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EDITORIAL

Challenges on Ultraviolet Astronomy 2014

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We are pleased to present this Special Issue of Astrophysics & Space Science; "Challenges on Ultraviolet Astronomy 2014". This volume comes at a crucial time in Ultraviolet (UV) astronomy. The NASA/ESA programmes that created the community are reaching completion and future missions, apart from the World Space Observatory-Ultraviolet (WSO-UV), are small-class, some operating from balloons. This volume provides an update on the evolution of the field since our last Special Issue "UV Astronomy 2011".

By the end of its lifetime, the Hubble Space Telescope (HST) will have left a rich legacy of UV spectroscopic data for a very wide range of astronomical objects, at a wide range of spectral resolutions, basically covering the full wavelength range from the Lyman limit at 90 nm to about 350 nm, where the Earth atmosphere becomes almost fully transparent to cosmic photons. For obvious reasons, at high spectral resolutions ($R > 20{,}000$) the HST spectrographs, in particular the Space Telescope Imaging Spectrograph (STIS) and the Cosmic Origins Spectrograph (COS), were designed to work at wavelengths that cannot be reached from the ground (110–310 nm), thus leaving the twilight zone, between the atmospheric cutoff at about 300 nm and the optical U-band at about 360 nm, uncovered. At high resolution, the spectral region between 300–400 nm provides crucial and unique information that can answer some key questions in planetary, stellar, interstellar, and extragalactic astrophysics.

The advent of the 10-m class telescopes and the projects for extremely large telescopes, such as the European Extremely Large Telescope (E-ELT), have opened the possibility to explore efficiently from the ground a fraction of the UV spectrum that, albeit small, is of extraordinary scientific interest. In the present era when most instruments are optimized for observations in the infrared with the aim of reaching high-redshift targets, the UV on the other hand cannot be left aside, providing means to work in near-field cosmology, and many other important science areas. The new UV instrumentation, such as Cassegrain Ultraviolet Brazil-ESO Spectrograph (CUBES)—a high resolution UV spectrograph planned jointly by the Instituto de Astronomia, Geofisica e Ciencias Atmosfericas of the Universidade de Sao Paulo and the European Southern Observatory for the Very Large Telescope (VLT)—will grant access to some prominent atomic and molecular transitions, the Ozone jump, the Balmer jump, and the Universe at redshift ($z \sim 2$) connecting the recent history of the Universe with the deep optical/infrared surveys. CUBES is optimized for UV wavelengths in the range 300–400 nm at a resolution of $R = 20{,}000$–$25{,}000$, with an expected gain in sensitivity of about 3 magnitudes at 320 nm over even the most sensitive ground-based high resolution spectrographs.

This volume is brought together as an activity of the Network for UltraViolet Astrophysics (NUVA), a pan-European network set-up to identify the needs of the as-

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tronomical community in the UV domain and eventually propose actions to structure it around new projects (http://www.nuva.eu), now extending its activity world wide. The volume includes recent advances in the field, from the characterization of the UV radiation field in planet-hosting systems—a main actor in the evolution/stability of planet's atmospheres—to the application of UV emission lines in passively evolving galaxies to reveal the progenitors of Type Ia supernovae. This volume also contains an amazing view on the current proposals for new UV instrumentation from small missions that are cubesat based, to the 10 meter European space telescope proposal, EUVO. From proposals for UV observations from small landers on the Moon, to 1–2 meter class space telescopes dedicated to single science cases such as GESE, to conduct a large spectroscopic survey of $z \sim 1$ galaxies, or UVMag (now Arago) for stellar formation, evolution, structure and environment with space UV and optical spectropolarimetry. The current status of the on-going projects, UVIT on ASTROSAT and WSO-UV, as well as the Fresnel Interferometry project are presented. A good summary of the current status of UV technologies, from detectors to coatings, is also included.

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