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Deep Optical Limits on the Neutron Star-Black Hole Merger S190814bv from an Extensive Blanco/DECam SOAR Search ROBERT MORGAN, University of Wisconsin - Madison, MARCELLE SOARES-SANTOS, Brandeis University, JAMES ANNIS, KEN HERNER, Fermilab, ALYSSA GARCIA, Brandeis University, DARK ENERGY SURVEY COLLABORATION — On 14 August 2019, the LIGO and Virgo Collaborations announced the detection of gravitational waves from a neutron star - black hole merger, the first event of its kind. In search of an optical counterpart, The Dark Energy Survey (DES) Gravitational Wave Search and Discovery Team targeted 99 percent of the localization area with Blanco/DECam 1,2,3,4,6 and 16 nights after the merger. Objects with varying brightness were detected by the DES Difference Imaging Pipeline, and we systematically reduced the list of candidates through catalog matching, light curve properties, host-galaxy photometric redshifts, SOAR spectroscopic follow-up, and machine-learning-based photometric classification. All candidates were ruled out. We also applied our selection criteria to simulations of supernovae and kilonovae as they would appear in the DECam observations. We find that if a kilonova occurred during this merger, the ejected matter must have been less than 0.006 solar masses, had a lanthanide abundance of more than 10^{-3}, and had a velocity of less than $0.25c$ if the lanthanide abundance was greater than 10^{-1}. Furthermore, we find that without reducing the background to smaller than one object per follow-up, the properties of a kilonova are not constrainable.

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