FACULTY ANNUAL REVIEW

LAMAR UNIVERSITY

Submitted by: James L. Drachenberg

College: Arts and Sciences **Department:** Physics

Rank: Assistant Professor **Status:** ☐ Non-Tenure Track
X Tenure Track
☐ Tenured

Reporting Period, Calendar Year 2015.

Performance Scores:	Numeric score	Merit Reward Level
Exemplary Performance	(level 5)	Highest merit
High Performance	(level 4)	High merit
Adequate Performance	(level 3)	Merit
Marginal Performance	(level 2)	No merit
Unsatisfactory Performance	(level 1)	No raise

Chair: _____ **(Signature)** **Date:**_____

Evaluation/Merit Score: _____5_____ (from Section IV, page 5)

Performance was satisfactory X
Performance was unsatisfactory ☐

[Note: An unsatisfactory rating on Section I mandates an unsatisfactory overall performance evaluation for any faculty member.]

Faculty Acknowledgment

_____ (Signature) Date: _____

☐ Faculty disputes the evaluation [Attach documentation of appeal, give to chair for transmittal to dean]

COLLEGE of *Arts and Sciences*

Dean: _____ **(Signature)** **Date:** 4/15/2016

Performance was satisfactory Ξ
Performance was unsatisfactory ☐

Comments (not required): Dr. Drachenberg's conscientious self-reporting of his instructional experiences during his first semester at Lamar is both refreshingly cordial and purposefully directed to future adjustments to enhance student learning, particularly as they relate to problem solving skills. Dr. Drachenberg's research accomplishments are beyond prodigious, and as co-convener of the Spin PWG of the STAR collaboration, he has one of the highest international profiles certainly with in the college and likely within the university. He demonstrates exceptional capabilities as a researcher and scholar. Not to be overshadowed, Dr. Drachenberg serves as the Physics SACS Liaison, as a member of the Chair Search Committee, and as an ongoing member of the upcoming APS Texas Section/AAPT annual conference to be hosted by Lamar from March 31 to April 2, 2016. I concur with Dr. Lumpkin's assessment that Dr. Drachenberg is off to a great start at Lamar. And thus deserving of highest merit.

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High Performance	(level 4)	High merit
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Marginal Performance	(level 2)	No merit
Unsatisfactory Performance	(level 1)	No raise

Chair: _____ **(Signature)** **Date:** 2/25/16

Evaluation/Merit Score: 5 (from Section IV, page 5)

Performance was satisfactory X
Performance was unsatisfactory ☐

[Note: An unsatisfactory rating on Section I mandates an unsatisfactory overall performance evaluation for any faculty member.]

Faculty Acknowledgment

_____ (Signature) Date: 02/26/16

☐ Faculty disputes the evaluation [Attach documentation of appeal, give to chair for transmittal to dean]

COLLEGE of _____

Dean: _____ **(Signature)** **Date:** _____

Performance was satisfactory ☐
Performance was unsatisfactory ☐

Comments (not required):

I. TEACHING AND INSTRUCTIONAL ACTIVITIES (For examples, see Appendix IV to Form F2.08, "Instructions and Comments.")

Goals (See Appendix IV, Item #1):

1. Develop a new curriculum for PHYS 1402 to incorporate active learning methods.
2. Update the write-ups for 1402 lab with modern word processors.

Accomplishments for the evaluation year:

Teaching Proficiency/Teaching Effectiveness.

1. A new curriculum for PHYS 1402 was developed for the fall 2015 semester with three goals in mind: 1) implement active-learning elements for more engaging and effective class-time, 2) enhance students' conceptual understanding of the course material for less reliance on rote memorization, and 3) incorporate technological advances in instructional tools. Toward the first and second goals, a set of PowerPoint lecture slides for each week was provided ahead of time to the students through Blackboard, including a set of "clicker questions" for the week. After a traditional lecture-style introduction of each new concept, students were presented with a short, multiple-choice, concept-based question and given a brief amount of time to reflect on the possible answers. The class would then vote on the answer and various students volunteered or were chosen to justify their answers. Class discussion would follow organically with my direction and clarification, as necessary. To solidify the class discussions, weekly quizzes were administered through Pearson Mastering Physics, utilizing their online bank of conceptual questions. This element also helped to meet the third goal. Additionally, weekly homework assignments were administered through Mastering Physics.

