UNI CHAPTER SIGMA XI 14TH ANNUAL STUDENT RESEARCH CONFERENCE
3:30-5:30 pm Wednesday April 18, 2007, Maucker Multicultural Education Foyer
Poster Abstracts

1. MATERIAL POINT METHOD COMPUTER SIMULATIONS OF GRAZING IMPACTS ON THE MARTIAN SURFACE **C. Massina[1], M.W. Roth[1] and Paul A. Gray[2]**
[1]Department of Physics, University of Northern Iowa, [2]Department of Computer Science, University of Northern Iowa
Mars' Valles Marineris has long been considered to have been formed by tectonic "crack" in concert with erosion of the Martian surface. We present simulated evidence suggesting that what is known to be the longest and deepest valley in the solar system could have been created by a low angle, high velocity, asteroid or comet. The system is modeled using a combination of the Material Point Method (MPM) and classical planetary dynamics. The simulations reproduce the general morphology of Valles as well as fragmented sections that may have produced orbiting structures. Results for various initial conditions and system parameters are discussed.
The authors gratefully acknowledge support for C.M. from a UNI Physics Department Summer 2006 Research Fellowship.

2. DETERMINISTIC PARALLEL COMPUTER SIMULATIONS OF HEXANE ON GRAPHITE AT VARYING DENSITIES USING AN EXPLICIT HYDROGEN MODEL
M.J. Connolly[1], M.W. Roth[1], Carlos Wexler[2] and Paul A. Gray[3]
[1]Department of Physics, University of Northern Iowa, [2] Department of Physics and Astronomy, University of Missouri-Columbia, [3]Department of Computer Science, University of Northern Iowa
Results of Molecular dynamics computer simulations of hexane on graphite at submonolayer densities are presented. Two models are utilized; the first is a united atom (UA) representation which suppresses hydrogen atoms and the second is NAMD Scalable Molecular Dynamics in parallel computing environments with explicit hydrogens. Large UA systems having N = 1008 molecules and smaller (N = 112) explicit - hydrogen systems both show three distinct regimes: vacancy dominated at higher densities, a connected network at intermediate densities and individual islands at low densities. Various structural and thermodynamic quantities are utilized to understand how the systems behavior correlated to the topology it exhibits.
Acknowledgment is made to the Donors of the American Chemical Society Petroleum Research Fund for support (or partial support) of this research through grant PRF43277 – B5, as well as to the UNI Physics Department for a Summer 2005 Research Fellowship (M.C.).

3. THERMAL AND MECHANICAL STABILITY OF NOBLE GAS DISCS AROUND C60 FULLERENES **Eddie Maldonado and M.W. Roth**, Department of Physics, University of Northern Iowa
We are presenting the results from multiple Molecular Dynamics computer simulations of thermal and mechanical stability of various noble gas discs placed around a central C60 fullerene molecule. First thermal stability was observed by changing the temperature while holding rotation constant. Without rotation and at low – temperature argon, krypton, and xenon show completely connected discs, while helium and neon have a few symmetric lobes present. As the temperature is increased, the adsorbed layer nearest the fullerene becomes slightly flatter and the structure far away from its center breaks into a larger number of symmetric lobes. With further increase in temperature the system melts, exhibiting diffusion between the lobes and finally the system disintegrates. Second, mechanical stability is studied by changing the angular momentum while holding temperature constant. Rotation causes the adsorbed layer to flatten into a single ring, which orbits the fullerene in a choppy fashion at low angular momentum values. As rotation increases the ring responds by orbiting more smoothly; in addition smaller lobes are produced

farther away from the central fullerene.
M.R. gratefully acknowledges partial support for this project from a 2006 UNI Graduate College Summer Fellowship.

