



**T**ransformational  
**L**earning  
**O**pportunities

## 2009 - 2010 Request for Support

Name: Lev Gasparov, Phone: 620-1933, e-mail: lgasprov@unf.edu

Department: Chemistry and Physics

Proposal Title: Optical spectroscopy at UNF and abroad.

### Approvals

Date Submitted: 10/20/08

Chairperson (or immediate supervisor)	Date
X _____	

Dean or Vice President	Date
X _____	

<b>TYPE OF APPLICATION</b>		
----------------------------	--	--

<input checked="" type="checkbox"/> Undergraduate	<input type="checkbox"/> Graduate	<input type="checkbox"/> Both
---	-----------------------------------	-------------------------------

(If graduate and undergraduate students in the **same** TLO, choose "Both" and complete only one application. If you would like to propose more than one TLO experiences please submit two separate applications).

<b>General Information</b>
----------------------------

Proposal Title: <u>Optical spectroscopy at UNF and abroad.</u>	
Location(s): <u>UNF; Aachen, Germany; Lindau, Germany</u>	
Proposed Dates: <u>05/2009-08/2010</u>	
Length of experience (in days): <u>90 days (summer 2009) at UNF and 14 days in Germany in summer 2010</u>	
Would this TLO be a credit-bearing course? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N	If yes, how many credits? <u>    </u>
Number of students anticipated: <u>4</u> Undergrad <u>    </u> Grad <u>    </u> Total	
(Please note: Funding will be adjusted based on the actual number of students recruited.)	

Names of additional UNF faculty/ staff leaders associated with this project:

N/A
-----

<b>FOR INTERNATIONAL TLOs ONLY</b>	
<b>Type of TLO Program (choose one)</b>	
Faculty-led international group travel activity/ course	<u>    </u>
Faculty-led Research Project	<u>  X  </u>
Individual Study Abroad Scholarships	<u>    </u>

<b>Funding Request</b>	
Total cost of proposed activity:	\$18,736.00
Total amount to be paid by students (total cost minus TLO funds):	\$13,736.00
Undergraduate TLO funds requested:	\$5,000.00
Graduate TLO funds requested:	\$0.00
<b>Total amount of TLO funds requested:</b>	<b>\$5,000.00</b>

**Please provide the source and amount of additional financial support that you are expecting (if any). 300 words max**

I have an active NSF grant (DMR-0805073) with a total budget of **\$158,734** for 2008-2011. This grant provides stipends for two undergraduate students for a 20 hours/week workload and a PI's salary for two summer months per academic year.

I will apply for the NSF supplemental grant for the international collaboration. This grant allows for additional funds about (\$10,000) to be used for international collaborative research programs. However, according to the NSF program officers, I should apply for this grant only in 2009. The latter is dictated by the budgetary constraints. The outcome of that application will not be known till the spring of 2010.

**Project Description**

**Please provide a description of the proposed TLO including a statement about the length of time that participants will devote to the learning experience (i.e., an estimation of hours, days, weeks, or terms). 300 words max**

The goal of the proposed TLO is to provide UNF physics majors with research experience in optical spectroscopy at UNF and abroad. The UNF part of the TLO will be carried out in the PI's optical spectroscopy laboratory. The students will spend a Summer 2009 semester working on the spectroscopic studies of magnetite and novel layered Co-based chalcogenides. The results will be published in a peer reviewed paper. The second part will take place in Summer 2010 and it involves a two week trip to Germany. The first week will be spent in the Aachen Technical University where students will explore complimentary advanced experimental techniques not available at UNF. The trip to Germany will be scheduled in such a way that the students would be able to attend The Nobel Laureate Meeting at Lindau, (June 27<sup>th</sup> - July 2<sup>nd</sup>, 2010). Every year about 500 participants attend this meeting that provides "a globally recognized forum for the transfer of knowledge between generations of scientists." To participate in the meeting one needs to go through a rigorous selection process. UNF students with the best academic record will have to apply and hopefully be accepted to attend this conference. The paper resulting from UNF work will provide students with a competitive edge and higher chances to be selected. I am certain that it will be a truly unique opportunity for students to meet Nobel Prize Winners in Physics, Chemistry and Medicine. In this TLO I anticipate to involve four students. One should note that since the inception of the UNF Bachelors Program in Physics we graduate about 3.2 students per year. It is not uncommon to have a total of about twelve sophomores /juniors /seniors. Therefore, four students would represent about 30% of all physics majors at UNF.

**How will this experience be transformational for students and how will the leaders facilitate this transformation? 300 words max**

According to the American Institute of Physics the number of total PhDs awarded in the US is steadily increasing while the number of doctorates in physics is currently at the same level of which it was in 1991. It is believed that students are reluctant to go into physics because they think it is a very difficult but not a truly exciting subject missing a "cool" factor.

