

# Preface

*Ulysses is telling Dante about his final fatal voyage, beyond the Pillars of Hercules, beyond the borders of the known world. Thanks to this episode in Dante's poem, Ulysses has become one of the world's great symbols of human dignity and human resource, a representative of the human compulsion to follow knowledge . . . Ulysses goes on to tell Dante of the courage that was required to initiate and pursue his adventure; I set forth then upon the open sea with just one vessel from my fleet's remains and those few men who had not deserted me.*

*Seamus Heney, Speech delivered to the Human Rights Organization  
Frontline January 2002*

When I was a boy I attended lectures by Rafel Carreras at the European Center for Nuclear Research (CERN) in Geneva Switzerland. These weekly popular science lectures were attended by people from all walks of life. As Carreras puts it

I often had university professors in the audience, schoolchildren, pensioners, sometimes even a mother feeding her baby, not forgetting the former CERN staff member whose job in my early years had been to clean off the blackboards at the end of my lectures, who, after he had retired, used to attend my lectures and sit in the front row

Carreras' job description at CERN was to "contribute to the intellectual health of the staff". Maybe every organization should have such a position. I hope this book will fill the reader with enthusiasm and encourage them to further explore the wonderful field of astronomy. It is in the Carreras spirit of sharing knowledge that I have written this book.

The book is aimed at the general public. It is not intended to be a textbook but rather an accessible overview of cosmology. The purpose of this book is to guide the reader to one of the frontiers of the field; the search for the first galaxies that formed after the big bang.

I feel I have two main duties as an author in writing a book such as this. Firstly, the book should not be boring, and secondly, it should provide correct scientific information. I hope I have achieved the goal of being entertaining without compromising accuracy.

Progress in cosmology is driven on the one hand by creative thinking and on the other by vast improvements in computing, telescope and instrument design. We stand on the brink of uncharted territory to be explored with the next generation of telescopes. It is easy for astronomers to impress the public with the awe inspiring images produced by telescopes such as the Hubble Space Telescope. I hope after reading this book, the reader will have the insight to appreciate the deeper significance of these images placed in their scientific context. For the most part I hope the reader will feel the same sense of wonder that I felt as a boy when I discovered science. Knowledge and wonder go hand in hand in the field of cosmology.

I would like to thank my colleagues at the University of Nevada, Stephen Lepp, Tao Pang, Bing Zhang, Daniel Proga and Ken Nagamine for providing a stimulating intellectual environment in which to think and write about these problems. Colleagues at other institutions including Rien van de Weygaert, Anatoly Klypin, Octavio Valenzuela and Fabio Governato have helped shape my ideas. I acknowledge support by the NSF AST-04-07072 grant to the University of Nevada, Las Vegas. I thank Doug Haag for his careful reading of the manuscript. I thank Heidie Grigg for her constant love and encouragement that made it possible for me to do this work. Let us then, like Ulysses, set forth on the open sea. . .

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Cosmic Dawn

The Search for the First Stars and Galaxies

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