

The European Solar Telescope: the future of European ground-based solar physics

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Abstract

With first light expected in 2026, the European Solar Telescope (EST) represents the most important technological joint effort made by the European ground-based Solar Physics community. EST will improve considerably the present observational capabilities thanks to its 4-metre diameter. Its optical design is especially designed to study magnetic phenomena taking place in the solar atmosphere, optimising two crucial aspects. On the one hand, its polarimetrically-compensated design is conceived to cancel out the instrumental polarisation induced by the individual elements of the optical train. This property is crucial to detect very small, both spatial and temporal, fluctuations of the magnetic field. Secondly, its design includes a powerful multi-conjugate adaptive optics system (MCAO) to optimally correct the wave-front distortions introduced by the Earth's atmosphere. With this MCAO system, EST is intended to measure the Sun at diffraction limit, with a spatial resolution of 20-30 km. The design is complemented with a suite of instruments that will operate simultaneously, to extract the maximum information about the dynamics, thermodynamics and magnetism of the solar plasma at different layers. In this talk, the present status of the project will be presented, emphasising on the most recent technical developments and on the new operational models that will maximise the scientific impact of the data obtained with this facility.