4. MOLECULAR DYNAMICS SIMULATIONS OF ENDOHEDRAL NOBLE GAS @ C60 FULLERENE AGGREGATES **M.K. Balasubramanya[1], Michael Roth[2], Bryce Suchy[3] and Philip Tilton[1]**
[1] Department of Physical and Life Sciences, Texas A&M University - Corpus Christi
[2] Department of Physics, University of Northern Iowa
[3] Department of Chemistry, University of Northern Iowa
Molecular Dynamics (MD) computer simulations are utilized to better understand the escape of neon from small (N=5) endohedral X@C60 clusters, with X = He, Ne, Ar, Kr and Xe in the temperature range $4000K \leq T \leq 5000K$. The cluster holds together until somewhere between T = 1150K and T = 1200K, where it dissociates, showing no intermediate sign of melting or fullerene disintegration. When the temperature is increased to around T = 4000K, the encapsulated atoms begin to leave the cluster, with the fullerene molecules still remaining intact. At temperatures near T = 4400K, thermal disintegration of the fullerenes pre-empts the cluster dissociation. The atoms are then more quickly released and the fullerenes form a larger connected structure, with bonding taking place in atom pairs from different original fullerene molecules. Larger noble gas atoms are generally released at a slower rate and that helium is released considerably more rapidly than any of the other noble gases. The differing release rates are due not only to the differences in the size and mass of a given endohedral species but also because larger endohedral species tend to stabilize the fullerene cage against thermal fluctuations. The agreements and disagreements of results of this work with experiments suggest that classical MD simulations are useful in describing fullerene systems at low temperatures and near disintegration, but require more thought and modification before accurately modeling windowing at temperatures below T = 3000K. Escape constants and half lives are calculated for the temperature range $4000K \leq T \leq 5000K$.
M.R. acknowledges useful discussions with J. Che and R.J. Cross, as well as a UNI student fellowship for B.S. during the summer of 2004. M.K.B. acknowledges support for Molecular Dynamics simulations by the National Science Foundation's MRI program, under the Division of Computer and Network Systems' grant numbered 0321218.

5. COMPUTATIONAL SIMULATIONS OF FLUIDIC DYNAMICS USING THE MATERIAL POINT METHOD **J.L. Dean[1], M.W. Roth[1] and Paul A. Gray[2]**
[1]Department of Physics, University of Northern Iowa, [2]Department of Computer Science, University of Northern Iowa
Development and utilization of the Material Point Method (MPM) to investigate (Langrangian) Navier-Stokes fluid dynamics is presented. Material point particles are placed in a two dimensional boundary specific pipe containing arbitrary stationary perturbations and are given an initial velocity field. Initial results of cursory validation studies are promising; ultimately interactions between particles and boundaries are expected to result in dynamic properties including variations of particle densities, eddy currents along the edges of stationary perturbations and localized vorticity.
The authors gratefully acknowledge support for J.D. from a UNI Physics Department Summer Research Fellowship.

6. NONCONTACT DETERMINATION OF SURFACE TENSION FROM MEASUREMENT OF THE RESONANT RADIAL WAVE AMPLITUDE BY LASER INTERFEROMETRY
Dan Eivins, Craig Pawlak, and **Dr. Fred Behroozi** Department of Physics
We describe a non-contact method for determining the surface tension of a small fluid sample. The method exploits standing wave patterns on the surface of a fluid in a cylindrical well of volume less than 1 cm^3. To generate radial waves on the surface of the fluid, the well is driven by a piezoelectric transducer. The standing radial waves are Bessel functions whose characteristic wave numbers are associated with the resonant frequencies of the system. When the system is driven at a resonant frequency, the wave amplitude at the center of the well is a maximum. The wave amplitude is monitored by a miniature laser interferometer as the driving frequency is increased until the amplitude attains a maximum. From the experimentally measured resonance frequencies, the corresponding wave numbers are obtained from the Bessel functions. The resonance frequencies and the associated wave numbers are then used in the dispersion relation to determine the surface tension of the fluid. The curvature of the fluid surface influences the effective radius of the well. However, by plating the well with gold, a flat fluid surface is assured.

