Joseph Ivor Silk

Professor of Physics at the Institut d'Astrophysique, Université Pierre et Marie Curie, Paris, Homewood Professor in the Department of Physics and Astronomy, Johns Hopkins University, Baltimore, and Senior Fellow in the Beecroft Institute of Particle Astrophysics and Cosmology, Department of Physics, University of Oxford

2011 Balzan Prize for the Early Universe (From the Planck Time to the First Galaxies)
For his pioneering work on the early evolution of the Universe, studying the effects of various physical processes and phenomena such as dark matter and space curvature on the fluctuations of the Cosmic Microwave Background and the formation of galaxies of different types.

Institution Administering Research Funds: New College, University of Oxford

Adviser for the Balzan General Prize Committee: Bengt Gustafsson

An Oxford New College - Johns Hopkins Centre for Cosmological Studies

Cosmology is in a golden age of discovery, but a deeper understanding of what is meant by a science of cosmology, in the fuller reaches of these words, is in its infancy. It must involve astrophysics, physics, philosophy, and cosmogony, and tackle genuinely fundamental questions in cosmology.

Joseph Silk will designate part of his Balzan research funds for the creation of a Centre for Cosmological Studies based at New College Oxford and at the Department of Physics and Astronomy at the Johns Hopkins University in Baltimore. It will also involve the Oxford University Department of Physics and the Institut d'Astrophysique of the Université Pierre et Marie Curie in Paris.

The Centre's goal will be to provide Balzan grants for young researchers in cosmology in frontier areas of research that are consistent with the scientific themes supported by the Centre, and to establish international links involving leading young researchers to develop scientific interactions and collaborations that will benefit their careers as well

as enhance the scientific life of the partner institutions. Young research visitors at partner institutions will be invited to give an interdisciplinary talk, aimed at a broad audience, as well as a departmental seminar on their research.

The Centre will focus on five areas which are at the forefront of current research, and where New College, Oxford University and the other partner institutions have particular research interests and strengths:

(1) Issues of measure, and beyond: to understand the requirements and possibilities for a probability 'measure' of the observed universe in some space of possibilities, including potential uses of anthropic reasoning.
(2) Cosmogony: to better understand how the universe began and evolved.
(3) The dark energy and dark matter problems: to understand the origin and value of the cosmological constant that appears to be responsible for the observed acceleration of the universe, and of the dark matter that constitutes the bulk of the matter in the universe.
(4) Entropy, time and complexity: to deepen our understanding of gravitational entropy and information in the universe, the various arrows of time, and the growth and measures of complexity in cosmology.
(5) Data science: to understand and develop new techniques for cosmology with the largest of data sets.

The project will initially have a 5-10 year lifetime.