Megan Janiak

**Award:** Undergraduate Student Research; $4000.00

**Status:** Sophomore, Physics

**Advisor:** Kevin Crosby

**Research Topic:** Development of Fuel Gauging Methods in Microgravity

**Abstract:** Since 2011, the Modal Propellant Gauging (MPG) team, consisting of multidisciplinary undergraduate researchers from Carthage College, has been developing and testing a fuel gauging system for use in microgravity environments. Using experimental modal analysis (EMA) techniques, the goal of the MPG project is to develop a flight ready technology that gauges fuel in microgravity environments by correlating the modal response of a 1-g equilibrium surface to the microgravity surface response at the same fluid fill level. The technology has been tested aboard parabolic flights via a manned parabolic flight payload. The payload consists of two propellant tanks and is designed to measure the modal response of each propellant tank to an injected white noise signal via piezoelectric sensors. Flight data shows that the MPG method can measure fuel with greater than or equal to 1% resolution at and below 50% fill levels. Under funding from the Wisconsin Space Grant Consortium during the summer of 2017, the MPG team made improvements to the parabolic flight payload in addition to designing a new payload for use aboard a Blue Origin New Shepard research flight scheduled for the first half of 2018.

**Biography:** Megan Janiak is a sophomore physics and chemistry major with a minor in mathematics at Carthage College. She is currently a member of the Microgravity Team, Lake Michigan Launchers, and Chemistry Club. She is a co-president of Carthage’s chapter of Society of Physics Students. Megan also enjoys playing the viola in the Carthage Philharmonic.

**Congressional District:** 1

**Congressional Representative:** Paul Ryan