7. SYNTHESIS AND MAGNETIC CHARACTERIZATION OF A II-V DILUTED MAGNETIC SEMICONDUCTOR: $CD_{1-X}MN_XSB$ **J. L. Harris[1], P. M. Shand[1], L. V. Shapoval[2], A. Van Waardhuizen[2], and L. H. Strauss[2],** University of Northern Iowa, Department of Physics[1], Department of Chemistry[2], Cedar Falls, IA 50614
A study was done regarding the synthesis and magnetic properties of a II-V diluted magnetic semiconductor: $Cd_{1-x}Mn_xSb$ (x=0.05-0.20). Standard high temperature ceramic methods under an inert atmosphere were utilized for sample fabrication. Structure characterization was done using x-ray diffractometry (XRD). Some basic thermal properties were determined using differential scanning calorimetry (DSC). Hysteresis, ac susceptibility, dc magnetization, and spontaneous magnetization curves were performed for $Cd_{0.90}Mn_{0.10}Sb$. The hysteresis data indicated the presence of a ferromagnetic component. Ferromagnetic contributions in the $Cd_{0.90}Mn_{0.10}Sb$ system are thought to be caused by MnSb impurities. This assertion is supported by a Curie temperature of 536K obtained for $Cd_{0.90}Mn_{0.10}Sb$ which is comparable to known values for MnSb. The value of the critical exponent β for $Cd_{0.90}Mn_{0.10}Sb$ was 0.172. A sample of MnSb was also prepared for comparison purposes. The Curie temperature was 514K, which indicates that the MnSb sample was Mn rich. The exponent β was found to have the value 0.379, indicating a shift in ferromagnetic behavior of MnSb from a 3d Heisenberg system to a 2d Ising system in $Cd_{0.90}Mn_{0.10}Sb$.

8. ARROTT-NOAKES ANALYSIS OF THE FERROMAGNETIC TRANSITION IN MELT-SPUN GADOLINIUM NANOCRYSTALS, **J.G.Bohnet and P. M. Shand*** Department of Physics, University of Northern Iowa,Cedar Falls, IA, 50614; **J. Goertzen and J.E. Shield**, Department of Mechanical Engineering and Nebraska Center for Materials and Nanoscience, University of Nebraska-Lincoln, Lincoln, NE 68588; **D. Schmitter, G. Shelburne and D. L. Leslie-Pelecky**, Department of Physics & Astronomy and Nebraska Center for Materials and Nanoscience, University of Nebraska-Lincoln, Lincoln, NE 68588.
Magnetic materials are present in rewriteable disk drives, electric motors and generators, and signal transformers/receivers. To improve the performance of these and other devices, much research in magnetism continues to be done. In particular, materials that are disordered on the atomic and nanometer scales have recently been the subject of extensive research. The arrangement of atoms and the interactions between them significantly affect a material's magnetic properties. We have prepared a disordered pure gadolinium (Gd) system using a melt-spinning technique. This resulted in a system of Gd crystals on the order on 100 nm embedded in an amorphous Gd matrix. The structure was identified using X-ray analysis and TEM. AC

susceptibility and DC magnetization measurements at various temperatures (280 -350 K) and DC bias fields (0 – 3 kOe) were performed on a sample of the nanocrystalline Gd. Using scaling ideas for a second-order phase transition and modified Arrott-Noakes plots, critical exponents and the Curie temperature (T_C) for the ferromagnetic transition in the nanocrystalline Gd system were obtained. T_C was found to be 289.5 K, which is close to that of bulk crystalline Gd. The critical exponents extracted from the analysis were somewhat higher than but consistent with those of the Heisenberg model with short-range interactions, indicating that melt-spinning suppressed the interactions present in bulk Gd. This first step in our larger project helps us understand the effects of disorder from the melt-spun system and will used for comparison in future studies of disordered magnetic systems.

9. DESCRIPTIVE EPIDEMIOLOGY OF INJURIES AND ILLNESSES REPORTED AT A UNIVERSITY WELLNESS AND RECREATION CENTER: 1987-1988 TO 2005-2006

Alexandria M. Frost[1] (Undergraduate), Thomas P. Dompier, Ph.D., ATC[1], James A. Langel[2] Timothy H. Klatt[3], Christopher Denison[3]

