ESTABLISHING AN ENVIRONMENTAL SIMULATION FACILITY FOR LUNAR DUST RESEARCH.
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Introduction: Baylor University and its partners announced recently the funding of the Baylor Research and Innovation Collaborative (BRIC) within the Central Texas Technology and Research Park. The primary goals of the BRIC are to expand existing research, create new research capabilities and foster education and workforce development.

As part of the goal to establish new research capabilities, the Center for Astrophysics, Space Physics and Engineering Research (CASPER) will establish new space research facilities in the fields of interstellar dust, orbital debris and micro gravity and lunar environment research.

CASPER Research: The Center for Astrophysics, Space Physics and Engineering Research (CASPER) is a Baylor center built around a partnership between Baylor University and Texas State Technical College Waco (TSTC). Space research within CASPER has a proud heritage dating back to the 1960's with personnel within the Center actively involved on a number of NASA and ESA flight missions including flight projects from Explorer I forward.

There are currently six primary research groups within CASPER, the Astrophysics and Space Science Theory Group (ASSTG), the Experimental Astronomy Group, the Early Universe Cosmology and Strings Group (EUCOS), the Gravity, Cosmology and Astroparticle Physics Group (GCAP) and the experimental groups which operates CASPER’s Hypervelocity Impacts and Dusty Plasmas Lab (HIDPL) and Space Science Lab (SSL).

An agreement signed in 2007 between Baylor University and the Universitaet Stuttgart allows CASPER and the Institute of Space Systems (IRS) to collaborate in the fields of space research and space technology applications. This combination provides the partnership with faculty and staff having long-term heritage and expertise in the fields of dust and plasma research and instrumentation. In addition, through the Universitaet Stuttgart, CASPER now also has access to staff within the Heidelberg Dust Research Group, who have mission participation experience beginning with Helios and continuing through Cassini.

Lunar Environment: The need for additional research in the field of lunar dust was recently emphasized by the Lunar Exploration Analysis Group (LEAG) at its annual 2009 meeting and is now listed as a potential field of work within the Lunar Advanced Science and Exploration Research (LASER) program of NASA’s 2009 Research Opportunities in Space and Earth Sciences (ROSES).

As part of the BRIC, CASPER plans to establish a lunar environmental simulation facility consisting of a set of vacuum chambers for lunar dust research. Potential fields of work include detector development, ISRU research, dust-hardware interaction experiments and lunar stimulant investigations [1]. The facility will also be used for preparation of a planned instrument contribution to the LUNAR MISSION BW1 of the Universitaet Stuttgart, Germany. Results of the scientific payload of this mission will be able to provide data for simulation calibration as well as provide in-situ data for modeling dust distributions in lunar orbit.

Additionally, recent results of experimental research at CASPER in the field of complex dusty plasma (e.g. with multi-sized dust distribution, dust levitation, etc.) would appear to be applicable for further lunar dust investigations [2-5].

Summary: The recently announced and funded Baylor Research and Innovation Collaborative (BRIC) will provide new research capabilities in the fields of interstellar dust, orbital debris and micro gravity and lunar environment research. Plans for establishing a lunar environmental simulation facility for lunar regolith simulant research will be presented.