LSU LOUISIANA STATE UNIVERSITY

PHYSICS & ASTRONOMY WEEKLY CALENDAR

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WEEKLY CALENDAR

April 27, 2009

DEPARTMENTAL COLLOQUIUM

""Cosmochemistry & Astromineralogy: from the Big Bang to Life"

3:40 PM, April 30, 2009
109 Nicholson Hall

Angela Speck
University of Missouri

Host: Jeffery Clayton

• Refreshments served at 3:15 PM in 201 Nicholson Hall •

At the beginning of the Universe, all matter was in the form of hydrogen and helium: all elements bigger than helium form via nuclear fusion in stars. These newly-formed elements are ejected from stars either explosively (in the case of supernovae) or more gently over a few hundred thousand years for lower mass star like the sun. These new elements then become part of the interstellar medium, from which new stars and their planets form. Dust is a vital ingredient in understanding many astrophysical processes. It is an essential part of star formation processes; it is the key to understanding mass loss from aging stars; and it contributes to several aspects of interstellar processes such as gas heating and the formation of molecules. Such a crucial and ubiquitous constituent of our Universe needs to be well understood in its own right, if we are to understand its contributions to many aspects of astrophysics.

Intermediate-mass stars (0.8-8.0 solar masses) are major contributors of new elements to interstellar space. These stars eventually evolve into asymptotic giant branch (AGB) stars. During the AGB phase, these stars suffer intensive mass loss leading to the formation of circumstellar shells of dust and neutral gas, including the new elements formed during the star's life. Using a combination of observing techniques (e.g. infrared (IR) spectroscopy, visible, IR and sub-mm imaging) and laboratory IR studies, combined with theoretical considerations (e.g. kinetics and thermodynamics of the dust-forming region; nucleosynthesis models and changing stellar chemistries) and meteoritic evidence, I will investigate the structure and evolution of the circumstellar dust and its environment.

Publications:

"Mapping two-qubit operators onto projective geometries," **A. R. P. Rau**, Phys. Rev. A 79, 042323 (6pages) (2009).

"The structure of the cornified claw sheath in the domesticated cat (Felis catus): implications for the claw-shedding mechanism and the evolution of the cornified digital end organs," D. Homberger, K. Ham, T. Ogunbakin, J. Bonin, B. Hopkins, M. Osborn, I. Hossain, H. Barnett, **K. Matthews II**, L. Butler, and H. Bragulla, Journal of Anatomy (2009) 214, pp.620-643, doi: 10.1111/j.1469-7580.2009.01068.x