Summary of the IAU Symposium 404: Advancing the Search for Technosignatures

Date: 2026 March 2 - 6

Venue: Online, Hosted by Blue Marble Space, USA

Coordinating IAU Division: Division F Planetary Systems and Astrobiology

Supporting IAU Divisions: N/A

Scientific Organizing Committee (Female 2/Male 4):

Jacob Haqq-Misra	Blue Marble Space, USA (chair)
Ravi Kopparapu	NASA Goddard Space Flight Center, USA
Beatriz Villarroel	Nordic Institute of Theoretical Physics, Sweden
Martin Dominik	University of St Andrews, UK
George Profitiliotis	Blue Marble Space Institute of Science, Netherlands
Svetlana Berdyugina	Istituto ricerche solari Aldo e Cele Daccò, Italy

Online Organizing Committee (Female 2/Male 3):

Graham Lau	Blue Marble Space, USA (chair)
Jacob Haqq-Misra	Blue Marble Space, USA
Kelly Dobitz	Blue Marble Space, UK
Sibsankar Palit	Blue Marble Space, India
C.J. Baal	Blue Marble Space, USA

Final Scientific Programme

Number of speakers invited talks: Female 5/Male 4
Number of speakers contributed talks: Female 5/Male 19
Number of presenters poster contributions: Female 16/Male 23
Number of session chairs: Female 1/Male 3

TIME										
GMT	*IST (India)*	*CST (China)*	*AEDT*	*PST*	*EST*	**Day 1: Exoplanetary Technosignatures**	**Day 2: Solar System Technosignatures**	**Day 3: Extragalactic Technosignatures**	**Day 4: Revisiting Theoretical Assumptions**	**Day 5: Looking to the Future**
0	*+5.5*	*+8*	*+11*	*-8*	*-5*					
						ATLANTIC SESSION				
2:00 PM	7:30 PM	10:00 PM	1:00 AM	6:00 AM	9:00 AM	Welcome & Opening Remarks	**Joseph Lazio (US)**	**Erik Zackrisson (Sweden)**	**Amedeo Balbi (Italy)**	Daniel Apai (US)
						Sara Seager (US)	Alex Ellery (Canada)	Tongtian Ren (UK)	John Elliott (UK)	Madeline Stratton (US)
3:00 PM	8:30 PM	11:00 PM	2:00 AM	7:00 AM	10:00 AM	Claudia Skoglund (Sweden)	Daniel Angerhausen (Switzerland)	Olivia Curtis (US)	Pinchen Fan (US)	*Discussion*
						Ranger Liu (US)	*Discussion*	*Discussion*	*Discussion*	Andreas Schwarz (Germany)
4:00 PM	9:30 PM	12:00 AM	3:00 AM	8:00 AM	11:00 AM	*Discussion*	*Break*	*Break*	*Break*	Daniela de Paulis (Netherlands)
						Break	**Futures Workshop**	**Poster Pop Talks I**	**Kathryn Denning (Canada)**	*Discussion*
5:00 PM	10:30 PM	1:00 AM	4:00 AM	9:00 AM	12:00 PM	**Paramita Dasgupta (US)**			Hilding Neilson (Canada)	*Break*
						Michael Garrett (UK)		*Break*	Milton Mendonça (Brazil)	**Ian Crawford (UK)**
6:00 PM	11:30 PM	2:00 AM	5:00 AM	10:00 AM	1:00 PM	Abel Méndez (Puerto Rico)			Saeed Jafari (Iran)	*Discussion*
						Discussion			*Discussion*	Closing Remarks
7:00 PM	12:30 AM	3:00 AM	6:00 AM	11:00 AM	2:00 PM	*End of Session*	*End of Session*	**All Worlds, All Times LARP (Live-Action Role-Play)**	*End of Session*	*Adjourn*
								End of Session		
						PACIFIC SESSION				
3:00 AM	8:30 AM	11:00 AM	2:00 PM	7:00 PM	10:00 PM	**Xiao-Hang Luan (China)**	**Laura Domine (Japan)**	**Poster Pop Talks II**	Jean-Luc Margot (US)	
						Vishal Gajjar (US)	Brian Lacki (US)		David P. Anderson (US)	
4:00 AM	9:30 AM	12:00 PM	3:00 PM	8:00 PM	11:00 PM	*Discussion*	Lewis Pinault (Japan)	**Science Fiction Social Hour**	Nick Siegler (US)	
						Logistical Remarks	Wesley Watters (US)		*Discussion*	
5:00 AM	10:30 AM	1:00 PM	4:00 PM	9:00 PM	12:00 AM	*End of Session*	*Discussion*	*End of Session*	*End of Session*	
							End of Session			
6:00 AM	11:30 AM	2:00 PM	5:00 PM	10:00 PM	1:00 AM					