The UNF Physics program is growing. Therefore it is vitally important to solidify student's interests in physics and provide a broader perspective on physics research. There is nothing better for future physicists than seeing the scientific method at work. How data is compared with a hypothesis. How some hypotheses are discarded and new hypotheses are born.

The supervised research program at UNF will offer students actual research experience. Research in Germany brings an international component to this experience.

The structure of the research institution is different in Germany and the US. In particular in Germany it is quite common when a leading scientist supervises a small army of graduate students and postdocs. In contrast in US a PI has on average of three to four graduate/undergraduate students working for her/him. In US a PI usually exploits one major experimental technique that is extensively used for her/his research program. In Germany the head of the lab (a full professor in US terms) has a wide variety of techniques at her/his fingers. While in Germany, UNF students will be exposed to this alternative approach and they will be able to draw their own conclusions on the benefits of both approaches. Again, that is another transformational experience for UNF students.

Finally, participation in the Nobel Prize Winners Conference will provide an absolutely unique perspective for a student's future career. The added benefit of this conference is that students will be exposed to Nobel laureates and several fields, making such an experience truly transformative.

### Evidence of Promise

**What qualifications/experience do the leaders have that will make them well suited to carry out this project? 300 words max**

My experience in optical spectroscopy goes back to 1988. I published a total of 31 papers on the subject of optical spectroscopy in solids. A total of eight students worked with me at UNF and three of these students are coauthors on the papers.

When I was hired at UNF in 2000 my startup package was just \$18,000. During the past eight years I was able to secure a sufficient amount of the external funding to build a state-of-the art Raman research laboratory at UNF. The current estimate of the total equipment cost in this lab is around \$400,000. The project builds up on this unique Raman equipment and the current NSF grant. It will strengthen the physics program at UNF and appreciably contribute to the developing of the Master's program in materials science.

Before coming to US I spend about three years working in the Aachen Technical University in Germany (RWTH-Aachen). Funding for this work was provided by the Alexander von Humboldt Foundation. The latter is a prestigious non-profit foundation established in 1953 by the Federal Republic of Germany for the promotion of international research cooperation. It enables highly qualified scholars outside of Germany to spend extended periods of research in Germany and promotes the ensuing academic contacts. During this time I established a strong collaboration with Prof. Gernot Güntherodt who is the head of the Second Physics Institute in RWTH. This is the renowned research institution with wide variety of instrumentation that is not available at UNF. The ongoing collaboration with Prof. Güntherodt is at the core of the proposed TLO. Between 2000 and now I made four trips to RWTH. Each of these trips resulted in a joint publication. Prof. Güntherodt is aware of my desire to establish some sort of student exchange between UNF and RWTH and he fully supports it.

**Has this activity been offered previously at UNF? \_\_ Y X\_ N**

**If yes, how was it funded? What evidence exists of success in previous years?**

**If no, what is the relevance or interest for this on campus? 300 words max**

---

In 2000 the Department of Chemistry and physics started the Bachelors degree program in Physics. In the past eight years the program grew both in the number of students and in the number of Physics faculty. A superb undergraduate education is one of the main goals of any university department. Research experience is an essential component of this education process. To achieve this goal, the department's faculty is actively pursuing external funding. In the past years more than a million dollars in scientific equipment has been acquired by the faculty and many including the PI, actively involve students in their research.

I often ask myself what else I can do to give my students the best possible education. My students work in the lab. They write papers and make presentations at the conferences. They excel in their classes. So it all seems to go well.

Then I thought about my experience when I was a student. I always look back to those times and think about all the opportunities that were missing. Fortunately, UNF undergraduates have plenty of opportunities for a superb scientific education. However I strongly believe that research experience in a foreign country known for the technological and scientific advances will make UNF physics majors stand out from many other undergraduates. This is why I think that this proposed TLO is very relevant for the success of the Physics program at UNF. It will strengthen the physics program at UNF and appreciably contribute to the developing of the Master's program in material science.

<b>Students</b>		
-----------------	--	--

**How will the students be selected?**

Interview <input checked="" type="checkbox"/>	Course Prerequisites <input type="checkbox"/>	Other:
Essay <input type="checkbox"/>	Academic Performance <input checked="" type="checkbox"/>	

**What specific criteria are required for the experience? (i.e., academic level, financial need, specific major) 300 words max**

1. Students for this TLO will have to be a physics majors because of the research subject.
2. To be competitive in the selection process for the Nobel Laureate meeting the students have to have an excellent academic record. I do not believe that any students with a GPA less than 3.0 should apply.
3. Students have to have an aptitude towards research. This is absolutely critical since their main job will be to actively participate in the research process.
4. It is desirable that students participating in this TLO will be leaning toward graduate studies.

**How will you advertise the TLO to students? 300 words max**

1. I will advertise this TLO through the students of the UNF Society of Physics.
2. An e-mail with the information about this TLO will be sent to all the students in the classes I teach.
3. I will ask my colleagues to bring up the information about this TLO to the students in their classes.
4. The announcements about this TLO will be posted on the information board of the Department of Chemistry and Physics as well as on the information board near my office.
5. I will also ask my colleagues to post this information on their info.-boards.

