and measured performance of a pulsed inductive thruster operating on argon propellant K. POLZIN - NASA	Peroxy-fuels for rocket propulsion K.B. MISHRA - BAM Federal Institute for Materials Research and Testing	Development of an advanced global MMH-NTO combustion model for CFD application T. AICHNER - Astrium	Combustion stability verification of the Vega LV upper stage main engine at free gas injection into the engine channels V. SHNYAKIN - Yuzhnoye State Design Office	
END OF CONFERENCE						