

# FRONTIERS IN PHYSICS

During 1997, twenty-one speakers from other institutions visited the Physics Department to present colloquia in the *Frontiers of Physics* series. This included Prof. James Kaler, who delivered the Harlow Shapley Lecture on planetary nebula described in a separate article of this Newsletter.

Astronaut **Tom Akers** probably holds the record for the longest distance traveled for a UMR physics colloquium, since he launched into a Space Shuttle Mission simply to gather material for his presentation *NASA Missions and the MIR Space Station*. But to give his seminar, he merely had to walk from his UMR Air Force ROTC office to the Physics Department. He talked about his shuttle missions in general, and more specifically about his time aboard the MIR space station. Needless to say, this talk was presented to a packed lecture hall with many students attending from outside the physics department.

The Department enjoyed hearing **Gerry Wilemski** of Lawrence Livermore National Lab describe his *Aerosol SANS* (small angle neutron scattering) experiments which he uses to characterize macroscopically small particles in the atmosphere, and to probe droplet/vapor interfaces. These, in turns out, have considerable impact on nucleation, droplet growth, and heterogeneous chemistry, and are important phenomena in a variety of industrial and atmospheric processes. As you will read elsewhere in this newsletter, Gerry was subsequently selected to replace John Carstens when he retired as Director of the Cloud and Aerosol Sciences Laboratory.

**David Crandall** returned to Rolla to speak on *Inertial Confinement Fusion*. Over 25 years ago, he was a post-doctoral fellow in the ion-accelerator laboratory of now-Chancellor **John Park**. Dave is now Director of the Inertial Fusion/National Ignition Facility Project of the US Department of Energy. In his presentation, he described the new facility being constructed at the Lawrence Livermore National Laboratory. When completed, the facility will direct 196 intense laser beams on small gold capsules containing hydrogen and deuterium to induce a fusion reaction. This



*Dave Crandall*

talk was especially interesting for the graduate students since it provided a high-level example of how their research efforts, when applied in a broad team effort, may ultimately contribute to scientific advances affecting the general public. During his visit, Dave renewed acquaintances with many old friends, and had a chance to visit the current manifestation of the accelerator lab in the renovated physics basement.

We were also fortunate to have alumnus **Charles Myles** (BS '69) as our 1997 Homecoming Colloquium speaker. Charley is Chair of the Physics Department at Texas Tech University. While here, he spoke on his recent research in *Molecular Dynamics: A Tool for Probing the Defect Properties of Semiconductors*.

**Lee Grodzins** of the Massachusetts Institute of Technology delivered a particularly interesting and timely seminar. For many years, Dr. Grodzins was an advisor to the FAA on bomb and contraband detection at airports or border crossings. He presented a very interesting lecture on this topic titled *The Physics of Airport Security*. Grodzins also runs MIT's undergraduate physics "advanced lab" courses. The department's corresponding instructor, Prof. **Bob DuBois**, found it very interesting to compare the type of experiments that are performed at MIT with those that our students select.

In late spring, a special colloquium is dedicated to the **Fuller Undergraduate Research Competition**, where the best undergraduate projects are presented by the students who conducted the work. These presentations are quite polished, and employ fine graphics and electronic projection. First place was awarded to **Shella Keilholz** who spoke about the *Design and Construction of a Scanning Tunneling Microscope*, an Advanced Lab project undertaken with **Mike Pinkerton** and **Kevin Moll**. There was a tie for second place honors between **Brad White's** talk on *An Investigation of the Optical Properties of F-Centers in Alkali Halide Crystals* and **Pat Berryhill's** presentation of a *Study of the Normal Mode Vibrations of Model Low Temperature Water Clusters*. The F-Center work was performed in the Advanced Lab in conjunction with **Josh Gary**, while the water cluster research was performed under the direction of Prof. **Barbara Hale**. These presentations prove to be valuable learning experiences for the undergraduates. The overall quality often exceeds that of speakers who have many years of additional experience.