Daniel Caputo, Physics

University: University of Missouri-Columbia
Year in School: Senior
Hometown: St. Louis, MO
Faculty Mentor: Angela Speck, Physics & Astronomy
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Microwaves in the heavens

Daniel Caputo and Angela Speck

The cosmic microwave background radiation (CMB) is generally accepted as being a remnant of the very early universe. It was expected that this radiation should be uniformly distributed throughout the universe; however, data from Wilkinson Microwave Anisotropy Probe (WMAP), a space telescope which scanned the sky at various frequencies from 23 to 94 GHz to produce a map of the CMB, showed the distribution of radiation at these frequencies was not uniform. According to conventional wisdom, as this radiation has dispersed over the lifetime of the universe, any bits of anisotropy in the CMB would be evidence of structure within the early universe. However it has been postulated that the GHz emission is in fact due to large, carbon-rich molecules namely, polycyclic aromatic hydrocarbons (PAHs). If the anisotropies can be mostly attributed to PAH emissions then much of the modern cosmological theory would need to be reformulated since this would imply that there was no well defined structure within the early universe. Alternatively, if only some of the radiation previously associated with the CMB can be shown to be due to PAHs then any structure that may have been present in the early universe can be more accurately described. First, PAHs must be found by looking for their tell-tale, spectroscopic signature, the so called Unidentified Infrared (UIR) bands in the mid-infrared. These locations are found by analyzing publicly available data from the Infrared Astronomy Satellite (IRAS). Next, the UIR bands have to be isolated, and finally, we analyze publicly available data from WMAP to determine if there is a statistical correlation between the location of the PAHs and excess in the CMB. Preliminary results will be presented.