



College of  
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## Weekly Calendar

January 25-29, 2016

### Departmental Colloquium

#### "Chain Dynamics in Polymer Melts and Nanocomposites"

3:30 PM Thursday, January 28, 2016

**109 Nicholson Hall**

*Gerald Schneider*

Louisiana State University

**HOST: John DiTusa**

• Refreshments served at 3:10 PM in 232 (Library) Nicholson Hall •

Intense research has led to substantial progress towards understanding the fundamentals of polymer melts and polymer based nanocomposites. Characterizing the polymer dynamics at the micro- and mesoscopic scales is of particular interest. For example, it is important for modelling the macroscopic material response needed for the target-oriented engineering of new hybrid materials. Furthermore, it is useful to resolve apparent contradictions possibly raised by using different techniques, eventually measuring just two sides of the same medal. Finally, it may lead to optimized materials ranging from the classical car tire to battery or fuel cell applications, and are potentially useful for understanding protein and DNA interactions with cells. In composites, hard impenetrable walls impose constraints on polymer melts, by limiting the accessible regions. Furthermore, due to their small diameters nanoparticles possess a high surface to volume ratio. Therefore, interactions between polymer segments and particle surfaces determine the polymer dynamics, which is crucial for polymer processing and technology. The talk highlights the research on model nanocomposites well suited to act as interlink between a theoretical understanding and the technical application and sheds light on the influence of hard impenetrable surfaces. Furthermore, it presents the link from the morphology and the dynamics at the microscopic and mesoscopic scales to the material properties, e.g. those measured by rheology experiments.

### Publications:

1. Zhaoliang Liao, Fengmiao Li, Peng Gao, Lin Li, Jiandong Guo, Xiaoqing Pan, E. R. Jin, **W. Plummer and Jiandi Zhang**, "Origin of the Metal-Insulator Transition in Ultrathin Films of  $La_{2/3}Sr_{1/3}MnO_3$ ", Phys. Rev. B **92**, 125123 (2015).
2. Xuetao Zhu, Yanwei Cao, Shuyuan Zhang, Xun Jia, Qinlin Guo, Fang Yang, Linfan Zhu, **Jiandi Zhang, E. W. Plummer**, and Jiandong Guo, "High Resolution Electron Energy Loss Spectroscopy with Two-Dimensional Energy and Momentum Mapping," Rev. Sci. Instrum. **86**, 083902 (2015).

# LSU Physics & Astronomy in the News

1. **Wayne Newhauser & Rui Zhang** received a Physics in Medicine and Biology accolade for "most read" paper in 2015. Downloaded almost 7500 times. "The physics of proton therapy" discusses underlying processes as well as selected practical experimental and theoretical methods. It concludes by briefly speculating on possible future areas of research of relevance to the physics of proton therapy. [Read More](#)
2. LSU Astrophysicist **Geoffrey Clayton's** recent paper is featured in Research Highlights from the journals of the AAS. This paper reports the results of program using Hubble Space Telescope to study the nature of interstellar dust in the Andromeda Galaxy, which is the nearest galaxy similar to the Milky Way. Interstellar dust consists of grains of sand and soot. His team studied how the absorption of ultraviolet light changes at different wavelengths, providing clues to what the dust is made out of, and its size and shape. [Read More](#)
3. "KIC8462852 Faded at an Average Rate of  $0.165 \pm 0.013$  Magnitudes Per Century From 1890 To 1989". "This star's dimming is unique and inexplicable," **Bradley Schaefer** told CNN. According to Centauri Dreams, "Schaefer takes a hard look at this F3 main sequence star in the original Kepler field not only via the Kepler data but by using a collection of roughly 500,000 sky photographs in the archives of Harvard College Observatory, covering the period from 1890 to 1989." [Read more](#)
4. String theory and loop quantum gravity - attempting to unify quantum theory and gravity - **Jorge Pullin** argues that making LQG compatible with special relativity necessitates interactions that are similar to those found in string theory. [Read more](#)
5. The Laser Interferometer Gravitational-Wave Observatory, or LIGO, is one of NSF's largest investments, which consists of more than 900 scientists from institutions throughout the U.S. and 16 countries working together to detect and analyze gravitational waves as defined by Einstein's Theory of General Relativity. The spokesperson for this massive collaboration is LSU Physics & Astronomy Professor and LIGO scientist **Gabriela Gonzalez**. Internationally recognized for her work with LIGO, Gonzalez has been a member of the LSC since its founding in 1997. She was also featured in "LIGO Generations," a documentary highlighting four generations of researchers committed to proving the existence of gravitational waves. [Read more](#)