IAUS 404 – DAY 1: Exoplanetary Technosignatures

GMT	IST (India)	CST (China)	AEDT	PST	EST	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 2	*March 2*	*March 2*	*March 3*	*March 2*	*March 2*	*ATLANTIC SESSION*
2:00 PM	7:30 PM	10:00 PM	1:00 AM	6:00 AM	9:00 AM	Welcome & Opening Remarks
2:20 PM	7:50 PM	10:20 PM	1:20 AM	6:20 AM	9:20 AM	**Sara Seager** (Massachusetts Institute of Technology) **"Fully Fluorinated Non-Carbon Compounds as Exemplary Technosignature Gases"**
3:00 PM	8:30 PM	11:00 PM	2:00 AM	7:00 AM	10:00 AM	**Claudia Skoglund** (Stockholm University) - "Starshades as technosignatures in direct imaging phase curves: Application to the Habitable Worlds Observatory targets"
3:20 PM	8:50 PM	11:20 PM	2:20 AM	7:20 AM	10:20 AM	**Ranger Liu** (University of Washington) - "Transit Information Density: An Artificiality Metric for Transit-Based Technosignatures"
3:40 PM	9:10 PM	11:40 PM	2:40 AM	7:40 AM	10:40 AM	*Discussion*
4:00 PM	9:30 PM	12:00 AM	3:00 AM	8:00 AM	11:00 AM	*Break*
		March 3				
4:20 PM	9:50 PM	12:20 AM	3:20 AM	8:20 AM	11:20 AM	**Paramita Dasgupta** (Ohio State University) **"Pathways to Technosignature Discoveries: Towards Using Radio Data from UHE Neutrino Experiments"**
5:00 PM	10:30 PM	1:00 AM	4:00 AM	9:00 AM	12:00 PM	**Michael Garrett** (University of Manchester and Leiden) - "SETI's blind spot: Technological Acceleration and the Fleeting Technosignatures of Post-biological Civilisations."
5:20 PM	10:50 PM	1:20 AM	4:20 AM	9:20 AM	12:20 PM	**Abel Méndez** (University of Puerto Rico) - "Arecibo Wow: A Reanalysis of the Wow! Signal"
5:40 PM	11:10 PM	1:40 AM	4:40 AM	9:40 AM	12:40 PM	*Discussion*
6:00 PM	11:30 PM	2:00 AM	5:00 AM	10:00 AM	1:00 PM	*End of Session*

GMT	IST (India)	CST (China)	AEDT	PST	EST	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 3	*March 3*	*March 3*	*March 3*	*March 2*	*March 2*	*PACIFIC SESSION*
3:00 AM	8:30 AM	11:00 AM	2:00 PM	7:00 PM	10:00 PM	**Xiao-Hang Luan** (Beijing Normal University) **"The multibeam coincidence matching (MBCM) blind search mode for SETI on FAST in China"**
3:40 AM	9:10 AM	11:40 AM	2:40 PM	7:40 PM	10:40 PM	**Vishal Gajjar** (SETI Institute) - "Exo--IPM Scattering as a Hidden Gatekeeper of Narrowband Technosignatures"
4:00 AM	9:30 AM	12:00 PM	3:00 PM	8:00 PM	11:00 PM	*Discussion*
4:40 AM	10:10 AM	12:40 PM	3:40 PM	8:40 PM	11:40 PM	Logistical Remarks
5:00 AM	10:30 AM	1:00 PM	4:00 PM	9:00 PM	12:00 AM	*End of Session*

