



## **ORGANIZATIONAL UNIT PROPOSAL FORM**

*(Revised November 2018)*

**DIRECTIONS:** *Use this form when proposing a new school, college, center, institute or other organizational unit. Internal administrative changes, including but not limited to the addition or elimination of departments, do not require approval by the Academic Affairs Council or the Board of Regents.*

**DATE OF REQUEST:** March 2022

*Date of AAC Approval:*

06-08-22

**INSTITUTION:** University of Nevada, Las Vegas

**NAME OF PROPOSED UNIT:** Nevada Center for Astrophysics

*Date of Board Approval:*

**DATE OF IMPLEMENTATION:** Upon Approval

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### **PART 1**

#### **A. Action requested**

The University of Nevada, Las Vegas requests approval for the creation of a research center named the Nevada Center for Astrophysics, to be housed within the College of Sciences.

#### **B. Brief description and purpose of proposed unit**

The proposed Nevada Center for Astrophysics will foster theoretical and observational studies in astrophysical transients (e.g., supernovae), black holes, stars, their planets, and cosmology by providing the necessary infrastructure to attract new talent and research resources to UNLV. The research will involve big data collection and processing, theoretical modeling, numerical simulations, and computation. The proposed center will support interdisciplinary efforts and be an outreach program for the broad community in Nevada.

#### **C. Outline plans for the success of the proposed unit**

The importance of astrophysics, especially multi-messenger, time-domain astrophysics, has been highlighted by its inclusion as one of 10 Big Ideas of National Science Foundation and the emphasis in the latest decadal survey by the National Academy of Sciences. The Nevada Center for Astrophysics will include nine faculty members from the Department of Physics and Astronomy, and at least four more faculty members from the College of Sciences and the Howard R. Hughes College of Engineering. The faculty members are experienced researchers who are working on several cutting-edge frontiers in astrophysics, such as astrophysical transients, black holes, stars and planets, galaxies, and cosmology. With funding support from the Office of the Executive Vice President and Provost, the institution intends to hire one assistant professor who will work on the active research area of multi-messenger and time-domain astrophysics, and two Prize Postdoctoral Fellows (competitive postdoc fellowships that allow talented new researchers to conduct both independent research and collaborative research with center faculty members). These fellows will work on two different active research areas of the Nevada Center for Astrophysics. With the start-up funding provided by the Office of the Executive Vice President and Provost, the Nevada Center for Astrophysics will organize conferences, workshops, and collaboration meetings to engage the external collaborators. The center will also aggressively seek additional funding from federal, state, and private funding sources. Proposed affiliated faculty have

demonstrated success in obtaining external funding; therefore, it is expected that the productivity of the center will boom and continuous funding will be acquired to provide long-term support of the center.

## **PART II**

### **A. Mission statement**

Built upon the strong expertise in astrophysics of existing UNLV faculty, the proposed Nevada Center for Astrophysics will foster theoretical and observational studies in astrophysical transients, black holes, stars, their planets, and cosmology by providing the necessary infrastructure to attract new talent and research resources to UNLV. The research will involve big data collection and processing, theoretical modeling, numerical simulations, and computation. The proposed center will support interdisciplinary efforts and be an outreach program for the broad community in Nevada.

### **B. Goals and objectives**

#### **i. Teaching**

- Providing education and training opportunities to junior researchers (undergraduate students, graduate students, and postdoctoral researchers) through involving, advising, and mentoring them in cutting-edge research.
- Providing additional training opportunities for junior researchers through colloquia, on-site workshops, and external collaborations.
- Establishing an astronomy outreach program to engage the broad community in the Las Vegas area.

#### **ii. Research**

- The proposed center members have been performing cutting-edge research in several frontiers in astrophysics. Faculty will continue their research in astrophysical transients, black hole accretion systems, stars and planetary systems, extrasolar planets, and cosmology.
- Faculty will expand the research front to multi-messenger (electromagnetic waves, gravitational waves, and neutrinos) theoretical modeling and observations with the new members at the center (new faculty and prize postdocs, as defined in Part 1 Section C).
- Center research will involve big data collection and processing, theoretical modeling, numerical simulations, and computation, as well as machine learning and artificial intelligence.
- The proposed center will maintain existing external collaborations and establish new national and international collaborations in various research frontiers.
- The proposed center will establish a robust externally funded center program that is self-sustaining by year four.
- The research results of the Nevada Center for Astrophysics will be disseminated in high-impact journals. Based on the publication record of the center members and projected research activities, center faculty are projected to publish at least 30 research papers per year in top astrophysics journals (e.g., American Astronomical Society journals and Monthly Notices for Royal Astronomical Society), including papers in very high impact journals such as Nature, Science, Nature Astronomy, and Nature Communications.

#### **iii. Service**

- Mentoring undergraduate, graduate students, and postdoctoral researchers.
- Center members will actively serve in their profession, including serving as panel reviewers for funding agencies, referees for journals, and scientific organizing committees of conferences and workshops.

