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INTERNATIONAL ACADEMY OF ASTRONAUTICS

International Academy of Astronautics (IAA)

Agenzia Spaziale Italiana

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DRAFT

24th IAA Humans in Space Symposium

PROGRAM

Monday, April 20, 2026

9:30 – 10:00 Registration

10:00–10:30 Conference opening, welcome to the participants

Dr. J.-M. Contant, IAA, Secretary General

Dr. Gabriela Arrigo, ASI

Prof. Teodoro Valente, ASI, President

Greetings from the astronauts from the ISS

10:30–13:00 Plenary session. Moderator: Dr. Maria Chiara Noto

1. **Academician Oleg Orlov, IBMP, Russia**
   Biology research in space
2. **Prof. Yulin Deng, China**
   Intelligence to the space: AI assists space technology to empower future health
3. **Dr. Nick Kanas, University of California, USA**
   Behavioral and Interpersonal Issues in Space: On-orbit, Moon, and Mars
4. **Dr. Christian Rogon, DLR, Germany**
   The German space life science program

13:00-14:00 Lunch

14:00-15:00 Poster session

15:00-16:30 Round table with cosmonauts and astronauts (moderators Dr. J.-M. Contant and Ch. Kourtidou-Papadeli)

- **Oleg Kotov (Medical Doctor, Hero of the Russian Federation, Russian cosmonaut who completed six EVAs during three long-duration missions (over 520 days in orbit))**
- **Sergey Prokopev (Hero of the Russian Federation, Russian cosmonaut who completed eight EVAs (more than 55 hours) during two long-duration missions (over 560 days in orbit))**
- **ESA and ASI astronauts (TBD)**

18:00–20:00 Welcome reception

Tuesday, April 21, 2026

9:30 – Registration

10:00 – 11:20

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 2 Preparing for Moon exploration and interplanetary flights. Lessons from model and analog experiments*
Orbital missions in integrated risk assessment for interplanetary missions **Co-chairs: Oleg Orlov and Yulin Deng** **Elena Luchitskaya, Vasiliy Rusanov** Cardiovascular research onboard the ISS **Daniel L. Belavy, Kirsten Albracht, Helena Brisby, Deborah Falla, Richard Scheuring, Roope Sovelius, Hans-Joachim Wilke, Kajsa Rennerfelt, Michail Arvanitidis, Nitin Kumar Arora, Bjoern Braunstein, Fabian Göll, Svenja Kaczorowski, Eva Moreira, Florian Teichert, Gabriele Armbrecht** Longitudinal Evaluation of cervical spine structures and function in astronauts and their relation to intervertebral disc herniation **Olga Manko, Sergey Danilichev, Alexey Polyakov, Oleg Kotov** Assessment of the dynamics of SANS syndrome during long-term space flights **Felice Strollo** Microgravity as an insulin resistance model to be exploited on Earth	**Isolation experiments for the future space flights** **Co-chairs: Sergey Ponomarev and Ivan I. Melnikov** **Oleg Orlov, Mark Belakovskiy, Sergey Ponomarev** The SIRIUS International Experiment: Implementation Framework and Principal Findings **Eugeniy Litvinov, Dmitry Shved, Alla Vinokhodova, Daria Schastlivtseva** What could we bring to the future human spaceflights? Main Results of Russian Psychological Studies in SIRIUS Isolation Project and Orbital Flights **Anna Ganicheva, Elena Fomina** Electrophysiological characteristics and functional connectivity of the brain after physical load in participants of the SIRIUS-23 experiment **Sergey Ponomarev, Marina Rykova, Olga Kutko, Daria Vlasova, Ksenia Orlova, Konstantin Utkin, Sofia Shulgina, Anastasia Kotikova, Viacheslav Shmarov** Immunity research as a part of the SIRIUS Project: main Results