IAUS 404 – DAY 2: Solar System Technosignatures

GMT	*IST (India)*	*CST (China)*	*AEDT*	*PST*	*EST*	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 3	*March 3*	*March 3*	*March 4*	*March 3*	*March 3*	*ATLANTIC SESSION*
2:00 PM	7:30 PM	10:00 PM	1:00 AM	6:00 AM	9:00 AM	**Joseph W. Lazio** (Independent Researcher) **"Technosignature Searches within the Solar System"**
2:40 PM	8:10 PM	10:40 PM	1:40 AM	6:40 AM	9:40 AM	**Alex Ellery** (Carleton University) - "Cluedo with Self-Replicating Probes - Where are They?"
3:00 PM	8:30 PM	11:00 PM	2:00 AM	7:00 AM	10:00 AM	**Daniel Angerhausen** (SETI Institute) - "A Machine Learning Based Search for Lunar Anomalies"
3:20 PM	8:50 PM	11:20 PM	2:20 AM	7:20 AM	10:20 AM	*Discussion*
3:40 PM	9:10 PM	11:40 PM	2:40 AM	7:40 AM	10:40 AM	*Break*
4:00 PM	9:30 PM	12:00 AM *March 4*	3:00 AM	8:00 AM	11:00 AM	**Futures Workshop -** led by George Profitiliotis
6:00 PM	11:30 PM	2:00 AM	5:00 AM	10:00 AM	1:00 PM	*End of Session*

GMT	*IST (India)*	*CST (China)*	*AEDT*	*PST*	*EST*	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 4	*March 4*	*March 4*	*March 4*	*March 3*	*March 3*	*PACIFIC SESSION*
3:00 AM	8:30 AM	11:00 AM	2:00 PM	7:00 PM	10:00 PM	**Laura Domine** (National Institute of Information and Communications Technology) **"Towards a foundation model for scientific multi-sensor platforms in search of novel local technosignatures"**
3:40 AM	9:10 AM	11:40 AM	2:40 PM	7:40 PM	10:40 PM	**Brian Lacki** (Oxford University) - "Dust to Dust: Prospects for Passive Technosignatures as Relics of ETIs"
4:00 AM	9:30 AM	12:00 PM	3:00 PM	8:00 PM	11:00 PM	**Lewis Pinault** (SETI Institute) - "Micron Scale Technosignatures: How Examination of 1m^3 of Lunar Regolith May Constrain the Number of Past Technological Civilisations in the Galaxy"
4:20 AM	9:50 AM	12:20 PM	3:20 PM	8:20 PM	11:20 PM	**Wesley Watters** (Wellesley College) - "Searching for exogenous technosignatures via optical triangulation of luminous objects in the atmosphere and near space"
4:40 AM	10:10 AM	12:40 PM	3:40 PM	8:40 PM	11:40 PM	*Discussion*
5:00 AM	10:30 AM	1:00 PM	4:00 PM	9:00 PM	12:00 AM	*End of Session*

IAUS 404 – DAY 3: Extragalactic & Exotic Technosignatures

GMT	IST (India)	CST (China)	AEDT	PST	EST	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 4	*March 4*	*March 4*	*March 5*	*March 4*	*March 4*	*ATLANTIC SESSION*
2:00 PM	7:30 PM	10:00 PM	1:00 AM	6:00 AM	9:00 AM	**Erik Zackrisson** (Uppsala University) **"The Project Hephaistos search for Dyson spheres"**
2:40 PM	8:10 PM	10:40 PM	1:40 AM	6:40 AM	9:40 AM	**Tongtian Ren** (University of Manchester) - "Astrometric Diagnostics of Dyson Sphere Candidate Stars Using Archival Survey Data"
3:00 PM	8:30 PM	11:00 PM	2:00 AM	7:00 AM	10:00 AM	**Olivia Curtis** (Penn State University) - "Dyson Spheres, Black Holes, and Minds: A Look at the Dyson Minds 2025 Workshop"
3:20 PM	8:50 PM	11:20 PM	2:20 AM	7:20 AM	10:20 AM	*Discussion*
3:40 PM	9:10 PM	11:40 PM	2:40 AM	7:40 AM	10:40 AM	*Break*
4:00 PM	9:30 PM	12:00 AM *March 5*	3:00 AM	8:00 AM	11:00 AM	**Poster Pop Talks I**
5:00 PM	10:30 PM	1:00 AM	4:00 AM	9:00 AM	12:00 PM	*Break*
5:30 PM	11:00 PM	1:30 AM	4:30 AM	9:30 AM	12:30 PM	**All Worlds, All Times LARP (Live-Action Role-Play)** - led by Theresa Fisher, Kate Genevieve, and Andjelka Kovacevic
7:30 PM	1:00 AM	3:30 AM	6:30 AM	11:30 AM	2:30 PM	*End of Session*

