

Workshop on Drake Equation  
November 21 & 22, 2011, CNES Paris – France



This workshop was supported by CNES (Centre National d'Études Spatiales), IAA (International Academy of Astronautics) and SFE (Société Française d'Exobiologie). It aimed at stimulating discussions about Drake Equation initially introduced by the American astronomer Frank Drake in November 1961 at the Greenbank Conference (USA). Fifty years after its formulation, knowledge has significantly increased on most of the parameters involved in the Equation. This workshop has promoted interdisciplinary exchanges and discussions about each parameter between the speakers present at this workshop and coming from various areas (astrophysics, chemistry, biology, anthropology and philosophy). The workshop has led to the exploration of new ideas about the presence and search of other civilizations in the galaxy.

The workshop was divided in four sessions: 1) Drake Equation, Exoplanets and Habitability. 2) Origin and Evolution of Life and Intelligence, Socio-Anthropological aspects. 3) Evolution of Extraterrestrial Civilizations and Technologies of communication. 4) Epistemology and Open questions.



The opening lecture of the first session was given by Claudio Maccone (IAA Turin) on the Statistical Drake equation and the KLT for an innovative SETI. The two next talks were given by Alain Lecavelier (IAP Paris) and François Forget (LMD Paris) and concerned the last news on exoplanets, their detection and habitability. The second part of this session began with Olivier Bastien (University

of Grenoble), who proposed an evaluation of the uncertainties in the Drake equation parameters. Elisabeth Piotelat (LIMSI Orsay) raised the problem of the compatibility between technologies coming from different galactic civilizations. Danielle Briot (Paris-Meudon Observatory) ended this session with a talk on a historical view about the search for life in the universe.

Session 2 started with an opening lecture given by Jacques Reisse (University of Brussels) on epistemological considerations about the origin of life and its probability on other planets. The second talk was given by André Brack (CBM Orléans) and was focused on the problem of extraterrestrial life. Jean-Pierre Rospars (INRA Versailles) pointed out the possible existence of universal evolutionary constraints in the light of some terrestrial biological examples. Pierre Lagrange (University of Avignon) discussed the question of SETI as a science. The two last talks of this session dealt with anthropological and sociological problems. Anne Dambricourt-Malassé (MNHN Paris) wondered about the emergence of extraterrestrial civilizations, basing her arguments on human evolution. David Morin Ulmann ended the session with a talk on socio-anthropological questions.

Session 3 started with Luc Arnold (Haute-Provence Observatory) whose proposals concerned alternative solutions for SETI and their consequences on Drake equation. Nicolas Prantzos (IAP Paris) explained in a second talk the problem of interstellar travels. Stephane Dumas (SETI League Canada) ended the session with a talk about the probability of a galactic empire.

The opening lecture of Session 4 was given by Jean Schneider (Paris-Meudon Observatory) and was divided in three parts: - Two possible applications of SETI – How to conceive an extraterrestrial intelligence from human intelligence only? – Presentation of Farid Abdelouahab “Visual Dictionary of Extraterrestrial Worlds”. The next talk was given by Jean-Luc Petit (Strasbourg University) who presented his philosophical viewpoint about the communication with extraterrestrials. The workshop was closed by Brandon Carter (Paris-Meudon Observatory) with a talk dealing with the question of Anthropic time windows.



**Local Organization Committee:** Alain Labèque *Institut d'astrophysique spatiale Orsay*, Elisabeth Piotelat *Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur Orsay*, Florence Raulin Cerceau *Centre Koyré Muséum national d'Histoire naturelle Paris*, Jean-Pierre Rospars *Institut National de la Recherche Agronomique Versailles*, Jean-Michel Martin *Observatoire de Paris*.

**Scientific Committee:** Luc Arnold *Observatoire de Haute Provence*, André Brack *Centre de Biophysique Moléculaire Orléans*, Didier Despois *Observatoire Aquitain des Sciences de l'Univers Bordeaux*, Jean-Michel Martin *Observatoire de Paris*, Nicolas Prantzos *Institut d'Astrophysique de Paris*, Jean-Pierre Rospars *Institut National de la Recherche Agronomique Versailles*, Jean Schneider *Observatoire de Paris*.