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Context: Physical activity is important for wellbeing and health. Many universities operate wellness and recreation centers providing a variety of activities ranging from personal fitness to intramural sports. Facility administrators need objective data regarding injury incidence when making policy and resource allocation decisions. Despite the need for objective data, there is paucity of literature describing injuries and illnesses occurring in these facilities. **Objective:** The purpose of this study was to analyze the descriptive epidemiology of incidents occurring at a university wellness and recreation center. **Design:** Descriptive. **Setting:** Data include incident reports from 1987 through 2001 at a Midwestern comprehensive university with an average enrollment of 13,000 students. **Patients or Other Participants:** All incident reports that included intramural athletes or patrons of the wellness center were included. Patrons and intramural participants included students, faculty, staff, and visitors. **Interventions:** Facility incident reports were consistent across all years of data collection. Reports were completed whenever an injury or illness required intervention by facility staff or emergency medical services (EMS). **Main Outcome Measures:** Incidence reports included information regarding the characteristics of the patron, the activity, the body location, and the disposition of the patron. Incident frequencies are reported for all years. Exposure frequencies were available for recreation center patrons beginning in the 1998-1999 academic year, but did not discriminate between gender or patron type. The overall incident rate per 10,000 exposures and the 95% confidence interval (CI) was calculated for recreation center incidents only. Injury types were not included in these analyses because that data was considered unreliable. **Results:** There were a total of 1437 incident reports completed across the 14 years of analysis with males accounting for 81.1%. Students accounted for 93.5% of the injuries while employees and faculty accounted for less than 2% combined. Forty-eight percent of the injuries were evaluated by athletic training personnel, and 8.4% required EMS transportation to hospitals while 23% of all incidents eventually sought medical intervention. The overall incident rate per 10,000 exposures was 4.8 (95% CI, 4.3-5.3). The most frequent locations of injury included the ankle (41.8%), knee (14.5%), face (13.2%), and finger (7.0%). Recreational and intramural basketball accounted for the majority of incidents (55.9%) followed by flag football (15.1%). The majority of injuries occurred in February (24.2%) and October (20.2%) corresponding to the beginning of the basketball and flag football intramural seasons respectively. **Conclusions:** Although incidents were rare when exposures are considered, administrators can expect up to an average of 32 reportable incidents during the heaviest months of recreation center and intramural patronage with nearly three of those incidents requiring EMS transportation. Future research is needed to

describe the types of injuries and long-term disposition of patrons who are injured while using these facilities.

10. SCIENTISTS' BIASED PERCEPTIONS OF OTHERS' BELIEFS: THE CASE OF NATURE VS. NURTURE **Jennifer J. Bumgarner, Duoc V. Nguyen, Helen C. Harton** Dept of Psychology

Scientists have long debated over the extent to which nature vs. nurture causes human behavior. It now seems clear that at least most behaviors are caused by both (e.g., see Lyubomirsky, Sheldon, & Schkade, 2005; Miles, Silberg, Pickens, & Eaves, 2005). National polls of the American public show that they too realize this (e.g., US News, 1997). Scientists may still perceive the public to be biased against their views, however, due to a form of the "hostile media phenomenon" (Dursun & Matheson, 2001; Lepper, Ross, & Vallone, 1985). College students and random selected community members rated the extent to which they believed particular behaviors were due to biology and environment. Randomly selected Association for Psychological Science (APS) members rated their own as well as their perceptions of others' beliefs about the causes of behavior. Students and community members attributed mental illness and intelligence more to biological causes, and religious behavior and happiness more to environmental causes, but overall they perceived behaviors to be about equally influenced by both. Not surprisingly, biological psychologists rated behaviors as caused by biological factors to a greater extent than social/cultural psychologists. Both biological and social/cultural psychologists, however, believed that the American public's beliefs leaned toward the "opposite" side, supporting our hypothesis. Scientists may show the same tendency as other humans to perceive others as biased against their beliefs on personally important issues. These incorrect perceptions of others' beliefs may affect scientists' research, teaching style, and approach in presenting their information to others.

11. SELF-REPORTED PARENT STATURE IS ACCEPTABLE IN ESTIMATES OF MATURITY STATUS IN YOUTH SOCCER PLAYERS **Samantha L. Sweet, ATC, Thomas P. Dompier, ATC, Kristin Stoneberg, ATC, Brian G. Ragan, ATC** Division of Athletic Training, University of Northern Iowa

Context: Maturity is a variable that should be considered when examining injury risk in children. Maturity can be estimated using relative stature, the percentage of a child's current stature to their predicted adult stature. Regression equations used for predicting a child's adult stature require the stature of the biologic parents. Ideally, parental statures would be measured, but doing so is not always practical. The use of reported parental statures with correction for overestimation has been recommended, but the impact of the overestimation on the predictions of adult stature by this method is unclear. **Objective:** To determine the effect of simulated overestimation of parental stature on predications of adult stature. **Design:** Cross-sectional. **Setting:** Data were collected during one soccer season as part of a broader study of injury risk in youth soccer. **Patients or Other Participants:** Convenience sample of 189 youth, 94 females and 95 males, aged 6-14 years and 6-16 years respectively. **Interventions:** The Khamis-Roche method was used to predict adult stature. Child stature and weight was measured using standardized procedures. Parental statures were self-reported and corrected for overestimation. Simulated overestimation of parent stature included adding 2.54 cm and 5.08 cm to original reported measures of the father, mother and both parents together. The Epstein corrections were used to correct the overestimation in reported and simulated parental stature. **Main Outcome Measures:** The root mean squared difference (RMSD) of the child's actual predicted adult stature to each of the experimental conditions was calculated. The RMSD was compared to the median absolute deviation (MAD) (females = 1.8cm, males = 2.3cm) and 90% error bounds (females = 4.3cm, males = 5.3cm). Significance was set at $p < .05$ one-tailed. **Results:** The overall RMSD for all experimental conditions ranged from 0.06cm to 1.13cm for females and 0.12cm to 0.17 for males. The RMSD with 5.08cm added to the stature of both parents was

