



5th Workshop of the Italian Astrobiology Society
Life in a Cosmic Context
15-17 September 2015, Trieste, Italy



Scientific Program

Tuesday, September 15

08:30-14:30 Registration

Opening Session (chairman: J. Chela-Flores)

09:00-09:20 Welcome address of the Society and the organizing institutes

09:20-09:40 **A. Bressan** (SISSA)

Cosmic Factories of Metals and Dust

Session 1: Organic chemistry in space and meteorites (chairman: L. Testi)

09:40-10:10 **S. Viti** (UCL)

Complex Organic Molecules in star forming regions

10:10-10:25 **V. Rivilla** (INAF- OAA)

Understanding the formation of astrobiological molecules in star-forming regions

10:25-10:40 **C. Codella** (INAF- OAA)

Pristine protostellar jet-disk systems: from darkness to the cradle of life

10:40-11:10 Coffee break

11:10-11:25 **C. Ceccarelli** (IPAG)

The cosmic heritage: message from isotopes

11:25-11:55 **S. Pizzarello** (ASU)

The cosmic trail of reduced Nitrogen towards Earth

Session 2: Prebiotic chemistry (chairman: R. Saladino)

11:55-12:15 **N. Balucani** (Univ. Perugia)

Gas-phase formation routes of simple prebiotic molecules in the interstellar medium

12:15-12:30 **F. Vazart** (Scuola Normale di Pisa)

Cyanomethanimine isomers in cold interstellar clouds: insights from electronic structure and kinetic calculations

12:30-12:45 **S. Falcinelli** (Univ. Perugia)

Dication formation and escape probability of ions from planetary atmospheres

12:45-13:00 **M. Rosi** (Univ. Perugia)

A theoretical study of formation routes and dimerization of methanimine: implications for the aerosols presence in the upper atmosphere of Titan

13:00-13:15 **F. Cataldo** (INAF-OACT)

From Elemental Carbon to the Formation and Radiation Stability of Chiral Molecules

13:15-13:30 Installation of posters - Registration

13:30-14:30 Lunch break (SISSA cafeteria)

Session 2 (continued): Prebiotic chemistry (chairman: J. Brucato)

- 14:30-14:45 **S. Stranges** (Univ. La Sapienza)
Synchrotron radiation enantioselective ARPES studies of intrinsic properties of chiral free molecules
- 14:45-15:00 **M. Facchin** (Univ. Ca' Foscari)
Life in hydrocarbons: typical micelles from reverse amphiphiles in hexane
- 15:00-15:15 **L. Dore** (Univ. Bologna)
Laboratory Millimeter-Wave Spectroscopy of Organic Molecule of Astrophysical Importance
- 15:15-15:30 **A. Maris** (Univ. Bologna)
Microwave spectroscopy characterization of small organic rings
- 15:30-15:45 **C. Puzzarini** (Univ. Bologna)
Quantum Chemistry Meets Spectroscopy for Astrochemistry: Increasing Complexity toward Prebiotic Molecules
- 15:45-16:00 **F. Pichierri** (Tohoku Univ.)
Metal-Formamide Complexes and their Role in Prebiotic Chemical Catalysis
- 16:00-16:15 **M. Accolla** (INAF-OACT)
Photochemistry on the International Space Station: A study of the effects of the solar electromagnetic radiation on organic refractory samples
- 16:15-16:30 **S. Longo** (Univ. Bari)
Confined hydrogen atoms and exploding ice mantles
- 16:30-16:45 **F. Da Pieve** (CNRS, École Polytechnique)
Circular dichroism on condensed amino acids and precursors: results from Time Dependent Density Functional Theory

16:45-17:00 Coffee break

17:15-17:30 Bus leaves from SISSA to the "Elettra" Synchrotron

17:30-19:30 Visit to the "Elettra" Synchrotron facility

19:30-20:00 Bus transportation to Piazza Oberdan

Wednesday, September 16

08:30-14:30 Registration

Session 2 (continued): Prebiotic chemistry (chairman: N. Balucani)

- 09:00-09:20 **R. Saladino** (Tuscia Univ.)
The route from formamide to RNA and metabolism. Part I
- 09:20-09:50 **E. di Mauro** ("La Sapienza" Univ.)
The route from formamide to RNA and metabolism. Part II
- 09:50-10:05 **M. Simakov** (RAS, St. Petersburg)
The chemical evolution in open space: An experimental approach.
- 10:05-10:20 **M. Dubina** (RAS, St. Petersburg)
K⁺ vs. Na⁺ Driving Force of Prebiotic Peptide Emergence

10:20-10:50 Coffee break

Session 3: Origin of life and early cell evolution (chairman: E. Gallori)

10:50-11:20 **A. Lazcano** (UNAM)

Mind the gap: from the primitive soup to the root of universal phylogenetic trees

11:20-11:50 **M. Mandrioli** (Unimore)

From modern symbioses... to the origin of the eukaryotic cell

Session 4: Life in extreme environments (chairman: E. Gallori)

11:50-12:05 **M. Moracci** (CNR-Napoli)