GMT	IST (India)	CST (China)	AEDT	PST	EST	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 5	*March 5*	*March 5*	*March 5*	*March 4*	*March 4*	*PACIFIC SESSION*
3:00 AM	8:30 AM	11:00 AM	2:00 PM	7:00 PM	10:00 PM	**Poster Pop Talks II**
3:20 AM	8:50 AM	11:20 AM	2:20 PM	7:20 PM	10:20 PM	**Science Fiction Social Hour** - led by Andrew Fraknoi
4:40 AM	10:10 AM	12:40 PM	3:40 PM	8:40 PM	11:40 PM	*End of Session*

IAUS 404 – DAY 4: Revisiting Theoretical Assumptions

GMT	IST (India)	CST (China)	AEDT	PST	EST	
0	+5.5	+8	+11	-8	-5	
March 5	March 5	March 5	March 6	March 5	March 5	*ATLANTIC SESSION*
2:00 PM	7:30 PM	10:00 PM	1:00 AM	6:00 AM	9:00 AM	**Amedeo Balbi** (Tor Vergata University of Rome) **"Demographics of Technosignatures: Lifetimes, Abundance, and Detectability"**
2:40 PM	8:10 PM	10:40 PM	1:40 AM	6:40 AM	9:40 AM	**John Elliott** (University of St Andrews) - "A Techosignature Toolbox"
3:00 PM	8:30 PM	11:00 PM	2:00 AM	7:00 AM	10:00 AM	**Pinchen Fan** (Penn State University), Jason T. Wright, & Joseph W. Lazio - "Detecting Extraterrestrial Civilizations That Employ an Earth-level Deep Space Network"
3:20 PM	8:50 PM	11:20 PM	2:20 AM	7:20 AM	10:20 AM	*Discussion*
3:40 PM	9:10 PM	11:40 PM	2:40 AM	7:40 AM	10:40 AM	*Break*
4:00 PM	9:30 PM	12:00 AM March 6	3:00 AM	8:00 AM	11:00 AM	**Kathryn Denning** (York University) **"SETI and Our Own World: An Anthropologist's Perspective on Post-Detection and More in 2026"**
4:40 PM	10:10 PM	12:40 AM	3:40 AM	8:40 AM	11:40 AM	**Hilding Neilson** (Memorial University of Newfoundland & Labrador) - "Decolonizing technosignatures: Reimagining technosignatures through an Indigenist lens"
5:00 PM	10:30 PM	1:00 AM	4:00 AM	9:00 AM	12:00 PM	**Milton Mendonça** (UFRGS - Federal University of Rio Grande do Sul) - "Ecosystem engineer species effects as potentially ambiguous technosignatures"
5:20 PM	10:50 PM	1:20 AM	4:20 AM	9:20 AM	12:20 PM	**Saeed Jafari** (UNESCO's International Decade of Indigenous Languages) - "Universal Grammar or Local Semantics? Reassessing Technosignature Detection through Cross-Species Vocal Communication"
5:40 PM	11:10 PM	1:40 AM	4:40 AM	9:40 AM	12:40 PM	*Discussion*
6:00 PM	11:30 PM	2:00 AM	5:00 AM	10:00 AM	1:00 PM	*End of Session*