within the MAD and 90% error bounds for both females (1.13cm) and males (1.73cm). The RMSD was greatest in the 10 (1.3cm) and 11 (1.5cm) year old age groups for females, and the 12 (2.15cm) and 13 (1.98) year old age groups for males. **Conclusions:** These results demonstrate that corrected self-reported parental statures can be used in the Khamis-Roche regression equation for predicting adult stature when measurement of parent stature is impractical. Although self-reported stature rarely approaches 5.08cm of inaccuracy, the RMSD does exceed the 90% error bounds near the ages of the adolescent growth spurt in both females (10-12 years) and males (12-14). These results also demonstrate the increased variability of the adult stature prediction equation during the adolescent growth spurt indicating that parent stature should be measured if a higher level of accuracy is needed in these age ranges.

12. CELL CYCLE ANALYSIS OF ATRAZINE-TREATED HUMAN FIBROBLAST CELLS USING FLOW CYTOMETRY **Andrea Austin and Kavita R. Dhanwada**. Department of Biology. University of Northern Iowa, Cedar Falls, IA 50614-0421

Atrazine is the most frequently used triazine herbicide in the United States. Studies have shown an association between herbicide exposure and increased levels of DNA damage, reproductive and endocrine problems, and an increased risk for certain cancers. Previous work from our lab has shown decreased cell proliferation of normal human fibroblasts after low-level atrazine exposure (0.8-100 ppb) without a corresponding increase in apoptosis or necrosis. The objective of the current study is to determine a mechanism for the observed decrease in cell number after atrazine exposure. We used flow cytometric analysis to see if treated cells progressed through the cell cycle differently than control cells and resulted in fewer cells after exposure. We hypothesized treated cells would take longer to cycle, so fewer cells would be present after a specific amount of time. Synchronized and unsynchronized normal human fibroblasts were exposed to increasing concentrations of atrazine (0-300 ppb) for 24 or 48 hours and flow cytometric analysis was performed. Results suggest a G1 block in atrazine-treated cells after 24 and 48 hour exposure in both synchronized and unsynchronized cells. This block would increase the length of the cell cycle thus supporting our hypothesis. Additionally, the number of apoptotic cells after treatment was comparable to control, again supporting previous growth study results.

13. THE ENVIRONMENTAL IMPLICATIONS OF AGGRADATION IN MAJOR BRAIDED RIVERS AT MOUNT RAINIER NATIONAL PARK, WASHINGTON **Scott R Beason, M.S. Environmental Science Program, Dr. James C Walters and Dr. Mohammad Z Iqbal** (Advisors and co-authors, Department of Earth Science)

The purpose of this study is to quantify the historic rate of river bedfilling, and to the extent possible, evaluate the factors that control sedimentation in river channels at Mount Rainier National Park. Mount Rainier is the tallest and the most glaciated of the Cascade volcanoes, located in southwestern Washington State. Steep, glacially-fed braided river channels radiate outward from the volcano in all directions and transport materials varying from fine sediment to cobbles and large boulders. As the gradient in the channels decreases downstream, sediment is no longer entrained and accumulates in the river bed. Over time, the river bed surface increases in height, or aggrades. River aggradation was previously estimated at 0.5 to 1 ft (15 to 30 cm) per decade, but until now, there has been no measured, long term data on river filling.
Geologists at Mount Rainier surveyed cross sections in the summers of 1997 and 2005. We conducted additional surveying in 2006 to quantify the current rates of aggradation in the Nisqually and White Rivers, two major river channels that have the greatest potential to affect primary infrastructure in the park. These rates were also compared with data derived from historical topographic maps as well as longitudinal profiles of the Nisqually and White Rivers, measured in 1910. Aggradation rates quantified in this study depend on gradient and are approximately 6 to 14 in (15 to 36 cm) per decade on the NisquallyRiver. This rate appears to be increasing based on longitudinal profile and topographic map analysis. In areas that experienced