   The initial trial during the fall 2015 semester was enlightening. Students were often very engaged during the discussions (I even received some positive course evaluation comments addressing the class discussions), and their concept-based on-line quiz averages were quite satisfactory. I see this as a bona fide success and look forward to continuing and expanding upon this element of the course. However, the initial translation of this improved conceptual understanding to success in working longer, homework-style problems was disappointing. This seems to stem from a combination of factors: First, there was a general unfamiliarity with how to study for physics, favoring rote memorization of equations rather than guidance by intuition of physical laws. Second, the class generally demonstrated very poor abilities in algebra and trigonometry. Finally, there seemed very little ability to translate the reasoning behind the example problems solved in class to those in their homework. Going forward, I will work on ways to streamline the lecture to include more example problems. Additionally, I have begun to address specific homework problems when a concept or example is first introduced to provide context to the problems they solve on their own. I am optimistic that prioritizing more time for longer examples will help the students begin to improve on this important element of the course.

2. Revisions were made to fall 2015 PHYS 1402 labs. Most of the standard laboratory write-ups were reformatted with up-to-date word processors. The selection of laboratory exercises was arranged to facilitate the newly developed lecture curriculum with several new experiments introduced (or reintroduced) into the sequence, e.g. a new set of very simple interference and diffraction experiments that can be performed with ordinary household objects. For several labs, new data analysis elements were introduced, requiring students to analyze laboratory data in spreadsheets, utilizing physics department laptop computers.

   I was modestly satisfied with the success of the lab course. There were often strong correlations between concepts discussed in the lab and success on exam problems over the same concepts. As a result, I modified my spring 2016 exam schedule to ensure that, prior to the exam, concepts have not only been discussed during lecture but also during lab. An unexpected but positive development has been the utilization of spreadsheets for data analysis. Most of the students have taken some form of statistics course, however, they have very little familiarity with how to translate those concepts to interpreting scientific data. Also, the students generally have very little familiarity with writing simple spreadsheets. The lab became an opportunity to develop some of these skills on a very modest level, and I have expanded this element for the spring 2016 semester.

3. I participated as a co-PI with several other STEM faculty on a Visionary Initiative Proposal titled, "Enhancing Student Success and Retention in STEM Fields with Active Learning." The proposal, still under consideration, would utilize funds to purchase a set of iClickers for students to answer clicker questions. Additional funds would go to support development of pre-lecture videos for students to watch, as well as for supporting student TA's for recitation sessions.

4. While the proposal is still under university review, there was enthusiasm among the co-PIs about continued pursuit of external funding for this grant, should the university be unable to fund the proposal. Going forward, I will continue discussions with these colleagues from the STEM disciplines about possible sources of funding, e.g. NSF. I will likely be unable to lead such an effort on my own, due to time constraints, however, sufficient interest seems available for sharing the workload.

5. I have reviewed my course evaluations for the fall 2015 semester, and my numerical scores are typically around or slightly below the physics department average. My average was below 4 in nine categories: "The assignments and readings helped me learn" (3.9 vs. 4.2 PHYS avg), "The instructor stimulated my interest in the subject" (3.8 vs. 4.1 PHYS avg), "The course helped me to understand the subject matter" (3.8 vs. 4.1 PHYS avg), "Overall I learned a great deal from this course" (3.9 vs. 4.1 PHYS avg), "My final grade will reflect my overall performance" (3.8 vs. 4.2 PHYS avg), "I attended web conferences to better understand course related material" (1.7 vs. 3.0 PHYS avg), "I had a strong desire to take this course" (2.9 vs. 3.6 PHYS avg), "This course helped me develop as a team or a leader" (3.8 vs. 3.8 PHYS avg), and "My responses to the online course evaluation survey allowed me to clearly express my opinions about this course" (3.8 vs. 4.2 PHYS avg). However, for the entire survey, only one question received more than one negative response, i.e. not "neutral," "agree," or "strongly agree." That question was "I had a strong desire to take this course," with one "disagree" and two "strongly disagree." I believe this is a large reason for the somewhat tepid reaction reflected in the survey. There is probably not much I can do to change students' attitudes before they take the class, in particular, as the course has a reputation for being difficult. However, going forward I will try to show students early on why the course is useful an important for developing the kind of problem-solving skills they will need in their professional lives.