### **C. Major participants or collaborators**

#### **i. Internal to campus**

From the Department of Physics and Astronomy:

Nine faculty members who work on theoretical and observational studies in astrophysical transients, black holes, stars, their planets, and cosmology. They are the main participants of the proposed center and will contribute to paper and grant writing. The UNLV Vice President for Research will provide guidance to the

operation of the center but will also perform interdisciplinary research at the interplay between laboratory plasma physics and astrophysics.

From other departments in the College of Sciences:

A faculty member from the Department of Geoscience who works on planetary sciences, and researchers from the Department of Mathematical Sciences who work on numerical simulations and statistical analysis will be invited to join the Nevada Center for Astrophysics.

From other colleges:

Two faculty members from the Howard R. Hughes College of Engineering who work on big data and machine learning will be invited to join the Nevada Center for Astrophysics.

## **ii. External to campus**

Researchers from a variety of institutions and organizations will be invited to be associated with the proposed Nevada Center for Astrophysics. The proposed center will provide necessary funding to support short visits of these collaborators. Most of these individuals have had past or ongoing collaborations with the center faculty. They will be invited to collaborate with the proposed Nevada Center for Astrophysics to write joint research grants and participate in research projects.

Potential external collaborators may come from:

Caltech, Penn State, Princeton, Space Telescope, NASA/Goddard Space Flight Center, Flatiron Institute, West Virginia University, University of Texas, Austin, Los Alamos National Laboratory, the Neil Gehrels Swift Observatory Collaboration, the Fermi GBM Collaboration, NASA/Marshall Space Flight Center, the StarBurst Collaboration, Harvard/Center for Astrophysics, and Atacama Large Millimeter/submillimeter Array Collaboration, Osaka University, RadBoud University, Nanjing University.

## **D. Evidence of contact within and between affected academic units**

There have already been extensive collaborations among the members within the proposed center in the past:

- Successful joint multi-million dollar proposal under NASA EPSCoR titled “Nevada Astrophysics”
- Active jointly funded research grants
- There are multiple joint publications among the faculty members

## **E. Proposed physical location**

There is dedicated space in the Bigelow Physics Building (BPB) to house all the faculty members of the Nevada Center for Astrophysics. The existing faculty members from the Department of Physics and Astronomy currently have allocated office and research space in BPB. The Department of Physics and Astronomy has approved one office for the proposed new tenure track hire, and one office for associated Prize Postdocs (as defined in Part 1 Section C). A conference room within the Department of Physics and Astronomy can be used to host related center activities.

## **F. Proposed organizational structure (include organizational structure within the campus)**

The proposed center Director will be responsible for the overall operation and programming of the center. Faculty members and teaching/research faculty members of the center will perform research, teaching, service, and train junior research members (postdocs and graduate/undergraduate students). The Vice President for Research will provide guidance as to the operation of the center but will also perform interdisciplinary research. The tenure track faculty to be hired will perform research at the frontier of multi-messenger and time-domain astrophysics and will be expected to play a very active role at the center by advising and guiding students and postdoc fellows and by organizing academic activities (meetings & conferences) at the center. Two Prize Postdocs, as defined in Part 1 Section C (initially funded by the Executive Vice President and Provost) will be hired: one postdoc will work on multi-messenger and time-domain astrophysics and the second postdoc will work on another emergent area. Academic faculty will report to their chairs. Faculty center activities will report to the Director.

**G. Activities to be sponsored (e.g. courses, seminars, research, and outreach) – indicate if courses or seminars will be offered through the proposed unit. Please specify if they will be offered for academic credit and applicable to a degree program. Give estimated enrollment.**

Regular center-based seminars are planned. Nevada Center for Astrophysics members will mentor junior researchers and sit on academic committees in their respective departments. No courses with academic credit will be offered. The center will be focused on performing cutting-edge research at multiple frontiers in astrophysics. The Nevada Center for Astrophysics will foster theoretical and observational studies in astrophysical transients, black holes, stars, their planets, and cosmology by providing the necessary infrastructure to attract talented students and researchers and resources to UNLV. The research will involve big data collection and processing, theoretical modeling, numerical simulations, and computation. The center research-related activities will include a weekly Journal Club, Astro Coffee (an informal weekly event when astronomy faculty, postdocs, and students meet to discuss new developments in the field of astrophysics by reviewing interesting papers posted in the week or sharing exciting news in astronomy), and departmental seminars as well as conferences, workshops, and external collaboration meetings. The center members will perform extensive service to UNLV and to their profession by serving on academic committees, agency review panels, referees for professional journals and organizing committees of national/international academic conferences and workshops. The Nevada Center for Astrophysics will also support an active astronomy outreach program to engage the broad community in the Las Vegas area.

**H. Resource Analysis – source of funds necessary for the proposed change (enrollment-generated state funds, reallocation of existing funds, grants, other state funds)**

Funds will be provided by the Executive Vice President and Provost to support the center for the first three years. After the three-year period, the center is expected to self-support. Most center faculty have sufficient external funding to support ongoing research. The Director and other center faculty members will aggressively seek funding opportunities from federal, state, and private funding sources for new research areas associated with the center. The internationally influential research accomplishments from the group provides the base for attracting additional external funding. Additional junior faculty members and Prize Postdocs (defined in Part 1 Section C) will be hired through competitive selection processes, and will be expected to conduct high-quality research and write additional funding proposals.