GMT	IST (India)	CST (China)	AEDT	PST	EST	
0	+5.5	+8	+11	-8	-5	
March 6	March 6	March 6	March 6	March 5	March 5	*PACIFIC SESSION*
3:00 AM	8:30 AM	11:00 AM	2:00 PM	7:00 PM	10:00 PM	**Jean-Luc Margot** (UCLA) - "Results of ten years of UCLA SETI searches with the Green Bank Telescope"
3:20 AM	8:50 AM	11:20 AM	2:20 PM	7:20 PM	10:20 PM	**David P. Anderson** (University of California, Berkeley) - "SETI@home: algorithms and results"
3:40 AM	9:10 AM	11:40 AM	2:40 PM	7:40 PM	10:40 PM	**Nick Siegler** (Jet Propulsion Laboratory) - "NASA's Technosignatures Database"
4:00 AM	9:30 AM	12:00 PM	3:00 PM	8:00 PM	11:00 PM	*Discussion*
4:40 AM	10:10 AM	12:40 PM	3:40 PM	8:40 PM	11:40 PM	*End of Session*

IAUS 404 – DAY 5: Looking to the Future

GMT	*IST (India)*	*CST (China)*	*AEDT*	*PST*	*EST*	
0	*+5.5*	*+8*	*+11*	*-8*	*-5*	
March 6	*March 6*	*March 6*	*March 7*	*March 6*	*March 6*	*ATLANTIC SESSION*
2:00 PM	7:30 PM	10:00 PM	1:00 AM	6:00 AM	9:00 AM	**Daniel Apai** (University of Arizona) - "All-Sky Optical Beacon Search with a MODE Lens-Based System"
2:20 PM	7:50 PM	10:20 PM	1:20 AM	6:20 AM	9:20 AM	**Madeline Stratton** (University of Southern California) - "From Light to Life: Direct Imaging of Technosignatures with Optical Reef"
2:40 PM	8:10 PM	10:40 PM	1:40 AM	6:40 AM	9:40 AM	*Discussion*
3:00 PM	8:30 PM	11:00 PM	2:00 AM	7:00 AM	10:00 AM	**Andreas Schwartz** (Ilmenau University of Technology), Anamaria Berea, & Abdullah Almalki - "Public perceptions and communications of searching for technosignatures and detection claims: A systematic analysis of YouTube narratives and reactions"
3:20 PM	8:50 PM	11:20 PM	2:20 AM	7:20 AM	10:20 AM	**Daniela de Paulis** (SETI Institute) - "Patterns in Perception of a Simulated Message from Space"
3:40 PM	9:10 PM	11:40 PM	2:40 AM	7:40 AM	10:40 AM	*Discussion*
4:00 PM	9:30 PM	12:00 AM	3:00 AM	8:00 AM	11:00 AM	*Break*
		March 7				
4:20 PM	9:50 PM	12:20 AM	3:20 AM	8:20 AM	11:20 AM	**Ian Crawford** (Birkbeck College, University of London) **"Some thoughts on the future of technosignature searches"**
5:00 PM	10:30 PM	1:00 AM	4:00 AM	9:00 AM	12:00 PM	*Discussion*
5:40 PM	11:10 PM	1:40 AM	4:40 AM	9:40 AM	12:40 PM	Closing Remarks
6:00 PM	11:30 PM	2:00 AM	5:00 AM	10:00 AM	1:00 PM	*Adjourn*

IAUS 404 – Posters

	RADIO AND OPTICAL TECHNOSIGNATURES	
1	**Chenoa Tremblay**	Signals in the Noise: Radio Astronomy's Hunt for Technosignatures
2	**Daniel Kanev, Joe Callingham & Jasmina Lazendic-Galloway**	Low-Frequency Radio Emission from Massive Stars as a Precursor for Exoplanet Radio Searches
3	**Louisa Mason**	Simulating the Stellar Bycatch: Constraining the Prevalence of Extraterrestrial Transmitters within Radio SETI Surveys
6	**Benjamin Fields**	A 2821 Star Southern Hemisphere Optical SETI Survey
7	**Claudio Grimaldi**	Undetected past contacts with ETs: implications for technosignature science
	EXOPLANET ATMOSPHERE AND SYSTEM TECHNOSIGNATURES	
11	**Vincent Kofman**	Spectral signatures originating from technology
12	**Önder Bakır**	Transit Light Curve Manipulation as a Cloaking Strategy: Detection of Artificial Planetary Occultation in TESS Data
13	**Ishaani Purang**	Transit-Based Technosignatures
14	**Shauna Sallmen & Eric Korpela**	Exploring the Orbital Stability of Large, Lightweight Mirrors around Exoplanets
15	**M. Varnana, V. Kumar, V. Vipindas, K.S. Sony & T.E. Girish**	Some Possibilities for the Identification of Technosignatures in the Exoplanets