   The comments section is overwhelmingly positive. Under "Course/Instructor Weaknesses" I received, in fact, only *positive* comments. I had one comment in "Weaknesses," which I quote, "Since it's his first year, he doesn't really know what works best. Crams in lecture material, speeds through lecture, everyone is literally lost. Even the brightest students in our class were still lost and didn't completely understand the material given. The homework were generally due the same day we learned most of the material for that homework even though he gives us about a week to complete." The student is surely correct that my teaching will improve the longer I do it. In other ways, this comment is factually incorrect. It is not true that assignments were generally due the same day material was first covered, and I believe this is reinforced by the fact that no one else mentioned this in the comments. Nevertheless, I do appreciate the comment, as it is revealing of a mindset to which, going forward, I will be more attuned. The statement indicates a mindset that, if properly presented, the students should never struggle to understand material. This is not a realistic expectation for Physics II, which covers, in some cases, very challenging material and requires copious amounts of outside study and problem-solving. In the future, I will proactively try to address this notion, so that students will not be discouraged if they require some effort to grasp the material. On the other hand, I also received the following comments: "Dr. Drachenburg is best at breaking down extremely difficult topics and problems in a way that helps them not be so intimidating. He relates things to real world examples and makes things easier to understand." and "Timely, follows syllabus, and is wonderful at breaking down a incredibly complicated topic that students can understand."

   Under "Areas to improve" I also had a single comment, which I quote, "HIS TESTS. They're so hard. Normally, our class average is an F..." It is not true that the exam average is an F. On the other hand, it is probably fair to say that the exams were more challenging than the students expected. This was clear after the first exam, and I worked to address this during the semester. As a result, student performance quite steadily improved from the first exam to the last exam. Related to this, I note that I also received the following comment (emphasis mine): "takes time to talk to students and learns their names and faces, ***is fair with grading*** and is always positive and upbeat." My goal from the outset has been to challenge these very bright students but to do so in an atmosphere where questions and discussion are encouraged and assessment is fair. I believe these comments indicate that this goal has been modestly achieved, and I will work to improve even more, going forward.

Faculty Schedule. [Note: Faculty member's teaching schedule for all semesters (provided on-line by LU Faculty Web Pages) or a summary that includes at a minimum course identification and numbers enrolled. Other information may be included — e.g., off campus, web-based, interactive video, etc.]

Fall 2015

PHYS 1402-01 College Physics II	TR	1245-0205	20
PHYS 1402-11 College Physics II Lab	W	1245-0245	11
PHYS 1402-12 College Physics II Lab	W	0246-0445	9

Chair Review: Evaluation Score: ___5____
(NOTE: A score of 1 on this section **mandates** an overall unsatisfactory rating by Chair.)

Comments:

Dr. Drachenberg started with a new preparation for lecture and lab in his first semester at Lamar. He had no idea what to expect from our students and he modified his methods on the fly to best serve our students. He is taking his student evaluation comments seriously and is addressing those concerns appropriately.

II. RESEARCH, PUBLICATION, SCHOLARSHIP, AND/OR CREATIVE ACTIVITIES (For examples, see Appendix IV to Form F2.08, "Instructions and Comments.")

Goals (See Appendix IV, Item #1):

1. Continue my research with the STAR collaboration, including my term as co-convener of the Spin PWG.
2. Apply for Lamar University to be admitted officially to the STAR Collaboration as an associate member institution.

Accomplishments for the evaluation year:

[Note: Indicate refereed items with an asterisk (*) and invited items with a pound sign (#).]

Research Projects

Spin Physics Research at STAR

1. Continued as an active member of the STAR Collaboration. STAR (an acronym for "Solenoidal Tracker at RHIC") is an international collaboration of several hundred scientists located at Brookhaven National Laboratory's Relativistic Heavy Ion Collider (RHIC). STAR investigates high-energy nuclear interactions, as well as proton structure and the nature of the strong nuclear force, in particular, as it relates to the phenomena of "spin" (intrinsic angular momentum).