11:20 – 11:40 Coffee break

11:40 – 13:00

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 2 Preparing for Moon exploration and interplanetary flights. Lessons from model and analog experiments*
Orbital missions in integrated risk assessment for interplanetary missions **Co-chairs: Oleg Orlov and Yulin Deng** **Antoine G. Faddoul** From Lunar to Martian Missions: Human Exploration Challenges and Technology requirements **Giada Fregnan, Elisabeth Wyart, Maiara Colombera, Alfonso Scalera, Alessio Menga, Paolo E Porporato**	**Isolation experiments for the future space flights** **Co-chairs: Sergey Ponomarev and Ivan I. Melnikov** **Galina Vassilieva, Kirill Gordienko, Nadezhda Lukicheva, Yury Solomadin, Elaterina Servuli, Valery Novikov, Oleg Orlov** Bone status and body composition under isolation conditions: results of densitometry **Ivan I. Melnikov, Yegor V. Lemeshko, and Elena V. Fomina**

The glucocorticoid-LCN2-iron axis as a common driver of muscle atrophy in clinical settings and long-duration spaceflight **Ilya Rukavishnikov, Vladimir Kitov, Igor Kofman, Millard Reschke, Alexey Polyakov, Elena Fomina, Elena Tomilovskaya, Oleg Orlov** Evaluation of medical risks at the landing site: the Field Test experiment approach **Elena Tomilovskaya, Ilya Rukavishnikov, Vladimir Kitov, Maria Bekreneva, Igor Kofman, Millard Reschke** Dynamics of sensory-motor recovery after long term space flight: the Field Test experiment results	Multi-modal wearable biosensing for personalized cardiovascular monitoring in long-duration space missions **Ivan Vasilev, N. Sorsorova, Anastasia Senichkina, Galina Vassilieva, Lana Moukhamedieva, Oleg Orlov** Isolation Experiments: What Do Echocardiography and Doppler Ultrasound Show in the Long-Term Perspective

13.00 – 14.00 Lunch

14:00 – 15:40

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 2 Preparing for Moon exploration and interplanetary flights. Lessons from model and analog experiments*
Countermeasures and Biomedical Support in the Interplanetary Missions **Co-chairs: Elena Fomina and Ilaria Cinelli** **Elena Fomina, Maria Kokueva, Natalia Senatorova, Daria Guseva, Kseniia Lipatova** Scientific groundwork for the assessment and prediction of the effectiveness of preventing the negative effects of weightlessness for interplanetary flights **Chrysoula Kourtidou-Papadeli & Dimitrios A. Patikas, Sofia Kourtidou, Antonios Kyparos, Zafeiro Gkemou, Stavroula Chaloulakou, Nicholas Georgiou, Panagiotis D. Bamidis & Joan Vernikos** Dose-dependent neuromuscular activation during graded artificial gravity exposure using short-arm human centrifugation: Implications for countermeasure optimization **Anna Burakova, Natalia Senatorova, Elena Fomina** Dynamics of ground reaction force volumes in a standard locomotion test during long orbital flights **Martina Vita, Giuseppe Coviello, Giuseppe Brunetti, and Caterina Ciminelli** A modular distributed closed-loop wearable platform for multimodal astronauts health monitoring **Francesca Cialdai, Chiara Risaliti, Lorenzo Notari and Monica Monici** Studies on tissue regeneration in space	**Analog platforms for estimating space flight effects** **Co-chairs: Hasan Birol Çotuk and Elena Tomilovskaya** **Kussmaul A.R., Kharlamov M.M., Agaptseva T.N., Belakovsky M.S.** Analog facilities of the IBMP RAS to train candidates for cosmonauts and astronauts **İrem Argin, İpek Yılmaz, Sercan Seven, Ali Furkan Okur, Adil Deniz Duru, and Dilek Göksel Duru** Classification of EEG features measured in a cognitive workload in dry immersion as an analog of microgravity condition **Odette Laneuville, Ritu Shyam, Tom Cesari** A machine-learning approach to evaluate the systematic effects of an Earth-based analogue to microgravity and impact of countermeasures **Shigueva T.A., Artamonova N.M.A., Urbanskaya A.D., Riabova A.M., Kitov V.V., Sayenko D.G., Tomilovskaya E.S.** Hypogravitational spinal hyperreflexia: results of ground-based model experiments **Ali Furkan Okur, Adil Deniz Duru, Hasan Birol Çotuk** Frontal high-frequency EEG activity correlates with borderline personality features in a spaceflight analog environment

