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# Fine Structure and Dynamics of the Solar Atmosphere

*Edited by*

Santiago Vargas Domínguez

Alexander G. Kosovichev

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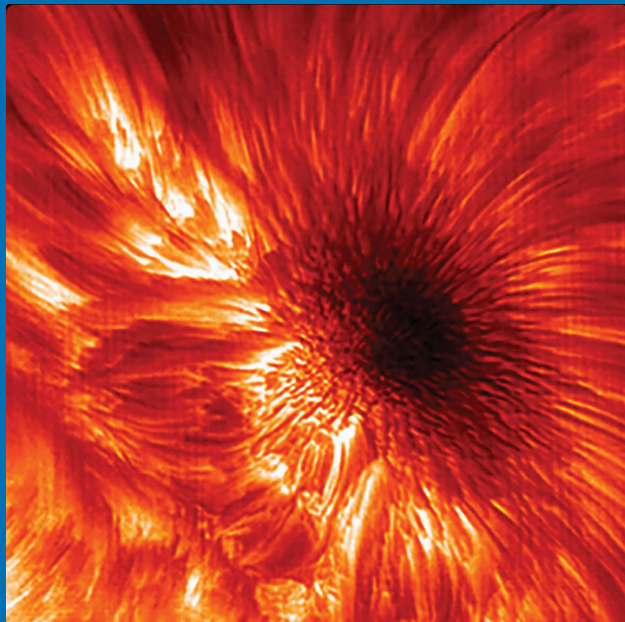
Louise Harra

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FINE STRUCTURE AND DYNAMICS  
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*COVER ILLUSTRATION:*

Image of the sunspot fine structure in the Hydrogen-alpha line obtained from the New Solar Telescope at Big Bear Solar Observatory (NJIT) on 29 September, 2013. The image shows a dark central part (umbra) surrounded by filamentary penumbra and very dynamic fibrils.

IAU SYMPOSIUM PROCEEDINGS SERIES

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**FINE STRUCTURE AND  
DYNAMICS OF THE SOLAR  
ATMOSPHERE**

**PROCEEDINGS OF THE 327th SYMPOSIUM  
OF THE INTERNATIONAL ASTRONOMICAL  
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## Preface

Magnetic activity of the solar atmosphere entails numerous multi-scale processes. State of the art solar instrumentation is revealing the dynamics of the Sun with unprecedented temporal and spatial resolutions. Together with advanced numerical simulations these investigations are making new steps towards the knowledge of the complex dynamical structure of the solar atmosphere. The understanding of the fine structure and dynamics of the solar atmosphere requires a considerable coordinated effort of observers, theorists and experts in realistic numerical simulations.

The IAU Symposium 327 “Fine Structure and Dynamics of the Solar Atmosphere” was the first IAU symposium held in Colombia and took place immediate after the XV Latin American Regional IAU Meeting (LARIM, 2–7 October 2016) and the First Workshop on Astronomy Beyond the Common Senses for Accessibility and Inclusion (8 October 2016). The venue was the University of Cartagena, among the oldest academic institutions in the country and the most important one in the Caribbean Colombian coast, located within the walled city of Cartagena de Indias. The historic city of Cartagena de Indias was selected by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as significant to the heritage of the world, having the most extensive fortifications in South America.

The main scientific goal of this Symposium was to discuss recent results on the processes shaping the structure of the solar atmosphere and driving plasma eruptions and explosive events. The Symposium brought together researchers, in both theory and observation, who study structure and activity in the solar atmosphere to discuss the range of topics in the field.

The IAUS 327 was very timely and represented an important step in the big international effort for our understanding of the solar atmosphere with large telescopes and detailed modelling. It provided a forum for discussion of the recent advances, and a platform for developing new coordinated observing and theoretical programs focusing on the activity of the solar atmosphere.

The papers presented in the Proceedings are focused on eleven primary themes:

- Advances in high-resolution solar observations
- Energy, mass and magnetic flux transport between the convection zone and the outer solar atmosphere
- Multi-scale magnetic reconnection: observations and theories
- Fine-structure of solar flares
- Solar-stellar connection
- Fine structure and dynamics of active regions and sunspots
- Energy release and explosive events at the finest spatial and temporal scales
- Structure and dynamics of flux rope formation and eruption
- Wave phenomena and atmospheric dynamics
- Magnetic structure and dynamics of coronal holes and solar wind
- High energies - fine structure (Radio, X and gamma rays)

We hope that this volume will be useful to senior and new researchers studying solar and stellar atmospheres and activity, sunspots and starspots, exoplanetary systems, and developing advanced observational techniques and theoretical models.

*Santiago Vargas Domínguez, Alexander G. Kosovichev, Patrick Antolin, Louise Harra and co-chairs SOC*