Metagenomics of hydrothermal fumaroles to study the evolution of early life at high temperatures

12:05-12:20 **D. Billi** (Univ. Tor Vergata)

Desert cyanobacteria under space and Martian conditions: Insight into the limit of life as we know it

12:20-12:35 **B. Cavalazzi** (Univ. Bologna)

Sulphur springs, sulfates and iron oxides of the Dallol (Danakil Depression, Ethiopia): A spectacular Mars terrestrial analog

12:35-12:50 **E. Milotti** (Univ. Trieste)

Synthetic Life in Extreme Conditions

Session 5: Life in the Solar System (chairman: D. Billi)

12:50-13:30 **R. Mancinelli** (NASA, Ames)

Life beyond the planet of origin and implications for the search for life on Mars

13:30-14:30 **Lunch break**

14:30-15:00 **Poster session**

15:00-15:15 **T. Fornaro** (INAF-OAA, Scuola Normale di Pisa)

Nucleic Acid Components adsorbed on mineral surfaces: A test bed for searching signs of life on Mars

15:15-15:35 **J. Chela-Flores** (ICTP) *Beyond JUICE:*

Searching for habitability of ocean moons and dwarf planets

Session 6: Mathematical models of life evolution (chairman: G. Murante)

15:35-15:50 **S. Ferluga** (Univ. Trieste)

Probabilities of Earth-like evolution by easy and hard steps

15:50-16:05 **C. Maccone** (INAF-IASF)

Molecular Clock and Evo-SETI Theory of Evolution

Session 7: Search for habitable exoplanets (chairman: G. Vladilo)

16:05-16:35 **I. Pagano** (INAF-OACT)

CHEOPS and PLATO as part of the ESA roadmap to detect and characterize extrasolar planets

16:35-16:50 **Coffee break**

18:00-19:30 **Public Conference** "*Le strategie della vita*", coordinated by **F. Pagan**: **A. Balbi** (*Alla ricerca di una seconda Terra*), **E. Gallori** (*La persistenza della memoria biologica*), **A. Lazcano** (*Le origini: una storia lunga e sfuggente*). Location: Museo Revoltella, Via Armando Diaz, 27, Trieste.

20:00-22:00 **Social dinner** at *Società Triestina della Vela*, Pontile Istria, 8, Trieste.

Thursday, September 17

Session 7 (continued): Search for habitable exoplanets (chairman: G. Vladilo)

09:00-09:30 **A. Sozzetti** (INAF-Torino)

Exoplanets: Ushering in the Era of Comparative Planetology

Session 8: Protoplanetary disks in astrobiological context (chairman: S. Viti)

09:30-10:00 **L. Testi** (ESO)

Protoplanetary disks and the dawn of planets

10:00-10:15 **M. Tazzari** (ESO)

Constraining the dust grain size distribution in protoplanetary disks with ALMA and JVL A observations

10:15-10:30 **L. Podio** (INAF- OAA)

The chemistry of protoplanetary disks: searching for the building blocks of life

10:30-11:00 **Coffee break**

Session 9: Atmospheres of inhabited planets (chairman: A. Sozzetti)

11:00-11:30 **G. Galletta** (Univ. Padova)

Exoplanets atmospheres in a test tube

11:30-11:45 **N. La Rocca** (Univ. Padova)

Microorganisms suitable for studying biomarkers within the atmosphere in a test tube project

11:45-12:00 **E. Simoncini** (INAF-OAA)

The effect of life on Earth's atmosphere: a disequilibrium analysis during history

Session 10: Habitability beyond the Solar System (chairman: A. Sozzetti)

12:00-12:20 **G. Vladilo** (INAF-OATS)

Exoclimates and planetary habitability

12:20-12:35 **G. Murante** (INAF-OATS)

Mapping the Galactic Habitable Zone

12:35-12:50 **E. Spitoni** (Univ. Trieste)

The Galactic habitable zone with detailed chemical evolution models

Session 11: Space Life Sciences (chairman: R. Mancinelli)

12:50-13:20 **M. Vukich** (Kayser)

Experiment Units to investigate biological systems for Space Life Sciences

13:30-14:30 **Lunch break**

14:30-15:00 **Poster session**

13:30-15:00 **Riunione del direttivo della Società Italiana di Astrobiologia (SISSA, Room 135)**

15:00-15:30 **Workshop summary**

Open questions - Census of astrobiological activities in Italy

15:30-16:30 **Tavola rotonda: Alta Formazione in Astrobiologia**

Moderatore: G. Vladilo (INAF-OATS/Univ. Ts).

Saluto del Rettore dell'Università degli Studi di Trieste, prof. **M. Fermeglia**.

Intervento introduttivo di **D. Billi** (Univ. Roma Tor Vergata):

Rassegna dei corsi di astrobiologia attivi nelle Università italiane

Segue dibattito. Interverranno rappresentanti dell'Agenzia Spaziale Italiana e docenti dei corsi tenuti a Bologna, Firenze, Padova, Pisa, Roma, Trieste, Viterbo e Grenoble.