	Razvan Ioan Papacocea, Juliana Herbert, Marlise A. dos Santos, Stefan Sebastian Busnatu, Geani Danut Teodorescu, George Temes, Ioana Raluca Papacocea, Willian de Vargas, Vinicius Soares, Lucas Rehnberg, Thais Russomano First investigation of pediatric cardiovascular responses to simulated microgravity

15:40 – 16:00 Coffee break

16:00 – 17:40

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 2 Preparing for Moon exploration and interplanetary flights. Lessons from model and analog experiments*
Countermeasures and Biomedical Support in the Interplanetary Missions **Co-chairs: Elena Fomina and Ilaria Cinelli** **Ivan Ponomarev, Elvira Gainutdinova, Olga Kurbanova, Maria Bekreneva, Ilya Rukavishnikov, Inna Zelenskaya, Vladimir Kitov, Tatian a Shigueva, Elena Tomilovskaya** Efficacy of passive countermeasures for minimizing adverse changes in muscle viscoelastic properties after one week of Dry Immersion **Mattoe Cerri** Hibernation as a Multi-System Countermeasure for Long-Duration Spaceflight **Stefania Fedyay, Arslan Niyazov, Sergey Ponomarev, Alexey Polyakov, Mark Belakovskiy, Oleg Orlov** Terrestrial Foundations for Space Medicine: The Role of Isolation Experiments **Nandu Goswami** Advancing Space Omics, AI integration and Network Physiology for Precision Health of Astronauts in Space and Patients on Earth (astroaimed project)	**Analog platforms for estimating space flight effects** **Co-chairs: Hasan Birol Çotuk and Elena Tomilovskaya** **Maria Bekreneva, Alina Saveko, Alexandra Riabova, Ivan Ponomarev, and Elena Tomilovskaya** Characteristics of postural stability after 7 and 14 days of dry immersion **Serdar Orkun Pelvan, Savaş Akbaş, Rahmet Achylov, Hasan Birol Çotuk** Dry immersion increases hemoglobin saturation in the muscles through left-right synchronous muscle circulation oscillations **L. Daumerie, J. Studer, L. Arnaud, C. Thevenot , M. Scholaert , MA. Custaud, B. Bolmont, N. Navasiolava, A. Paillet , L. Boyer** Physiological monitoring in a novel immersive spaceflight analog using controlled neurosensorial stimulation **Catherine J. Taylor, Polly Jarmen, Andrew Blaber, and Nandu Goswami,** Immunoregulatory Modulation During Short-Term Dry Immersion: Integrative NF-κB and CTRA-Related Transcriptomic Signatures with Hematological and Sex Hormone Analysis in the VIVALDI I (Female Cohort) **Galina Vassilieva, Anna Kussmaul, Arslan Niyazov, Daria Komissarova, Ksenia Orlova, Victoria Kirichenko, Stefania Fedyay, Sergey Ponomarev** The effects of spaceflight simulation in the analog project on the female body: immunological, microbiological, and physiological aspects