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<p><b>SESSION 1</b></p> <p>Fundamental questions and challenges</p>  <p><b>Sami Solanki *</b> MPS, Germany</p>	<p><b>SESSION 2</b></p> <p>Advances in high-resolution solar observations - I</p>  <p><b>Andrés Asensio</b> IAC, Spain</p>	<p><b>SESSION 3</b></p> <p>Advances in high-resolution solar observations - II</p>  <p><b>Mats Carlsson</b> University of Oslo, Norway</p>	<p><b>SESSION 4</b></p> <p>Energy, mass and magnetic flux transport in the solar atmosphere - I</p>  <p><b>Tiago Pereira</b> ITA, University of Oslo, Norway</p>
<p><b>SESSION 5</b></p> <p>Energy, mass and magnetic flux transport in the solar atmosphere - II</p>  <p><b>Juan Martínez-Sykora</b> LMSAL, USA</p>	<p><b>SESSION 6</b></p> <p>Multi-scale magnetic reconnection</p>  <p><b>Jiong Qiu</b> Montana State University, USA</p>	<p><b>SESSION 7</b></p> <p>Fine-structure of solar flares</p>  <p><b>Lucia Kleint</b> FHNW, Switzerland</p>	<p><b>SESSION 8</b></p> <p>Solar-stellar connections</p>  <p><b>Kazunari Shibata</b> Kyoto University, Japan</p>
<p><b>SESSION 9</b></p> <p>Fine structure and dynamics of active regions and sunspots - I</p>  <p><b>Rebeca Centeno</b> High Altitude Observatory, USA</p>	<p><b>SESSION 10</b></p> <p>Fine structure and dynamics of active regions and sunspots - II</p>  <p><b>Thomas Metcalf</b> Lecturers <b>Illa R. Losada</b> <b>Michael Kirk</b> Nordita, Sweden NASA/GSFC, USA</p>	<p><b>SESSION 11</b></p> <p>Energy release and explosive events</p>  <p><b>Fátima Rubio da Costa</b> Stanford University, USA</p>	<p><b>SESSION 12</b></p> <p>Structure and dynamics of flux rope formation and eruption</p>  <p><b>Chun Xia</b> University of Leuven, Belgium</p>
<p><b>SESSION 13</b></p> <p>Wave phenomena and atmospheric dynamics</p>  <p><b>Tom Van Doorselaere</b> KU Leuven, Belgium</p>	<p><b>SESSION 14</b></p> <p>Magnetic structure and dynamics of coronal holes and solar wind</p>  <p><b>Stuart Bale *</b> SSL, UC-Berkeley, USA</p>	<p><b>SESSION 15</b></p> <p>High energies - fine structure (radio, X and gamma rays)</p>  <p><b>Lindsay Glesener</b> University of Minnesota, USA</p>	

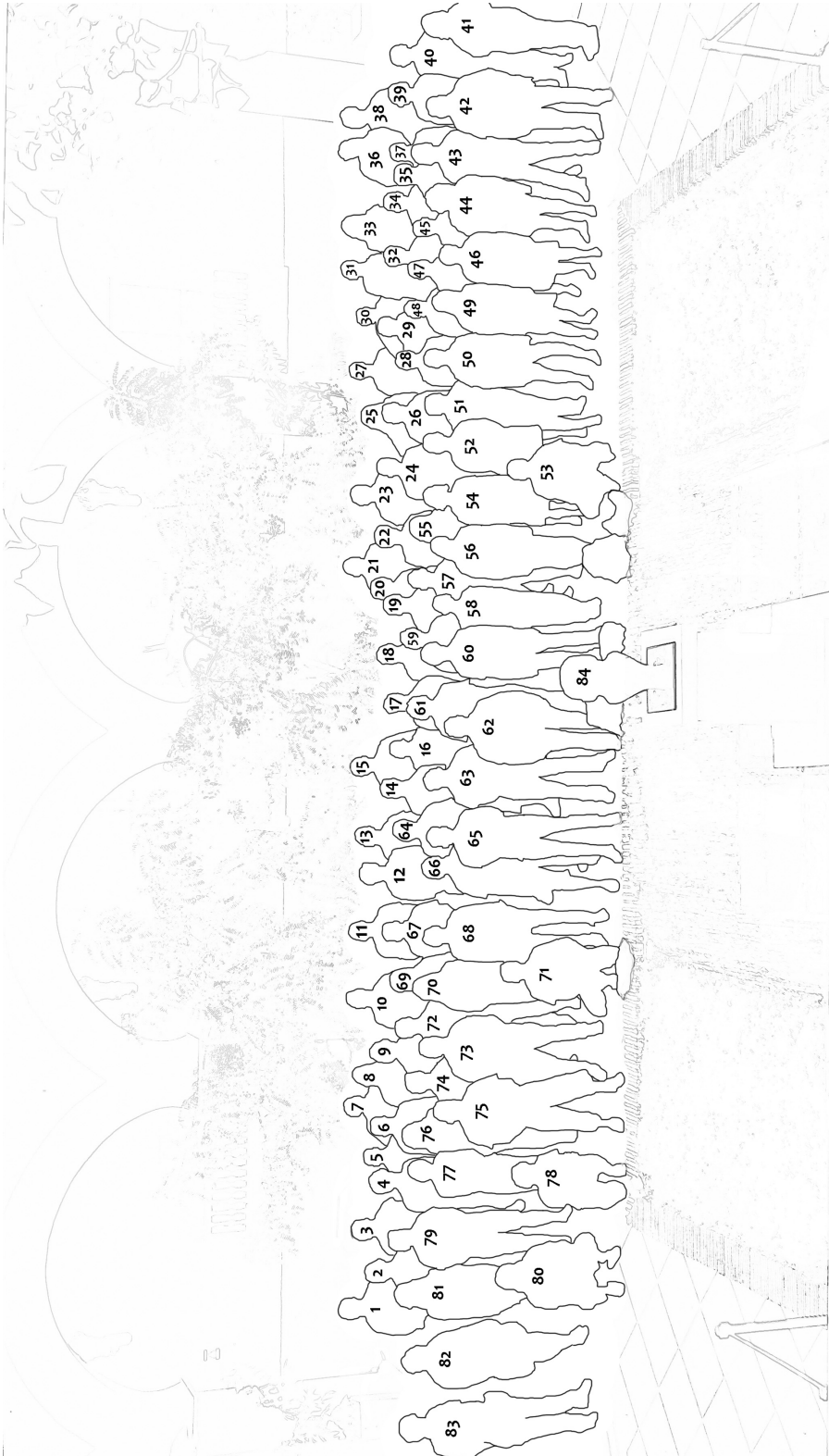
\* Due to last minute complications the speaker could not present.



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