

Preface

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The Community of European Solar Radio Astronomers (CESRA) organises triannual workshops on studies of the solar atmosphere, where the focus is on radio observations. These workshops bring together different communities, observers and theoreticians, to discuss current problems on the structure and dynamics of the solar atmosphere and its impact on and relationship with the heliosphere. The 2007 workshop addressed the role of radio diagnostics in the physics of flares and coronal mass ejections (CMEs) and in revealing the relationships between these two phenomena. Many of the papers included in this Topical Issue were presented and discussed in the CESRA 2007 workshop, but the issue was also made open for general submission on the core topics.

Radio astronomy plays an important part in this field, as a tool to study both impulsive and long-duration energy release and particle acceleration. Gyrosynchrotron radiation and coherent radiation processes are sensitive to nonthermal electron populations, and they are well observed in radio. Furthermore, radio measurements provide a fundamental remote sensing tool to study coronal and interplanetary shock waves. Although CMEs are a plausible driver of shocks – and are indeed identified as such in interplanetary space – the questions

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of whether there are other sources and what characterises the coronal shocks are still open to a large extent. Finally, radio emission also probes the propagation of energetic electrons through the corona and interplanetary space, as the radiating electrons have small gyroradii and are bound to follow the magnetic field. The related radio emissions therefore allow the investigation of energetic particle propagation to and in the heliosphere, combining ground-based and space-borne instruments. All these aspects of radio emission are reflected in the present Topical Issue, including two invited review papers.

There is a promising perspective that new observational windows on flares and CMEs will be opened at radio wavelengths in the coming years. Radio emission from unstable electron populations is a tracer of basic processes of energy release that we hope to map with new facilities, notably the Frequency Agile Solar Radio Telescope (FASR) project and the Chinese Radioheliograph. These instruments will provide the first imaging observations of solar flares over an extended spectral range. The new wavelength range to be imaged includes decimetre waves, where spectrographs show that key processes of energy release and electron acceleration occur during flares. With gyrosynchrotron emission we can trace the high-energy electrons, whose emitted frequency increases with energy. Extending observations to ever higher frequencies, up into the far infra-red, will therefore allow us to probe the high-energy limit of particle acceleration at the Sun.

The CESRA workshop in 2007 was held at the University of Ioannina (Greece). The members of the scientific committee were H. Aurass (Germany), K.-L. Klein (France), A. MacKinnon (United Kingdom), A. Nindos (Greece), S. Pohjolainen (Finland), A. Stepanov (Russia), and G. Poletto (Italy) as president of the Solar Physics Section within the Joint Astrophysics Division of the European Physical Society (EPS) and the European Astronomical Society (EAS). The local organisers were A. Nindos (chair), A. Anastasiadis, A. Fotiadi, P. Preka-Papadema, V. Tsikoudi, and L. Vlahos.

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