Wednesday, April 22, 2026

9:30 Registration

10:00 – 12:00

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 2 Preparing for Moon exploration and interplanetary flights. Lessons from model and analog experiments*
Biological Effects of Space Radiation and Hypomagnetic fields: Risks and Countermeasures **Co-chairs: Oleg Orlov and Pietro Fre** **Oleg Orlov, Elena Luchitskaya, Vasiliy Rusanov, Olga Popova** Beyond the Magnetic Field. Ground-Based Analog Experiments **Morteza Maleki, Giuseppe Brunetti, Caterina Ciminelli** Radiation-hardened bolometric photonic integrated sensor for real-time astronauts' dosimetry **Vladislav Sedletskiy, Vladimir Sychev, Oleg Orlov** Polar orbit of Bion-M#2 mission: the new space orbit for perspectives of the deep space exploration **Beatrice D'Orsi, Riccardo Anzuini, Rocco Carcione, Ilaria Di Sarcina, Emiliana Mansi, Jessica Scifo, Adriano Verna and Alessia Cemmi** Experimental dosimetric evaluation of regolith simulants for gamma radiation shielding in human lunar surface missions **Oleg Belov** Ground-based simulation of space radiation with particle accelerators: Research opportunities and first measurements done with NICA facility	**Human Centrifugation as an Analog Platform and Countermeasure: From Brain and Muscle Adaptation to Cardiovascular Control and AI-Driven Personalization** **Co-Chairs: Elena Fomina and Antonio Kyparos** **Stavroula Ioannidou, Chrysoula Kourtidou-Papadeli, Sofia Kourtidou, Evagelia Theodorou, Petros Skepastianos, Panagiotis Bamidis , Evgenia Lymperaki** Short-arm human centrifugation training effect on serum oxidative stress markers in patients with movement disorders: a preliminary study **Elena Luchitskaya, Maria Fedchuk, Milena Koloteva, Oleg Orlov** Short-arm centrifuge as a prospective countermeasure for orthostatic intolerance after long-term space missions. **Chrysoula Kourtidou-Papadeli, Sofia Kourtidou, Eleni Dafli, Panagiotis D. Bamidis** Cardiovascular and autonomic regulation during short-arm human centrifugation: implications for artificial gravity countermeasures and rehabilitation **Chrysoula Kourtidou-Papadeli, Sofia Kourtidou, Stavroula Chaloulakou, Nicholas Georgiou, Panagiotis D. Bamidis, Joan Vernikos** Neuromuscular Reorganization Under Chronic Graded Hypergravity Exposure: A Twin-Controled Human Study **Panagiotis D. Bamidis, Smarada Ketseridou, Chrysoula Kourtidou-Papadeli** Artificial intelligence topics in monitoring, personalization and decision support in human centrifugation

12.00 – 13.00 Lunch

16:00 Social Event

- Lecture by **Dr. Marcotulli**, Medical Director of Terme di Montecatini, on thermal waters
- Followed by transfer to **Terme Tettuccio** (UNESCO heritage site, Liberty-style landmark)
- Guided visit, water tasting and light refreshment

19:30-21:30 Gala-dinner

Thursday, April 23, 2026

9:30 Registration

10:00 – 11:20

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 2 Preparing for Moon exploration and interplanetary flights. Lessons from model and analog experiments*
Gravitational physiology and biology - lessons from ISS and on-ground experiments **Co-chairs: Irina Larina and Yulin Deng** **Irina Larina, Evgeniy Nikolaev, Oleg Orlov** Human blood proteome in space flight **Jing Yang, Juan Zhao, Yaoyuan Cui, Junxiao Wang, Jie Sun, Mengke Yang, Wenjun Tu, Mingchao Ding, Guan Wang, Jilai Li, Jichen Du** Cerebroprotective mechanism of simulated microgravity on ischemic stroke rats by proteomics approach **Beiqin Liu, Xuelian Guo, Hong Ma, Yulin Deng, Zhimin Wang** Microgravity-Induced Desialylation Drives Blood-Brain Barrier Dysfunction and Neuroinflammation **Juan Zhao, Yaoyuan Cui, Anqing Wang, Shiyi Tang, Shaoyi Su, Wenjun Tu, Mingchao Ding, Guan Wang, Jilai Li, Jichen Du, Jing Yang** Investigating the Dynamic Effects of Simulated Microgravity on Cerebral Hemodynamics, Structure, and Function in Rats: An Integrated Multi-modal and Modeling Study	**Extreme Earth ecosystems and LEO as models for deep space flights** **Co-chairs: Alfonso Pagani and Anna Kussmaul** **Elena Mamonova, Mikhail Baranov, Anna Kussmaul** The Arctic and Antarctic as terrestrial analogs of the space environment: interdisciplinary parallels in the study of extreme ecosystems **Francesco Salese, Gian Gabriele Ori, Francesca Mancini, Rebecca Martellotti, Alice Tarozzi, Cristina Baldetti, Micol Bellucci, Monica Pondrelli, and Barbara Cavalazzi** Terrestrial analogues environments as integrated testbeds for human spaceflight: linking habitats, ISRU and field operations **Luka Pejic, Christopher Egg, and Sandra Häuplik-Meusburger** Promethea station: testbed for bettering human health **Karagozaiym Turganbek, Deniz Cetin, Sandra Haeuplik-Meusburger** S.O.S.-Geo: Space Station for Orbital Servicing in Geostationary Orbit

