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**What Marfa Lights Probably Aren't** KARL STEPHAN, Dept. of Engineering & Technology, Texas State University-San Marcos — Since 2002, numerous photographs and eyewitness accounts of what are popularly known as "Marfa lights" were recorded by a researcher named James Bunnell, who has installed unmanned monitoring stations outside Marfa, Texas. In this paper, we describe highlights of the observational data Bunnell has collected. These include estimates of visible-radiation intensity and extensive information on location and movement. In view of these data, we examine several leading proposed explanations for these lights, including auto headlights, mirages, natural gas, and more unlikely ones such as antimatter and evaporating black holes. Although headlights and mirages are visible at the site, these are generally easy to distinguish from the phenomena of interest. A one-cubic-meter volume of methane gas at atmospheric pressure provides sufficient chemical energy of combustion to account for many of the observed effects, but not for all of them. Nauenberg and Ruderman (Phys. Letters 22, 512 (1966)) showed that any antimatter object would rapidly suffer annihilation even in the rarefied atmosphere at high altitudes. Evaporating black holes would either produce much more power than the observations indicate for the observed lifetimes, or would be much too massive and long-lasting to account for the observed power estimates. Applications of these problems for physics instruction at the high-school and college level will be described.

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