

EGU21-13329

<https://doi.org/10.5194/egusphere-egu21-13329>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



First solar electron events observed by EPD aboard Solar Orbiter

Raúl Gómez-Herrero¹, Daniel Pacheco², Alexander Kollhoff², Francisco Espinosa Lara¹, Johan L. Freiherr von Forstner², Nina Dresing³, David Lario⁴, Laura Balmaceda⁴, Vratislav Krupar⁴, Olga E. Malandraki⁷, Angels Aran⁸, Radoslav Bucik⁹, Andreas Klassen², Karl-Ludwig Klein¹⁰, Ignacio Cernuda¹, Sandra Eldrum², Hamish Reid¹¹, John G. Mitchell¹², Glenn M. Mason¹³, George C. Ho¹³, and the Solar Orbiter EPD/RPW/MAG/SWA Teams*

¹Universidad de Alcalá, Dpto. Física y Matemáticas, Alcalá de Henares, Spain (raul.gomez@uah.es)

²Institut für Experimentelle und Angewandte Physik, Christian-Albrechts-Universität zu Kiel, Kiel, Germany

³Department of Physics and Astronomy, University of Turku, FI-20014 Turku, Finland

⁴Heliophysics Science Division, NASA Goddard Space Flight Center, Greenbelt, MD, USA

⁷National Observatory of Athens, Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing, Athens, Greece

⁸Departament de Física Quàntica i Astrofísica, Institut de Ciències del Cosmos (ICCUB), Universitat de Barcelona (UB-IEEC), Barcelona, Spain

⁹Southwest Research Institute, 6220 Culebra Rd, San Antonio, TX, 78238, USA

¹⁰LESIA, Observatoire de Paris, Université PSL, CNRS, Sorbonne Université, Université de Paris, 5 place Jules Janssen, 92195 Meudon, France

¹¹Department of Space and Climate Physics, University College London, Holmbury St Mary, Dorking, RH5 6NT, UK

¹²Department of Physics, George Washington University, Washington, DC 20052, USA; NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA

¹³Johns Hopkins University Applied Physics Laboratory, Laurel, MD, USA

*A full list of authors appears at the end of the abstract

The first solar electron events detected by Solar Orbiter were observed by the Energetic Particle Detector (EPD) suite during July 11-23, 2020, when the spacecraft was at heliocentric distances between 0.61 and 0.69 au. We combined EPD electron observations from 4 keV to the relativistic range (few MeV), radio dynamic spectra and extreme ultraviolet (EUV) observations from multiple spacecraft in order to identify the solar origin of these electron events. Electron anisotropies and timing as well as the plasma and magnetic field environment were evaluated to characterize the interplanetary transport conditions. We found that all the electron events were clearly associated with type III radio bursts. EUV jets were also found in association with all of them except one. A diversity of time profiles and pitch-angle distributions (ranging from almost isotropic to beam-like) was observed. These observations indicate that different source locations and different magnetic connectivity and transport conditions were likely involved. The broad spectral range covered by EPD with excellent energy resolution and the high time cadence ensure that future observations close to the Sun will contribute to the understanding of the acceleration, release, and transport processes of energetic particles. EPD observations will play a key role in the identification of the sources of impulsive events and the links between the near-relativistic electrons and the ion

populations enriched in ^3He and heavy ions

Solar Orbiter EPD/RPW/MAG/SWA Teams: Javier Rodríguez-Pacheco, Robert F. Wimmer-Schweingruber, Bernd Heber, Lars Berger, Robert C. Allen, Nils P. Janitzek, Monica Laurenza, Rossana De Marco, Nicolas Wijsen, Yulia Kartavykh, Wolfgang Dröge, Tim S. Horbury, Milan Maksimovic, Christopher J. Owen, Antonio Vecchio, Xavier Bonnin, Oksana Kruparova, David Pisa, Jan Soucek, Philippe Louarn, Andrei Fedorov, Helen O'Brien, Vincent Evans, Virginia Angelini, Pietro Zucca, Manuel Prieto, Sebastián Sánchez-Prieto, Alberto Carrasco, Juan J. Blanco, Pablo Parra, Óscar Rodríguez-Polo, César Martín, J. Christoph Terasa, Sebastian Boden, Shrinivasrao R. Kulkarni, Ali Ravanbakhsh, Mahesh Yedla, Zigong Xu, Bruce Andrews, Chuck Schlemm, Helmut Seifert, Kush Tyagi, Jeff Lees, John Hayes