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Are we alone in the Universe?

Vil Bakirov, Massimo Capaccioli, and Vadym Kaydash
Editors

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Collection of papers presented on a virtual conference held in the V.N.Karazin Kharkiv National University (Ukraine) on the occasion of the Italian Research Day in the World, 2020. The meeting was organized by the Italian Embassy to Ukraine (Kiev), the Karazin University, and the INAF-National Institute of Astrophysics (Italy). Conference papers debate the question: “Are We Alone in the Universe?”, addressed from different angles: scientific, technological, philosophical, sociological, legal, historical, biological, futurological, theological, to face some of the aspects of the multifaceted problem of pluralism. The purpose is to kindle the readers' interest in particular towards various scientific fields, showing in practice that all these human disciplines (as well as others not quoted here) are intermingled in building the future of human beings.

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Professor Nicolò (Nichi) D'Amico, distinguished Radio-astronomer, Academician and University Professor, was appointed President of INAF (National Institute for Astrophysics) in 2015 and confirmed for a second term in December 2019, the first president to be reconfirmed in the history of this institution.

Nichi had a passion, more than an interest, for pulsars. Following a career as INAF staff, he was later appointed full Professor of Astrophysics at the University of Cagliari and directed the construction and early operation of the Sardinia Radio Telescope (SRT), one of the largest single-dish radio telescopes in the world.

He authored or co-authored more than 300 publications with about 10.000 citations, according to NASA – Astrophysics Data System, about twenty of which published on Nature or Science and 10 co-authored with the Nobel Laureate J.H. Taylor. He was indicated by Thompson-ISI as the most cited scientist in 2004 in Space Sciences by VIA-Academy in the top-list of Italian Scientists. He received the CSIRO (Australian Commonwealth Scientific and Industrial Research Organisation) Medal certificate in 1993 and the European Descartes Prize in 2005 for the first discovery of the double Radio Pulsar PSR J0737-3039.

In his role as INAF President he boosted research in astrophysics in Italy, paying special attention to the international collaboration and common research infrastructures. He represented Italy on the European Southern Observatory (ESO) Council and was head of the Italian delegation in the negotiation that led to the Square Kilometre Array (SKA) becoming an Intergovernmental Organisation. His fundamental interest in the Cherenkov Telescope Array brought the Headquarters of CTA to the INAF premises in Bologna.

With a firm belief in the value of human capital in Science, Nichi fostered the local, national and international collaborations at any possible level. He strongly supported the bilateral relation between V.N. Karazin Kharkiv National University and INAF, as well as any initiative of the Italian Embassy in Kiev to strengthen the dialogue on Science and Culture between Ukraine and Italy.

Nichi passed away on 14 September 2020 at his home in Sardinia without having the chance to visit personally Kharkiv and Ukraine. His contribution to the initiative “*Are we alone in the universe*” represents the last testimony of his effort to bring Ukrainian and Italian Scientists closer.

Rome, June 2, 2021

Filippo Maria Zerbi

(INAF Scientific Director)

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FOREWORD

Are we alone in the universe? This is an old and classical question, yet unanswered, and as such it stands as an ideal ground for scientific, philosophical, sociological, political, metaphysical and even theological considerations and debates. The broad spectrum of expertise involved makes the topic particularly suitable for a confrontation of the intellectual and technological capabilities of Italian and Ukrainian scholars in the framework of the tight and fruitful cooperation program established between the Italian National Institute of Astrophysics (INAF), the V.N. Karazin Kharkiv National University, and the National Academy of Sciences of Ukraine.

The synergy of interests, strongly fostered by the Embassy of Italy in Kyiv and formally subscribed by two Memorandum of Understanding signed in 2017, started with astronomy and then has developed into other fields, such as history and archeology, with the involvement of the University of Campania Luigi Vanvitelli. Among the various activities resulting from this collaboration, some individual and other collective, there are the scientific conferences organized since the first Italy–Ukraine meeting held at INAF in Rome in 2017: the second Italy-Ukraine meeting held in Kharkiv in 2018 and entitled “*Multiwavelength astrophysics from Radio to gamma rays*”, and the mega-events “*Leonardo and the Moon*”, to celebrate the 500th anniversary of Leonardo da Vinci’s death and the 50th anniversary of the first human landing on the Moon, and “*Are we alone in the Universe?*” on the occasion of the Italian Research Day in the World, both held in Kharkiv respectively in May 2019 and June 2020. To these we shall add the Italy-Ukraine scientific meeting “*Archeology and Formation of Space of Historical Memory*”, held in April 2021 again on the occasion of the Italian Research Day in the World.

Then pandemic caused by coronavirus has put some sands in the gears, but it has not diminished our will to nourish our scientific friendship. This book proves it. It collects the papers presented in our last mega-event, a three day

virtual meeting involving Italian and Ukrainian scholars with quite different competences. The format was that of a webinar due to contingency. Each author recorded his own presentation speaking either in Italian, or in Ukrainian, or in English. The files were then postprocessed at INAF and subtitled using proper translations made either at INAF in Rome or at the Karazin University in Kharkiv so as to have all presentations in each one of the three languages. Finally, the individual presentations were linked through short introductions made by Dr. Elena Bannikova who acted as chairman for the three days of the meeting. All this material has been posted in the Web at precise dates (see Day 1, <https://www.youtube.com/watch?v=xB0OPyGInrQ&feature=youtu.be>; Day 2, https://youtu.be/3vae_4l-87w; Day 3, <https://www.youtube.com/watch?v=D0GqgNrxjU4>).

This book collects the updated English versions of the papers, arranged in the same order they appeared in the webinar. All together they provide a panorama which can be indeed useful to students and to all those who want to speculate a bit on the near future having an eye to our past too. Obviously neither the webinar nor this book could be made without the intelligent and generous contribution of many people. First of all the former ambassador of Italy Davide La Cecilia, then all the other speakers; Filippo Zerbi, restless scientific director of INAF; Vadym Kaydash, director of the Institute of Astronomy of Kharkiv National University; Elena Bannikova, who has been among the first promoters of this collaboration; Kateryna Sorochan, Simona Mercantini and Mihaylo Protsenko, who worked at the texts and video materials on the Ukrainian side and Marco Malaspina, Delphine Perrodin and the INAF team on the Italian side.

We express our gratitude to Professor Oleksandr Rebrii, Head of Mykola Lukash Translation Studies Department, and Doctor Olha Pieshkova, also of Mykola Lukash Translation Studies Department, who provided invaluable assistance in editing the English version of the text of the book.

The book has dedicated to the memory of Nicolò D'Amico, former president of INAF, who had become a supporter of the Italy-Ukraine collaboration and has suddenly disappeared leaving all of us astonished and full of sorrow.

Kharkiv, July 5, 2021

Vil Bakirov

Massimo Capaccioli