2. Submitted an application to the STAR Council (the collaboration's governing body) for Lamar University to be admitted as an "Associate Member Institution." This would formally allow Lamar to be a collaborating institution of STAR and listed as my affiliation on publications. The application is still under consideration, but the immediate response was quite positive.

3. Continued a two-year term as co-convener of the STAR Spin Physics Working Group (PWG). This is a leadership position within the collaboration, tasked with organizing and overseeing research that could be considered "spin physics." Responsibilities include chairing weekly teleconference meetings of the PWG; soliciting, reviewing, editing, and approving all conference abstracts, presentations, and proceedings; organizing and chairing parallel sessions for biannual STAR Collaboration Meetings; and serving on committees for STAR internal review of journal articles on research conducted under the auspices of the Spin PWG.

4. Authored a paper and detailed technical note describing the first observation of the "Collins effect" in spin-polarized proton-proton collisions. The Collins effect is a non-perturbative mechanism that correlates quark transverse spin-polarization with the orientation of particles produced when the quark "hadronizes," i.e. converts into observable particles. This mechanism has been previously observed in the scattering of leptons from spin-polarized proton targets. However, it has never before been seen in collisions between two protons. Such an observation may have intriguing implications for the nature of the strong force. The paper is currently in STAR internal review.

5. Served as the Spin PWG representative on the STAR internal review committee for a paper describing the first observation of quark transverse spin-polarization ("transversity") in spin-polarized proton-proton collisions. The paper has been published

in the APS journal *Physical Review Letters*, designated as Phys. Rev. Lett. 115, 242501 (2015).

6. Estimated the expected experimental precision for measurements planned for data collected during the 2015 RHIC run period and data we proposed to collect during RHIC running in 2017. These estimates will be featured in STAR and RHIC Spin run proposal documents, submitted to BNL management, as well as in external conference presentations discussing future RHIC running.

Presentations (Abstracts Published)

7. (#) Gave an invited presentation entitled, "Recent Developments in Transverse Spin Physics at RHIC," at the Annual Fall Meeting of the APS Division of Nuclear Physics (DNP) in Santa Fe, NM. This meeting is held annually and is the largest meeting of the DNP. Abstracts are published in the Bulletin of the American Physical Society.

Publications

As an active member of STAR, I am coauthor to all journal publications of the STAR Collaboration. It goes without saying that my contributions to most of these papers is quite minimal. Here, I list only those papers to which I made a contribution in terms of either data analysis, peer-review, or an intellectual contribution. ***Note:*** *until my institutional membership application is officially accepted, my institutional affiliation for STAR publication is that of my previous institution, Valparaiso University.*

8. (*) "Measurement of Interaction Between Antiprotons," Nature 527, 345 (2015). In 2015 I served as a member of the STAR internal review panel for this publication.
9. (*) "Precision Measurement of the Longitudinal Double-spin Asymmetry for Inclusive Jet Production in Polarized Proton Collisions at $\sqrt{s} = 200$ GeV," Phys. Rev. Lett. 115, 092002 (2015). This result was conducted by my close colleagues at Texas A&M. I was present for most of the discussions of the work leading up to the final result and was serving as co-convener when the paper was published by the journal.
10. (*) "Observation of Transverse Spin-Dependent Azimuthal Correlations of Charged Pion Pairs in $p^{\uparrow} + p$ at $\sqrt{s} = 200$ GeV," Phys. Rev. Lett. 115, 242501 (2015). I served on the internal review committee that drafted this paper and was serving as co-convener when the article was published by the journal.

Grants

11. An NSF grant proposal, "RUI: Probing the Nature of QCD Through Transverse Spin Physics at RHIC" was submitted for continuing research with the STAR collaboration. The proposal is currently under review.

Conferences Attended

12. Annual Fall Meeting of the APS Division of Nuclear Physics (DNP2015), Santa Fe, NM, October 2015.

Chair Review: Evaluation Score: ___5___

Comments:

Dr. Drachenberg has an impressive research productivity for his first semester at Lamar with three peer-reviewed publications, an NSF proposal submitted, and a presentation at a national conference. His role as co-convener of the Spin PWG of the STAR collaboration gives him one of the highest international profiles of the department faculty.

