

# **Life in the Cosmos**

## **Beyond the blind spots**

Villa Galileo, Arcetri  
18-19-20 November 2024

### **Workshop Overview**

Astrobiology has seen remarkable progress over the last 30 years. From the discovery of exoplanets to the development of atmospheric characterization techniques and relevant in situ missions to objects in the solar system, there has been an explosion in studies of where, when, and how life might form (and thrive) in the Universe. However, by its nature, Astrobiology is a new kind of science—wildly interdisciplinary (or even transdisciplinary)—requiring deep collaborations across fields as diverse as geology, planetary science, biology, ecology, and even anthropology and history. In general, however, most researchers in astrobiology have primarily astrophysics/physics training and acquire knowledge of other domains through readings and collaborations. In this workshop (perhaps the first in a series), we focus on progress in the field with an eye to the "blind spots" that currently exist. Given the progress being made, we ask what kinds of perspectives are needed and how these blind spots might be addressed. Our ultimate goal is to foster new networks of collaboration to address the most exciting and challenging issues surrounding life in the cosmos.

## Program

**Monday, 18 November 2024**

10:30 - 11:00 - Introduction to the workshop: What is astrobiology (SOC)

11:00-11:30 *coffee break*

*Session 1: What's universal about life*

11:30-12:30 Chris Kempes

"The boundaries of evolution and general theories for biology"

12:30-14:00 *lunch break*

14:00 - 15:00 Marcelo Gleiser

"Why we are the only humans in the universe and why it matters for our collective future"

15:00 16:00 Amedeo Balbi

"Fallacies and Futures: Reframing the Search for Life in the Universe"

16:00-16:30 *coffee break*

*Session 2: Exoplanets: observations*

16:30 17:30 Alessandro Marconi

"From biomarkers in exoplanet atmospheres to Universe expansion: the combined power of ANDES and the Extremely Large Telescope"

## **Tuesday, 19 November 2024**

### *Session 2 (continued): Exoplanets: observations*

9:00-10:00 Isabella Pagano

"Exoplanetary systems and the search for life "

10:00-11:00 Jayne Birkby

"A High Resolution Search for Life in the Cosmos" (remote contribution)

11:00-11:30 *coffee break*

### *Session 3: Astrobiology*

11:30 - 12:00 Daniela Billi

"Cyanobacteria as a tool to explore the limit of life as we know it"

12:30-14:00 *lunch break*

14:00-15:00 John Brucato

"Searching for life in the Solar System"

15:00 - 16:00 Dirk Schulze-Makuch

"We May Have Overlooked the Presence of Life on Mars"

16:00-16:30 *coffee break*

### *Session 4: Exoplanets: biosphere, climate*

16:30 17:30 Nikku Madhusudhan

"The Hycean Paradigm in the Search for Life Elsewhere"

## **Wednesday, 20 November 2024**

### *Session 4 (continued): Exoplanets: biosphere, climate*

9:00-10:00 Axel Kleidon

"How the second law of thermodynamics shapes life on Earth - and how life responds to it"

10:00 - 11:00 Giuseppe Murante

"Modeling climate of exoplanets: assessing their habitability under different astrophysical, atmospheric and biological characteristics"

11:00-11:30 *coffee break*

11:30-12:30 Giovanni Covone

"Transition metal abundance as a key parameter for the search of Life in the Universe"

12:30-14:00 *lunch break*

### *Session 4 (continued): Exoplanets: biosphere, climate*

14:00 - 15:00 Erica Bisesi

"Impact of biological feedbacks on the habitability of rocky exoplanets"

### *Session 5: Techno signatures and information*

15:00 16:00 Ana Berea

"A Natural Language Processing Approach to Technosignatures - Information Theoretic Constraints to Detection"

16:00-16:30 *coffee break*

16:30-17:30 Adam Frank

"The Search for Technosignatures: Progress, Challenges and Blind Spots"