The advertisement for this TLO will start as soon as the TLO committee will make its decision (assuming the decision is positive).

## Assessment

**What student outcomes (learning and developmental) are anticipated? (e.g., students will be able to the ability to compare and contrast business practices of the U.S. and X country) 300 words max**

There are several things I would expect from this project.

1. **Research experience** should demonstrate to the students how science works. It is very important because frequently undergraduate education talks about science however quite often it does not expose students to scientific research. I hope that this TLO will give UNF physics undergraduates a flavor of actual research.

2. **Research experience in a foreign country** is another aspect of this TLO. The reaction to such exposure will likely be very individual. For one person a trip overseas can be an eye opener, and another person would just see different architecture and people speaking a foreign language. One person would embrace the new experiences while another person would try to shield herself/himself from this exposure. I hope that my students will embrace all the new information. I hope it will make them think about new approaches to life.

3. In my opinion, **participation in the Nobel Laureate Meeting** will be the most transformative part of this TLO. What is a better way to make oneself acquainted with new ideas in science? The information that comes from such a meeting could change ones thoughts about her/his future. Who knows, may be some of the students will decide to change their major whereas others will decide to go on with the graduate studies in their field!

**How will you measure and document student outcomes for this project? 300 words max**

1. The first part of the TLO should result in a publication. All students will be a part of it, and their contribution to the paper will be assessed in the peer review process in which the paper will be submitted to a professional journal.

2. Students will be asked to document their experience in their personal journals. They will be specifically asked to answer a series of questions about the effect of this TLO on their prospective career.

### Budget

Please choose the budget form below that corresponds with your TLO (travel or non-travel) and fill in each item with the expected costs that apply to your TLO. If it does not apply, then please fill the blank with zero. The dollar figures should be informed by the best available information that you are able to gather. If you are requesting funds for multiple semesters and/ or multiple projects within the same proposal, you will need to fill out a budget for each of those semesters and/ or projects.

<b>Travel Budget (Domestic or International)</b>			
<b>A. Number of students = 4</b>	Semester/ Year: <b>summer 2010</b>		
<b>B. Number of leaders = 1</b>			
	<b>Cost per student</b>	<b>Cost per leader</b>	<b>Comments</b>
Airfare (incl. taxes)	\$1500	\$1500	Average airfare in summer
Lodging	\$980	\$980	\$70(~Euro 50)/person for 14 days
Local program			
Local transport	\$300	\$300	Bus, train, to/from airport
Meals/ Per Diem	\$784	\$784	\$56(~Euro 40)/person for 14 days
Insurance	\$100		The leader is insured.
Contingency (5%)	\$100	\$100	
Other (specify, add lines as needed)			
<b>C. Cost per student/leader =</b>	\$3767	\$3667	
<b>D. Leader(s) cost per student (total cost per leader multiplied by number of leaders divided by number of students) Formula = (C. x B.) / A.</b>	\$917	NA	
<b>E. Total Cost per Student. (cost per student plus leader cost per student) Formula = C. + D.</b>	\$4684	NA	
<b>F. Total TLO award per student (Total Student TLO Funds Requested plus Total Leader TLO Funds Requested divided by number of students) Formula = (Total Students TLO + Total Leaders TLO) / A.</b>	\$1250	NA	-Maximum TLO per student is \$1,000 -Maximum TLO per leader is \$1,000 -One leader will be funded per 15 students. Two leaders will be funded for groups larger than 15 students.
Total amount to be paid by student (Total Cost per Student minus Total TLO award per student) Formula = E. - F.	3434	NA	No student should have costs completely covered by TLO funds. It is expected that students should bear some cost of any activity.

<b>Non-Travel Budget</b> (Within 50 miles of UNF = non-travel) <b>Summer 2009</b>		
Number of students = 4		Semester/ Year:
	<b>Costs</b>	<b>Comments</b>
Materials and Supplies	\$908	Liquid Helium to run low temperature experiments
Personnel (OPS)		
Local transport		
Equipment		
Other (specify)		
Total Cost		
Total TLO Funds Requested	\$908	
Total amount to be paid by students	\$0	

### Technology Needs

**If your TLO includes the acquisition or development of computer hardware or software, describe the nature and proposed use of the hardware and software. 300 words max**

N/A

**Do you anticipate the need for significant IT-related resources to support the TLO (e.g., large amounts of disk storage, increased network bandwidth, dedicated IT personnel, etc.)? If yes, explain. 300 words max**

N/A

**How will this hardware and/or software be maintained and supported in the short and long terms? 300 words max**

N/A

**The application should be submitted in electronic and hardcopy form no later than 5:00pm on October 20, 2008 to Dr. David Jaffee ([djaffee@unf.edu](mailto:djaffee@unf.edu)) in Undergraduate Studies 1/1220.**