11:20 – 11:40 Coffee break

11:40 – 13:00

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 4 Multidisciplinary approach in space exploration*
Gravitational physiology and biology - lessons from ISS and on-ground experiments **Co-chairs: Irina Larina and Yulin Deng** **Hao Wang, Ting Luo, Songze Che, Yongqian Zhang, Yulin Deng** Space pharmacy: spaceborne in-situ medicine synthesis system based on cell-free protein synthesis **Tianyi Er, Chen Zhang, Ruoyao Zhang, Hong Ma, and Yulin Deng** Simulated Microgravity-Induced Synaptic Plasticity Impairment: A Novel Mechanism Involving Ceramide-Linked Lipid Dyshomeostasis	**Future missions and plans** **Co-chairs: Zorica Ludzheva and _____?** **Zorica Ludzheva, Georgi I. Petrov, and Sandra Häuplik-Meusburger** Moon village reference masterplan **Sara Viviani, and Alessandra Rinaldi** Advancing design exploration on a lunar rover habitation for long-term permanence on the Moon **J. Persson**

Yaoyuan Cui, Juan Zhao, Xiaoyin Li, Yan Zhao, Yingyu Lu, Wenjun Tu, Mingchao Ding, Guan Wang, Jilai Li, Jichen Du, Jing Yang Investigation on the mechanism of simulated microgravity promoting rat cerebral angiogenesis based on proteomics **Zi'ang Zhang, Xuyun Liu, Mingzong Yang, Guiling Wu, Wenjuan Xing, Jia Li and Feng Gao** Lycium barbarum Glycopeptide Blocks Hepatic Pro-Aging Signals to Counteract Vascular Aging in Simulated Microgravity	Moon-to-Mars: The outlook for applying ESA Gateway technology to support mission design **Alex Kling, Ashwin Braude, Adrian Dumitriscu, Ari Essunfeld, Edwin Kite** Possible futures for Mars: can Mars be warmed using in-situ resources? **Carlo Artemi** Considerations on a human Mars Trip using SpaceX hardware

13.00 – 14.00 Lunch

14:00 – 15:20

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 3 Settling and colonizing outer space*
Innovations in Life Support and Nutrition for Deep Space **Co-chairs: Serge Ameye and Tatiana Agaptseva** **Tatiana Agaptseva, Anna Kussmaul, Margarita Levinskikh, Mark Belakovskiy, Maxim Kharlamov** Opportunities for testing elements of advanced biological life support systems in ground-based isolation experiments **Serge Ameye** Baking bread on the Moon **Ekaterina Burliaeva, Mark Belakovskiy** Dietary fiber - an important component of the space diet **Laura Benvenuti, Chiara Bertini, Gemma Marcelli, Gaetana Gambino, Leonardo Rossi, Chiara Ippolito, Valentina Citi, Melis Emanet, Gianni Ciofani, Diego Manzoni, Alessandra Salvetti** Supplementation with the antioxidant sumac mitigates microgravity-induced intestinal barrier dysfunction under simulated Mars gravity	**The Impact of Spaceflight on Reproductive Physiology, Fertility and Women's health** **Co-chairs: Irina Ogneva and _____?** **Irina Ogneva, Anna Kikina, Elena Gorbacheva, M. Matrosova, K. Toniyan, Valery Boyarintsev, Oleg Kotov** Female reproductive system during and after long-term space flight: case study **Berardini M., Di Pauli A. Cucina G. , Bizzarri M., Tafani M. , Barreca F. , Ferranti F. , Negri R. , Presutti C. , Perfetto L. , Signore M. , Morabito C. , Mariggiò MA. , Ricci G., Catizone A.** Cofilin and sirtuins induce early microgravity cytoskeletal remodeling in human male germ cells **Caterina Morabito, Alessia Di Pauli, Fani Konstantinidou, Valentina Gatta, Marika Berardini, Luisa Gesualdi, Simone Guarnieri, Francesca Ferranti, Michele Signore, Giulia Ricci, Angiolina Catizone, Maria A. Mariggiò** Early Transcriptomic Responses of Human Male Germ Cells to Simulated Microgravity: Activation of TGF-β/SMAD3 Signalling **Irina Ogneva** Early embryogenesis and space flight factors

