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Probing Cosmic-ray Physics in Starburst Galaxies With Future High-Energy Missions TONIA VENTERS, NASA/GSFC, MIHOKO YUKITA, Johns Hopkins University, ANN HORNSCHEMEIER, ANDREW PTAK, NASA/GSFC, DANIEL WIK, University of Utah, BRET LEHMER, University of Arkansas, NEVEN VULIC, NASA/GSFC CRESST, JEREMY PERKINS, NASA/GSFC — High-energy observations of non-thermal diffuse emission star-forming galaxies provide an excellent opportunity to study cosmic-ray physics in a variety of interstellar environments. Recent advances in gamma- ray astronomy in the GeV and TeV band have resulted in the first detections of non-AGN galaxies outside of the Milky Way, as well as providing more detailed measurements of the non-thermal diffuse emission within the Galaxy. However, the physical mechanism(s) involved in producing the broadband non-thermal diffuse spectrum is difficult to determine solely from gamma-ray observations, particularly for star-forming galaxies other than our own. Recent NuSTAR observations of starburst galaxies such as NGC 253 and M82 enable the most sensitive search to date for their diffuse inverse Compton emission in the hard X- ray band (10-30 keV), which in turn will constrain the role of hadronic and leptonic interactions in producing the GeV emission. We present the latest results from detailed broadband spectral modeling of NGC 253 from keV to TeV energies and discuss implications for future hard X-ray and MeV missions such as HEX-P and AMEGO.

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