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Thomas Lauterbach

Radio Astronomy

Small Radio Telescopes: Basics, Technology and Observations

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Preface

Radio astronomy is a fascinating field of research – the first image of a black hole, the elucidation of the spiral structure of the Milky Way, the discovery of cosmic background radiation, and the first indirect observation of gravitational waves are just some of the spectacular discoveries made with radio telescopes. For this reason, the Astronomical Society in the European Metropolitan Region Nuremberg decided to establish a special interest group under the leadership of the author in order to set up a radio telescope at Regiomontanus Observatory, Nuremberg, Germany, and thus also to be able to provide the public with insights into this field of astronomy.

Unlike classical astronomy with its view through a telescope, humans have no senses for radio radiation – and this results in the difficulty of understanding the basics of radio astronomy and interpreting its measurements. And this subject does not make it easy for us – in addition to astronomical and physical knowledge, knowledge of radio frequency technology and digital signal processing is also required. These challenges have been successfully met by the special interest group: In monthly seminars, the necessary knowledge was acquired, and a concept for a radio telescope was developed and tested in preliminary experiments. Finally, on April 26, 2019, the radio telescope named after Nobel laureate Arno Penzias could be ceremoniously inaugurated.

The radio astronomy tours, which have been organized repeatedly since then, met with gratifyingly great interest, raised the question of the didactics of radio astronomy as a new challenge. Presentations were developed and exemplary measurements and their explanations were prepared. But the question of some visitors, if it is possible to read all this somewhere, had to be answered negatively, because books about radio astronomy are only available in English and only on university