15:20 – 15:40 Coffee break

15:40 – 17:20

Track 1 Deep space exploration - a comprehensive assessment of human health risks. Lessons from orbital missions	*Track 4 Multidisciplinary approach in space exploration*
Innovations in Life Support and Nutrition for Deep Space **Co-chairs: Serge Ameye and Tatiana Agaptseva** **Jingxian Cui, Zekang Zhu, Difei Zhang, Hui Liu, Hong Liu** Integrating aromatic plants into space habitats: species selection based on bioactive volatiles and psychophysiological regulation **Nicolò Grasso, Luca Ghiotto, Franco Lombardi, and Bruno Mezzetti** Light spectrum management for enhanced space farming performance **John Masengo, Jun Hong Cheong, Nguyen Van Duc Long, Veronica Soebarto, Ranjan Swarup, Volker Hessel** Biophilic plant design: (nano) fertilizing barley in hydroponics for "lush space gardens" **Cosimo Sarti, Fabiana Marino, Cosimo Matteo Profico, Silvana Nicola** Wolffia Aprhiza can be a candidate crop for space farming within bioregenerative life-support systems	**Innovative methods and instrumentation –** **Co-chairs: Enrico Zappino and Hans-Ulrich Balzer** **Hans-Ulrich Balzer** Determination of deactivation phases of the vegetative response (emotional, cognitive, muscular), maximum/minimum excitation/relaxation (basis – rest- activity cycle - BRAC), and extreme excitation during the circadian rhythm using novel AI-based wearables **Eugeniy Litvinov, Olga Manko, Eugeniy Zhovnerchuk, Oleg Ryumin, Yury Usachev** AI Based approach of personalized psychological support with VR **Trevor Tingate** AI-based analysis of cell-free DNA chromatin geometry for monitoring stress and recovery during spaceflight **Kun Wang, Fanhao Kong, Yikun Deng, Yifan Deng, Chunhua Yang, Feiyi Sun, Yahui Wang, Xiaoqiong Li, and Yulin Deng** Intent-aware cargo information management with knowledge graph and natural language interaction for space station operations **Enrico Zappino, Alfonso Pagani, Marco Petrolo, Matteo Filippi and Erasmo Carrera** Innovative habitat concepts for surface and orbital human missions: integrated structural design and digital simulation

17.30 – 18.00 Closing remarks

April 24, 2026

Separate meetings

Free time

Poster session (Monday, April 20, 2026)

1. **Olga Manko, Marina Zueva, Kotelin, Akhmed Aleskerov, Yury Bubeev**

Functional activity of the visual system during a year-long isolation in the SIRIUS international experiment

2. **Tatiana Shigueva, Ivan Ponomarev, Ilya Rukavishnikov, Elena Tomilovskaya**

From spaceflight to earth clinics: a translational pipeline for personalized electromyostimulation countermeasures

3. **Tatiana Agaptseva, Ekaterina Burliaeva, Mark Belakovsky, Anna Kussmaul**

Nutritional system for future interplanetary expeditions

4. **Anna Kussmaul, Oleg Voloshin, Mark Belakovskiy**

Practical tools for outreach and popularization activities in space biomedicine: experience of the IBMP RAS

5. **Antoine G. Faddoul**

Lunar sports from robotics race to moon Olympics

6. **Karagozaiym Turganbek, Sandra Haeuplik-Meusburger**

Swarm-Built Worlds: Multi-Agent Robotic Precursors for Ethical ISRU Habitat Construction and Planetary Heritage Preservation on Mars