debris flows,the aggradation rate averaged 5.7 ft (1.74 m) in a single event with some locations seeing increases greater than 14 ft (4.3 m). In November 2006, Mount Rainier was ravaged by a severe storm that dropped almost 18 in of rain in 36 hours. Surveying found few, if any, places that saw erosion in the river channel from this event, an unexpected finding. In fact, in areas that had no debris flows, aggradation was measured ranging between 0.4 ft (12 cm) and depths greater than 5 ft (1.5 m). Tahoma Creek, near the main Park road, filled in and now the river channel is less than 5 ft (1.5 m) from the bottom of the bridge. Aggradation is a serious management and safety concern for Mount Rainier National Park, as a great deal of Park infrastructure is located in valley bottoms near – or in – major river channels. Because of the effects of aggradation on braided rivers over time, river flooding, debris flows and glacial outburst floods can cause overtopping of natural stream banks and levees built along the river which impact roads and buildings as well as Park visitors. These concerns are compounded with the prospect of increased sediment loads due to glacial retreat associated with climate change.

14. A PULSATIONAL STUDY OF V823 CAS: AN ANOMALOUS CEPHEID?
Jennifer N. Wahl and Siobahn M. Morgan Department of Earth Science, University of Northern Iowa
V823 Cas is a triple mode pulsating variable, thought to be pulsating in the fundamental, first and second overtone modes. It is one of only a handful of such stars known to exist in our galaxy, along with AC And, and V829 Aql. The period ratios for V823 Cas, P1/P0 and P2/P1, can be used to derive a range of metallicity, mass, luminosity and temperature values appropriate for the star. We used linear non-adiabatic static pulsation models to determine the parameter space that this star appears to be in, and we will compare these values to the known physical characteristics of the star and stellar evolution models. Based upon the results of our investigation, it is possible that V823 Cas is a multimode anomalous Cepheid.

15. QUARTZ GRAIN SURFACE TEXTURES AS INDICATORS OF INFILLING PROCESSES AND DEPOSITIONAL ENVIRONMENTS ASSOCIATED WITH ICE-WEDGE CASTS IN NORTHEAST IOWA **Michael Loux**, Applied Math and **Dr. James C. Walters**, Earth Science Ice-wedge casts and polygonal patterned ground are common features of the Iowan Surface of Northeast Iowa. Paleoenvironmental studies in Iowa and adjacent states indicate that tundra conditions existed in Northeast Iowa between 21,000 and 16,500 years BP, the coldest part of late Wisconsinan time. Degradation of permafrost and formation of ice-wedge casts must have occurred near the end of this episode of cold climate, which also promoted extreme erosion of the landscape in Northeast Iowa. The sediment-filled wedges in Northeast Iowa occur in pre-Illinoian till with the infilling material being mostly sand. The details of the infilling history of the wedges are largely unknown. Since quartz grain surface textures can be successfully used as fingerprints to identify sediment transport processes and depositional environments, we examined surface textures of quartz grains from ice-wedge casts using binocular and scanning electron microscopy in an effort to clarify this infilling history. Features indicative of glacial, fluvial, and eolian transport are evident. Preliminary results indicate that the predominate surface texture signature of a sand grain depends on its location in a wedge, and this location is variable. It appears that the infilling of the wedges was localized and determined by materials available and processes operating in the vicinity of the wedge during the melting and infilling.

16. MODELING THE STELLAR EVOLUTION OF V725 SGR
Holly M. Kagy and Siobahn M. Morgan Earth Science Dept.
The unusual variable V725 Sgr has changed its period several times in the past century, most dramatically between 1926 and 1935. In this study, linear non-adiabatic static atmosphere models are adjusted to fit data for the variable between 1926, when the period was 12 days, to that of 1935, when it had increased to 21 days. The estimated value for the effective temperature

is initially set at 5000 K and masses between 3 and 8 solar masses are investigated in the models in order to reproduce the behavior of V725 Sgr during this time. Models of various metallicities were initially used with values of Z=0.0002 – 0.0006. A range of likely models will be presented that follow the evolution of the star between 1926 and 1935 and these will be compared to evolutionary models with similar characteristics.