16	**Mitchell Yzer, Jayne Birkby, Ray Pierrehumbert & Andrew Siemion**	Prospects for Detecting Atmospheric Technosignatures on Nearby Rocky Exoplanets with the ELT
17	**Caldon Whyte & Colin Harrison**	The White Dwarf Technosignature Opportunity
	TARGET SELECTION AND SEARCH PRIORITIZATION	
18	**Diana Solano-Oropeza**	Chasing exoplanet host stars through the Earth Transit Zone over the past and future 500,000 years
19	**Juan José García Delgado**	Chemo-dynamic clues to the birthplaces of exoplanetary systems and the Galactic context for technosignatures
20	**Miles Timpe**	The Spacefaring Index: A Comparative Metric for Targeting Technosignature Searches
21	**Sanjoy Som**	Planetary Conditions for Spacefaring Civilizations: A Coupled Geophysical–Atmospheric–Astronautical Feasibility Framework
22	**Romina Paola Petrucci & Emiliano Jofré**	Searching for Abiogenesis on Planets Around Ultra-Cool Dwarfs: Choosing Best Technosignature Targets
	SOLAR SYSTEM TECHNOSIGNATURES	
23	**Eamonn Ansbro**	Evidence for Techno Signatures around the Earth
25	**Martin Dominik**	Is RNA biotech?
27	**Alyssa Johnson**	Advancing Technosignature Searches with the Panoramic SETI Telescope Deployments at Palomar Observatory

42	**Megan Grace Li**	"Are we alone in the universe?" - A Participatory Science Collaboration
43	**Wei Tang**	Venus, PH3, and the Challenge of Communicating Controversial Discoveries
44	**Andrew Fraknoi**	Technosignature Search Success: The Science-Fiction View
	FERMI PARADOX REDUX	
45	**Daliah Bibas & Clément Vidal**	The Fermi Paradox: Which Solutions Matter Most for Technosignature Searches?
46	**Jacob Haqq-Misra**	Framing the Possibility Space for Technosignature Searches
47	**Robin Corbet**	A Less Terrifying Universe: Mundanity as an Explanation for the Fermi Paradox
48	**Milton Mendonça**	Restoration ecology and technosignatures, or “hippie aliens”: should we expect planetary technological impacts from truly advanced civilisations?

Summary of the Scientific Highlights of the Meeting

During the IAUS 404, we discussed five major science topics on advancing the search for technosignatures.

1) Exoplanetary Technosignatures
2) Solar System Technosignatures
3) Extragalactic Technosignatures
4) Revisiting Theoretical Assumptions
5) Looking to the Future

In the following, we summarize the scientific highlights discussed at the IAU Symposium 404.

The first theme focused on searching for technosignatures in targeted observations of exoplanetary systems. Spectral characterization of exoplanet atmospheres could reveal atmospheric constituents that may be difficult to explain by non-technological means, with fully fluorinated compounds like nitrogen trifluoride (NF_3) and sulfur hexafluoride (SF_6) as prime candidates for technosignature gases. These and other atmospheric pollutants such as chlorofluorocarbons (CFCs) show the most discernible spectral features at mid-infraed wavelengths, which may be within the high-resolution spectroscopy detection capabilities of the Extremely Large Telescope for some nearby systems. Extending a search for mid-infrared technosignatures to a larger number of systems could be feasible with the Large Interferometer for Exoplanets (LIFE) mission concept. Other technosignatures could also be observed through transit spectroscopy with a mission like the Habitable Worlds Observatory, such as elevated NO_2 pollution, optical anomalies, and evidence of starshades. The theme of exoplanetary technosignatures included the search for radio anomalies, which has made continual progress through direct and commensal observing; improving analysis pipelines to optimize reduction of radio-frequency interference while avoiding loss of potential signals; developing novel multi-beam search modes; and collaborating with radio observatories around the world to maximize sky coverage. Traditional narrow-band approaches to radio technosignatures may need to expand to broader-band searches, due to the potential broadening that can occur as narrowband signals interact with the host stars interplanetary medium.

