Deep-Space test of a neutrino detector. N. Solomey[1] , N. Barghouty[2], M. Christl[2], L. Johnson[2], R. McTaggart[3] and H. Meyer[1], [1]Wichita State University, Wichita, KS 67260 email: nick.solomey@wichita.edu, [2]Marshall Space Flight Center, NASA, Huntsville AL 35812, [3]South Dakota State University, Brookings, SD 57007.

Introduction: The Sun provides all of the energy that our planet needs for life and has been doing so for five billion years. Understanding our Sun and its interior is one of the major goals of the NASA Science program. Still this is a very difficult task because very little makes it directly out of the Sun's interior. The energy we see today that warms the Earth was made 50,000 to 80,000 years ago and is only now coming to the surface to make light. However, neutrinos penetrate matter almost without interaction and make it to Earth in only eight minutes. Since neutrinos interact only weakly they are hard to detect; never-the-less within the last ten years neutrino detectors on Earth have started to reliably detect neutrinos from the fusion reactions in the interior of the Sun and scientists have started to use this information to investigate the Sun's nuclear furnace. Changes in solar neutrino flux make it advantageous to take a neutrino detector into space since the solar neutrino intensity changes dramatically as the inverse square of the distance from the Sun, by five orders of magnitude when going from the Earth to the Sun or from the Earth to the current position of the Voyager 1 space craft. Eventually launching a space-craft with a neutrino detector into close solar orbit would perform unprecedented science study opportunities. Before committing to such an ambitious mission we will need a space borne platform that can test a small prototype detector away from the Earth and in the deep space environment – the Deep Space Gateway is a promising candidate.