17. THE ROLE SOCIAL FACTORS PLAY IN UNDERGRADUATE RESEARCH EXPERIENCES

Jon Humston & Dawn Del Carlo, Department of Chemistry and Biochemistry

Examination of undergraduate research experiences has become common, but few examine the social enculturation involved in becoming a practitioner. This study examines the research experiences of nine undergraduate students involved in a 10-week summer research program in chemistry during the summer of 2005 at the University of Northern Iowa.

Data were collected using qualitative methods including journals, surveys and interviews. Inductive analysis using the constant comparative method focused on student interactions with their advising professor and on the dynamics of interactions with other students; topics which proved to be important to students. How these social interactions contribute to the roles students assumed in the lab, the students' sense of independence within their research, and the importance of the advising professor will be discussed.

18. EFFECTS PERFORMING AUTHENTIC RESEARCH HAS ON SECONDARY SCIENCE TEACHERS' CLASSROOM PRACTICES

Jeff Weld[1], Dawn Del Carlo[2], John Ophus[1], Andrea Van Waardhuizen, [1]Department of Biology, [2]Department of Chemistry and Biochemistry

Research Avenues for Iowa's Science Educators [RAISE] is a summer program that gives numerous secondary science teachers the opportunity to participate in authentic scientific research, and commenced the summer of 2006. RAISE was modeled after other similar programs around the United States, and aims to improve teacher effectiveness through a variety of mechanisms including: increasing teachers' content knowledge, understanding of the process of scientific discovery, and the use of inquiry in the classroom. Teacher responses to open-ended surveys and semi-structured interviews were examined to determine the effect participation in the program had on the teachers and their teaching practices. A description of the RAISE program, events, and teacher feedback will be discussed.

19. WHY STUDENTS MAJOR IN HEALTH PROMOTION

Susan Roberts-Dobie, Ph.D, CHES, HPELS and **Lindsey Sirowy** Major: Psychology Minor: Biology, Senior

The purpose of this project was to determine factors that predict students' choice of the Health Promotion Major. This information will be helpful in efforts to recruit University students into the major and to focus efforts on recruitment of high school students into the field of public health. There is little established literature on how students choose a major and no published literature on how students choose Health Promotion, Health Education, or Public Health degrees. What is known, is that upon entering college, 15% of freshman are undecided and an additional 8% believe there is a high probability they will change their major (Chronicle of Higher Education, 2001). Of freshman that declared a major, Kroc, Howard, Hull, and Woodward found 72% switched majors before graduating (1997). Certainly, it is important for students to search for a major until they find a good fit, but late decision making and "major switching" can have a negative impact on students. These students will find it more difficult to graduate in four years, their classes are often not sequenced well, and there may not be time for optional internship opportunities or the addition of a supporting minor (Strasser, Ozgur, & Schroeder, 2002).

20. THE DETERMINANTS OF LAW SCHOOL SUCCESS

John Fordyce and Dr. Lisa Jepsen, Economics Department.

The law school admissions process is competitive with many more applicants to law school than spots available. A law school applicant is evaluated on many factors, including the applicant's undergraduate GPA, Law School Admissions Test (LSAT) score, undergraduate institution, and undergraduate major. In addition, law students' first year grades affect the students' post-graduation job prospects significantly. Although some studies consider the factors that predict the LSAT score, there are few if any studies that analyze the variables that affect first year grades. Considering the importance of the applicant data and the first year GPA, the lack of studies is peculiar. We analyze the relationship between law students' first year GPA and the students' undergraduate GPA, LSAT score, undergraduate major, undergraduate institution, age, race, and gender. We use regression analysis in order to ascertain the primary determinants of students' first year GPA in law school. In other words we isolate the effects of each variable on first year GPA while holding all other variables constant. We give much focus to the relationship between students' undergraduate majors and students' first year GPA in law school. There is no specific undergraduate major required for admission to law school. As a result, law school classes are quite heterogeneous with regards to undergraduate majors. If certain undergraduate majors provide law students with better thinking skills relative to their peers, then the students will have an advantage over their classmates. If the students from specific majors have an advantage over their classmates, the demand for those majors should grow. A growing demand is important for undergraduate departments, considering many departments' funds are determined in part by student enrollment. Therefore, our findings are important to the students and faculty of undergraduate institutions.