The second theme focused on searching for technosignatures within the solar system. Such searches are predicated on the hypothesis that evidence of extraterrestrial visitation or settlement of the solar system, past or present, might be detectable. The solar system is vast, and even the current international fleet of orbiters, rovers, and probes can only place very limited constraints on the possible presence of solar system technosignatures. Unsupervised machine learning algorithms can be a promising approach toward leveraging existing datasets to search for possible anomalies, such as in high-resolution lunar or martian surface images. Relics of extraterrestrial spacecraft may only remain as dust, but discovering micron-scale technosignatures in lunar dust, for example, would be challenging. The possibility of active extraterrestrial activity within the solar system has motivated the development of multi-sensor platforms to search for exogenous technosignatures that may be observable in or near Earth's atmosphere. Such a discovery would have significant social implications.

The third theme focused on searching for extragalactic technosignatures and other exotic possibilities. Analyses of stellar databases found some possible candidates for systems with infrared anomalies that could conceivably be explained as energy-harvesting Dyson spheres or swarms; subsequent analysis was able to explain many of these candidates as contamination, while follow-up observations will provide further constraints. Other exotic technosignatures could include post-biological technospheres that harvest energy from supermassive black holes or X-ray binaries, observable through waste heat, spectral anomalies, and polarization.

The fourth theme focused on revising theoretical assumptions within the search for technosignatures. The longevity of technospheres remains an open question: long-lived technospheres may provide the greatest chances of discovery, but if short-lived technospheres are highly abundant, then they may be the easiest to find. Another open question relates to the acceleration of technological advancement: recent trends in AI and other technology can foster visions of exponential growth and expansion, but a broader look at the patterns of behavior across human history and in non-human species suggest that growth and expansion may not necessarily be an imperative that will operate at interstellar scales.

The fifth theme focused on looking to the future of the field. New concepts for all-sky surveys and direct imaging of exoplanets are already under study. Yet the Fermi paradox remains looming: if they exist, then why are they so hard to find? Observational limits are one explanation, pointing to the value in new observatories. Technosignatures could also be so rare or short-lived that we will never find them, they may already be in archival data but so far unnoticed, or they may be here and we will find them soon. It is possible that the first discovery of a promising technosignature will be in another area of astronomy or even another discipline, so advancing the search requires further interdisciplinary collaboration.

Executive Summary of the Meeting

IAU Symposium 404: Advancing the Search for Technosignatures, was hosted online by the US-based nonprofit organization Blue Marble Space, March 2-6, 2026. It was attended by 153 participants from 33 different countries and was the first online-only IAU symposium. It is worth noting that the organizers received numerous inquiries asking if the number for this online symposium was ironically chosen as "404" to match the "page not found" HTTP status code. However, the organizers did not select this number, and to our knowledge, this choice of number was merely coincidental due to the sequential ordering of IAU symposia.

Evidence of technosignatures indeed remains to be found, and this symposium featured 33 live talks and 39 recorded video posters that highlighted the expansive breadth of this search. The scientific enterprise of SETI (search for extraterrestrial intelligence), or the search for technosignatures, recognizes that Earth remains the only known inhabited planet—a planet where biology emerged long ago, and a phenomenon we call "technology" more recently has begin to exert global-scale effects. Just as "biosignatures" represent a class of remotely detectable features that could indicate the presence of extraterrestrial life, "technosignatures" are a subset of biosignatures: remotely detectable features that would indicate the presence of extraterrestrial technology. Some technosignatures might even be less ambiguous than other biosignatures if detected on an exoplanet. Possibilities could include narrow-band radio signals, spectral absorption features from pollutants, and emission spectra from laser pulses or urban illumination, as some of the many examples discussed at this symposium. Known technology on Earth today, and projections of the future, can provide ideas for possible technosignature candidates and search strategies.

