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[Abstract]

Polarization Studies of the Solar Corona During Total Solar Eclipses: Results and Perspectives

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Abstract: Polarization studies during total solar eclipses (TSEs) provide essential insights into the physical conditions within the white-light solar corona, where many polarization-related problems remain unsolved. Polarized-light observations during TSEs allow direct determination of the electron density, enabling large-scale mapping of electron concentration in the corona and facilitating the separation of its K (electron-scattered) and F (dust-scattered) components. This separation is crucial, as the F-corona is practically unpolarized within 3 solar radii from the limb, allowing clearer characterization of the polarized K-corona. Despite their importance, systematic data on the dependence of the degree of polarization on wavelength, particularly within polar plumes, remain insufficient.

Our team has conducted white-light corona polarization experiments during TSE expeditions in 1999 (Bulgaria), 2006 (Turkey), 2017 (USA), 2019 (Chile), 2023 (Australia), and 2024 (Mexico). We aim to expand and repeat these measurements during the TSE on 2026 August 12 from Spain. In this presentation, we outline our polarimetric methodologies to determine the degree of polarization across different coronal regions reliably. These studies contribute to refining

coronal models and advancing our understanding of the distribution and dynamics of the solar corona during total solar eclipses.

Keywords: Solar corona; Polarization; Total solar eclipse;

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