Doug Arion

**Award:** Higher Education Initiatives; $4500.00

**Title:** Professor, Physics and Astronomy

**Project:** Characterization of Rapidly Rotating Asteroids through Filtered Photometry

**Abstract:** (First Paragraph of Proposal) There is considerable interest in the compositions of asteroids, particularly those that are small enough to potentially be ‘harvested’ for minerals. Smaller asteroids are generally conglomerates of smaller components, and are usually oddly shaped, as they have insufficient gravity to have been pulled into spheres during their formation. The odd shapes result in tumbling, and thus these objects exhibit rapid changes in brightness as they rotate. While many observers around the world have obtained asteroid light curves, and thus provide data that could be used to infer general shape and size information, those which rapidly rotate are difficult to categorize through light curves as (a) it is uneconomical to utilize large telescopes with spectrographs to characterize the large number of such asteroids that exist; (b) many are not bright enough to allow filtered photometric imaging with the smaller telescopes that are usually employed to obtain light curves; and (c) even with sufficient aperture, the rapid rotation makes it difficult to compare brightness measurements in different bands directly as the aspect of the object changes substantially between exposures. In addition, if an asteroid is a composite of different materials the light curve obtained in a single band may be over- or under-estimating the actual geometrical reflectance of the object as the color shifts with orientation.

**Biography:** Dr. Douglas Arion is Director of the Carthage Institute of Astronomy,  
Professor of Physics and Astronomy, and Donald D. Hedberg Distinguished Professor  
of Entrepreneurial Studies at Carthage College. He is an Appalachian Mountain Club  
Lifetime member and a member of the AMC’s Presidents Society, and was awarded  
the 2015 Volunteer Leadership Award. He is a Lifetime member of the International  
Dark Sky Association, and serves on both the American Astronomical Society and  
International Astronomical Union commissions on dark skies preservation. He  
manages a partnership between Carthage and the AMC to offer astronomy programs  
and observing opportunities at AMC facilities and New Hampshire state parks, and  
operates telescopes at AMC’s lodges and high mountain huts. In its first five years  
the program has reached over 35,000 people, while also providing training in  
science communication to undergraduate science students and AMC full-time and  
seasonal staff. Arion’s presentations address the multitude of ways that everything  
on Earth is connected to the entirety of the Universe, and how cosmology and the  
history of life on Earth are combined in one big, fascinating story that will change  
the way audiences interact with their environment.  
For the International Year of Astronomy-2009, he founded Galileoscope LLC to  
develop, manufacture, and distribute high quality low cost telescopes for worldwide  
promotion of science education and outreach. Over 250,000 telescope kits have been  
distributed to 110 countries, including 7000 donated to developing nations and 25,000 to  
US science teachers. The Telescopes4Teachers donation program recruits donations to  
place Galileoscopes in classrooms throughout the United States. Galileoscope LLC was  
also a worldwide cornerstone project of the 2015 International Year of Light, and  
continues to supply Galileoscope kits all over the world, along with free educational  
materials including lesson plans, observing guides, and instructions in many languages.  
Arion is actively involved in promoting technology entrepreneurship education.  
He founded the ScienceWorks entrepreneurship program at Carthage in 1994, and  
supported the creation of the Center for Advanced Technology and Innovation. He has  
co-chaired a conference to promote entrepreneurship education with the American  
Physical Society, serves on the organizing committee and teaches courses on technical  
entrepreneurship for the Industrial Physics Forums of the American Institute of  
Physics/International Center for Theoretical Physics, held in 2014 in Sao Paolo, BZ and  
recently in Johannesburg, South Africa, and lectures on entrepreneurship education  
across the US and Canada.  
Previously, at Science Applications International Corporation, he was Division  
Head and Assistant Vice President, and led the growth of the Applied Physics and  
Engineering Division by a factor of 10 in less than four years. He directed the design and  
construction of extensive experimental systems, including space-qualified optics and high  
precision structural measuring systems. He holds a patent on the Blast Induced Emission  
of Radiation Gage to measure time-resolved pressure in high explosive environments.

**Congressional District**: 1

**Congressional Representative**: Paul Ryan