This purpose of this symposium was to advance the search for technosignatures by featuring contributions on theoretical, instrumental, observational, or data analysis ideas for characterizing and detecting technosignatures. Emphasis was placed on methods that are relevant to current and future exoplanet observations with facilities such as space- or ground-based telescopes, solar system exploration missions, and any other analyses of data from Earth or space observations. The goal of this symposium was to foster discussion on ways to advance the search for technosignatures by leveraging existing missions and data archives.

The online-only format was especially fitting for a symposium focused on technosignatures. The topic has significant interest among astronomers and other scholars, but few are able to make technosignatures a primary research focus; many researchers are unable to devote significant time and resources toward prioritizing technosignature-oriented projects, and indeed, funding in this area can often remain elusive. Resource-limited scientists or those living in places with travel restrictions likewise may be unable to join conventional events on this or any other topic. The online format reduced barriers to entry that enabled broader participation across as many time zones as possible, and at a much lower cost than travel to an in-person symposium.

Symposium events included live sessions using Zoom Webinars, recorded video posters hosted through YouTube, group conversations through a Slack Pro workspace, and digest emails featuring highlights of each day. Live sessions were also recorded and available for viewing the next day. Daily events were organized into two sessions, the Atlantic Session (14:00 - 18:00 GMT) and Pacific Session (3:00 - 5:00 GMT) in order to accommodate participation across many time zones. Sessions were organized in thematic blocks with plenty of time allocated for discussion with all session speakers. We also ensured adequate breaks in the schedule, with the schedule itself listed in six different time zones. Poster pop talks for both Atlantic and Pacific sessions were scheduled at the start of the symposium, which gave poster presenters an opportunity to share their ideas in a live setting.

In addition to the scientific talks and video posters, the symposium included participatory activities that were intended to stimulate new thinking about directions in technosignature research. The Futures Workshop provided an initial opportunity to capture the landscape of SETI research ideas that have been circulating around the SETI academic community, including the "whats," the "hows," the "whys," or any other pertinent aspects, using an Overton Window as a guide. The All Worlds, All Times LARP (Live-Action Role-Play) simulated the 2050 detection of an anomalous, musically structured gravitational-wave signal, in which participants collectively tested this signal using the Post-Detection Toolkit, examining communication, uncertainty, and meaning-making across four contrasting world scenarios. The Science Fiction Social Hour was a friendly and informal discussion about science fiction that portrays the search for, and the discovery of, technosignatures in a scientifically reasonable way. We also featured non-technical summaries of journal articles presented at the symposium on the Sciworthy website, as an outward-facing component.

This event was not the first IAU symposium to include scientific content about technosignatures or SETI. The Kavli-IAU Symposium 387 "(Toward) Discovery of Life beyond Earth and its Impact," convened in April 2024 in Durham, UK, included a broad spectrum of topics in astrobiology that included biosignatures and technosignatures. Other prior IAU events have also focused on the search for life (IAUS 345, IAU FM 15, IAUS 213, IAUC 131) but most of these did not include significant content on technosignatures. The first IAU symposium dedicated to SETI was number 112, "The Search for Extraterrestrial Life: Recent Developments," convened in June 1984 at Boston University and chaired by Michael Papagiannis. The organizing committee of IAUS 112 included many of the giants on whose shoulders we stand, such as Frank Drake, Carl Sagan, Nikolai Kardashev, and Philip Morrison, among others. As a commemoration of this history, IAUS 404 included "historical throwbacks" to selected proceedings papers from IAUS 112 as a complement to our discussions during the symposium.

This symposium has already ignited new connections and collaborations among the participants, and we are honored to have had the opportunity to work with so many dedicated and talented people. We thank the IAU and Division F for supporting us in organizing this symposium. Institutional support by Blue Marble Space allowed for a nearly flawless execution of the event, and we are grateful to the administrative team for all their efforts that enable us to support events like this. The high-quality program at our symposium reflects the efforts of our cordial and thoughtful Scientific Organizing Committee. This symposium would also not have been possible without the dedication of the student volunteers on our Online Organizing Committee, and we are thankful for all of their efforts in the preparation and management of the event.

Finally, We thank all of the participants at our symposium for making this a truly memorable event. We hope that the record of this meeting and the forthcoming proceedings volume will capture the enthusiasm of our symposium and draw new minds into the technosignature community.

IAUS 404

Advancing the Search for Technosignatures