PREFACE

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Two hundred years is a very short time on cosmic time scales. Yet, in human history, 200 years is a rather long interval that may contain a plethora of events. The old astronomical observatory in the very center of Tartu (Dorpat), on the small hill called Toomemägi, has witnessed both dramatic and joyful pages in the history of Estonia. It had the good fortune to avoid serious damages during the World War I, as well as it survived World War II. In the 1960s, most of the astronomers moved to the site of the new observatory at Tõravere, about 20 kilometers out of Tartu. The historical observatory, however, continued to decorate the town of Tartu as a museum, and served as center for popularizing astronomy.

On the threshold of the 200th anniversary of the observatory, the University of Tartu undertook a big effort to renovate the old observatory. After about one and half year of hard and delicate work, the constructors delivered the renovated observatory to the University on 2010 December 22nd – exactly 200 years after the similar original event. The observatory became a part of the University of Tartu History Museum. After a couple of months, filled with hard work to build up a new exposure of the museum, 2011 April 27 became the day of official opening of the renovated observatory. In the presence of the President of the Republic of Estonia, Mr. Toomas Hendrik Ilves, and of many foreign guests, the celebrations turned out to be an enjoyable and memorable landmark in the glorious history of astronomy in Estonia.

On 2011 April 28 and 29 an international scientific conference “Expanding the Universe” took place. The title of the conference was derived from the fact that for several times astronomers from Tartu have played an important role in updating distance scales of the Universe and in shifting cosmological paradigms. First, of course, Friedrich Georg Wilhelm Struve (1793–1864): he acquired to the observatory the 9-inch achromatic Fraunhofer refractor – considered the best telescope in the world at that time – and using it, he was able to measure the parallax of the bright star Vega, and to compile the catalogue of visual double stars. He also initiated meridian arc measurements in order to determine the shape and the size of the Earth. The 2820 kilometer long Struve Geodetic Arc, including the historical Tartu Observatory as its main center, has been admitted to the UNESCO World Heritage List.

Ernst Julius Õpik (1893–1985) was a universal scientist working in many fields of astronomy. In the context of the present conference, his novel dynamic method
to determine the distance to the Andromeda nebula (and thus proving that it is another galaxy outside the Milky Way) published in 1922 should be especially highlighted. Grigori Kusmin (1917–1988) was a specialist in stellar dynamics whose work on the third integral of motion in 1950s brings us closer to the modern dynamics, which includes Dark Matter. And of course, discovery of Dark Matter in 1974 by the “living classic” Jaan Einasto (born 1929) and his colleagues is among the brightest pages in the history of astronomy in Tartu. Taking into account Einasto’s subsequent studies of the regular large scale structure of the Universe – the cosmic web – we may be proud that Tartu observatory has been and continues to be a “hot spot” in the worldwide network of astronomical observatories.

In the present volume, most of the oral and poster presentations to the conference “Expanding the Universe” are published. The conference was not only devoted to the 200-year-long history of Tartu observatory, it also tackled several problems of modern astrophysics and cosmology. Discussing, for instance, the present-day luminosity function of galaxies or quasi-periodic oscillations from magnetars in the historical atmosphere where Struve, Mädler, Opik and other world-known astronomers have worked, added an extra flavour to the conference.

On behalf of the organizers of the conference, I express the hope that every participant truly enjoyed the historical atmosphere of Tartu, and I thank them for making the conference a memorable event. Last but not least, on behalf of the editors of the proceedings, I express my appreciation and gratitude to the authors for submitting most of the manuscripts in time.

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