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Galactic VHE gamma-ray astrophysics with H.E.S.S.

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H.E.S.S. is a hybrid array of five imaging atmospheric Cherenkov telescopes operating in the very-high-energy (VHE) gamma-ray energy range ˜20 GeV to 100 TeV. With its unprecedented sensitivity, broad energy range, fast slew time, and Southern-hemisphere location in Namibia, H.E.S.S. provides an unparalleled, high-quality view of the VHE Galaxy, in a multi-messenger approach that builds on agreements with many collaborations, including in particular Fermi-LAT, IceCube, ANTARES and VIRGO/LIGO. H.E.S.S. has conducted deep observations of several key Galactic regions of utmost importance for understanding the mechanisms at work accelerating cosmic rays and producing VHE gamma rays. Among them are the Galactic Center and Ridge, the Crab Nebula, the energetic Vela pulsar, and several binary systems such as PSR B1259-63 and LS 5039. To capitalize on these observations, recent years have seen a tremendous effort in the design, implementation, and optimization of analysis techniques for both monoscopic and stereoscopic events, as well as standardized analysis pipelines for processing large datasets like that of the Galactic Plane Survey. The comprehensive Survey is the culmination of a decade-long, ˜2800-hr observation program and is the first high-resolution (˜0.1 deg) and sensitive (˜2% Crab Nebula point-source sensitivity) survey of the Milky Way in TeV gamma rays. A public release of this legacy H.E.S.S. data, including a source catalog and source population studies, is also on schedule for 2015 and will be presented. This presentation will highlight the newest hybrid data and observations utilizing the fifth, large telescope, as well as spectacular new findings from the Large Magellanic Cloud, the powerful particle accelerator situated in the inner region of the Galactic Center, high-precision measurements of the iconic supernova remnant RX J1713.7-3946, and a handful of brand-new VHE source discoveries from the Survey.

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