III. PROFESSIONAL SERVICE TO THE DISCIPLINE, UNIVERSITY, AND/OR COMMUNITY (For examples, see Appendix IV to Form F2.08, "Instructions and Comments.")

Goals (See Appendix IV, Item #1):

1. Serve the department as a member of the hiring committees for department chair and administrative associate.
2. Serve the department in whatever capacity I can for purposes of accreditation or representation to the college.

Accomplishments for the evaluation year:

Professional Affiliations

1. Member of the American Physical Society (APS).

Service to Department

2. Physics SACS Liaison
3. Physics Administrative Associate Search Committee
   - Resulted in the hiring of Ms. Kristina Moffett
4. Physics Department Chair Search Committee
   - Ongoing
5. Served as a member of the organizing committee for the APS Texas Section/AAPT meeting hosted by the physics department. Recruited Dr. Carl Gagliardi from Texas A&M as a plenary speaker on the topic of nuclear physics.

Service to College

6. College Curriculum Committee Member

Chair Review: Evaluation Score: ___5____

Comments:

Dr. Drachenberg has made an excellent start in his service efforts, taking on many import assignments without becoming overwhelmed with too many minor but time consuming efforts.

IV. EVALUATION/ RECOMMENDATION BY CHAIR

Workload Distribution for this Evaluation Year:

(40 to 60%)	(20 to 40%)	(10 to 30%)
% Teaching = 40	% Research/Scholarship = 40	%Service = 20

The Chair will calculate a Composite Score for each faculty member, according to departmental workload policies.

[(Teaching score) • (% workload)] + [(Research/Scholarship score) • (% workload)] + [(Service score) • (% workload)]

= __5____ **CHAIR'S COMPOSITE SCORE**

[Note: Chair's Composite Score should be recorded also on Evaluation/Merit Score line on page 1 of this form.]

Chair's Overall Comments:

It has been a pleasure to work with Dr. Drachernberg, he is off to a great start at Lamar.

*** END OF FORM F2.08. SEE APPENDICES FOR SUPPLEMENTARY FORMS AND INSTRUCTIONS. ***

LAMAR UNIVERSITY
APPENDIX I FOR FORM F2.08
FACULTY and CHAIR PLANNING PAGE
Academic Year _____

Faculty _____ **Department** _____

This page is a **department level planning document** intended to enhance communication between each faculty member and the department chair/library coordinator. It should be completed during the annual performance evaluation conference between chair/coordinator and faculty member, and no later than April 10. For units which have elected to establish performance measures for each Merit Reward Level and have had them approved by the faculty, chair, dean, and provost, the goal-setting portion of this form may be omitted. These performance measures must be established and/or modified no later than December 31 preceding the year in which they will be in force.

Workload Distribution for the next Planning Calendar Year:

% Teaching = 45 % Research-Scholarship = 55 %Service = 10

I. TEACHING AND INSTRUCTIONAL ACTIVITIES
Goals for next calendar year:

1. Continue development of active-learning methods for PHYS 1402. Streamline lecture presentations to allow for more "homework-style" example problems.
2. Expand the role of error and data-analysis in 1402 labs using spreadsheets, e.g. Excel.
3. Develop a course on data reduction and error analysis for physics majors.

II. RESEARCH, PUBLICATION, SCHOLARSHIP, AND/OR CREATIVE ACTIVITIES
Goals for next calendar year:

1. Publication of the Collins effect paper, currently in internal review
2. Complete two-year term as co-convener of STAR Spin PWG
3. Utilize the published Collins data to examine spin-averaged hadronization in the same high-energy proton-proton collisions. Complete a "preliminary" analysis to be shown publicly at an external conference.

III. PROFESSIONAL SERVICE TO THE DISCIPLINE, UNIVERSITY, AND/OR COMMUNITY
Goals for next calendar year:

1. Complete SACS assessments for physics department.
2. Complete the department-chair search process.
3. Complete service as a member of the Texas APS organizing committee. Present a talk on my research at STAR to open the nuclear physics break-out session.

COMMENTS:

Faculty Member Signature & Date: _____

Chair/Coordinator Signature & Date: _____

12/1/04