UNL Department of Physics and Astronomy presents:

Condensed Matter Physicists as Astronomers: Nebraska's Helioastronomy Project in Pursuit of the Solar Neutron Flux

PRESENTED BY
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THURSDAY
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4:00 PM
IN JH 136

Refreshments will be served in the JH 1st Floor Vending Area at 3:30

ABSTRACT

This is a tale of science seven year in the making (2012-2019), involving significant contributions from five undergraduates (Nicole Benker, Ethiyal R. Wilson, Ben Bradley, Jennifer Hamblin, and Jacques Doumani) and five graduate student (Elena Echeverria, Robert Olesen, Brant Kananen, George Peterson, and Bin Dong) and was an international collaboration involving four institutions (University of Nebraska, University of North Texas, Air Force Institute of Technology and the Institute of Physical Optics, Ukraine). Originally led by Axel Enders, the project encountered problems due to exploding rockets, laundry and the conflicts between the University of Nebraska and NASA bureaucracies. Due to the skills of one undergraduate in particular (Nicole Benker), and with the help of Scott Whitehead (NASA), Glenn Ferraro (NASA) and Scott Tarry (University of Nebraska at Omaha Aviation Institute) as well as astronaut Shane Kimbrough (NASA), the latter for his technical assistance aboard International Space Station (ISS), the problems were overcome. Solar neutrons were detected aboard the International Space Station (ISS), using boron rich detector elements (lithium tetraborate and boron carbide). We find that evidence of a solar neutron flux, as detected in a neutron calorimeter following subtraction of the proton background, with an energy of about 2 to 4 MeV. This solar neutron flux is likely no more than 250 to 375 neutrons $cm^{-2}sec^{-1}$, with a lower bound of 50 to 75 neutrons $cm^{-2}sec^{-1}$ at one au (the distance from the sun to the Earth). These results are very unexpected and have huge implications for space exploration, stellar nucleosynthesis and potentially for future cosmology experiments.

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