**I. Projected Budget – identify portions of costs which will require state resources, grants, gifts and/or contracts**

The total direct costs budget for the first three years is \$1,631,000 (see budget sheet for details). The total budget requiring funding from the Executive Vice President and Provost is \$873,450, which will be used to cover the salaries of two Prize Postdoctoral Fellows (defined in Part 1 Section C), short-term sabbatical visitors, a director stipend, as well as the Nevada Center for Astrophysics operation budget. Existing and new grant money will provide the rest of the funds required to run the center, including some small equipment and software. It is anticipated that the center will be self-supporting starting in year four.


*Please attach any supporting documentation (i.e. support letters from community, industry).*

## NEW ORGANIZATIONAL UNIT PROPOSAL

<b>Costs</b>					
		<b>Year One Fall 2022</b>	<b>Year Two Fall 2023</b>	<b>Year Three Fall 2024</b>	<b><u>Total</u></b>
<b>Personnel</b>					
<b>Total of Salary and Fringe</b>		\$368,000	\$514,000	\$659,000	\$1,541,000
<b>Operations/Other</b>		\$20,000	\$20,000	\$20,000	\$60,000
Postdoc research support		\$10,000	\$10,000	\$10,000	\$30,000
<b>Total Direct Costs</b>		\$398,000	\$544,000	\$689,000	\$1,631,000
<b>Revenue</b>		<b>Year One</b>	<b>Year Two</b>	<b>Year Three</b>	<b><u>Total</u></b>
Institutional Funds		\$291,150	\$291,150	\$291,150	\$873,450
Grants & Contracts		\$250,000	\$350,000	\$550,000	\$1,150,000
F & A Collected by institution (negotiated at 29.5%)		(\$73,750)	(\$103,250)	(\$162,250)	(\$339,250)
Private Donations			\$50,000	\$100,000	\$150,000
<b>Total Revenue</b>		\$467,400	\$587,900	\$778,900	\$1,834,200

January 18, 2022

To: The Council for Centers, Institutes, Museums and Laboratories

From: Eric Chronister, Dean of College of Sciences 

**RE: Support for the Nevada Center for Astrophysics (NCfA)**

It is my pleasure to express my strong support for the establishment of the Nevada Center for Astrophysics (NCfA) at UNLV. This new research center builds upon UNLV strength and will foster UNLV's basic research in one of the most active fields in natural sciences. It will attract world class researchers to join the internationally recognized group here, which will open new opportunities for research funding and cutting edge fundamental research in Nevada. The formation of NCfA fully embraces UNLV's Top Tier 2.0 goals and will make positive contribution to UNLV for its maintaining R1 status and advancing the university ranking in fundamental research.

The importance of astrophysics (especially multi-messenger astrophysics) in natural sciences has been manifested by its inclusion as one of the Ten Big Ideas of National Science Foundation, the honors of 5 of last 11 Nobel Prize in Physics to the fields in astrophysics, as well as the emphases in the recent Decadal Survey by National Academy of Sciences. The NCfA members have been conducting cutting edge research in many of these fields. For example, NCfA Director and Distinguished Professor Bing Zhang and his international collaboration team has recently made watershed discoveries in understanding the origin of fast radio bursts, a type of mysterious transients in the universe. He published 4 Nature papers in the past two years, 1 of which was selected as one of the Top Ten Breakthrough of the Year in 2020 by the Science magazine. Center members Proga, Zhu, Martin and Yang are on three active multi-institution TCAN (Theoretical and Computational Astrophysics Networks) proposals sponsored by NASA, including one such proposal led by UNLV (PI: Proga). Center members have been actively publishing papers in prestigious journals and attracting grants from various funding agencies, making astrophysics as one of the most nationally competitive fields at UNLV.

The establishment of the Center will attract more young talents and external funding to UNLV. One tenure track professor will be hired, who will work on one of the most active research frontiers in multi-messenger and time-domain astrophysics. Two Prize postdocs with a competitive salary comparable to that of the most prestigious astrophysics fellowships (e.g. Hubble Fellow) will be recruited to join UNLV and to perform independent research in collaboration with senior Center members. This will allow UNLV to attract high-caliber young scientists normally attained in most prestigious universities in the nation to work in Nevada, making UNLV as one of the most attractive astrophysics researcher

centers for future astronomers. The establishment of NCfA will allow the members (which also include researchers from other departments within College of Sciences and from College of Engineering) to carry out interdisciplinary research and seek for additional funding opportunities not available from individual units.

NCfA will also allow UNLV play an active and even leadership role in national and international collaborations. Some Center members are already associated with several of such large collaborations (e.g. NASA's Swift, Kepler, NSF's ALMA, international collaborations FAST) and are on the proposal teams for several future grand-scale missions or telescope collaborations. The research programs led by the upcoming tenure-track assistant professor and Prize postdocs are projected to include observational efforts making use of the most advanced astrophysical facilities such as gravitational wave detectors LIGO and the most powerful optical telescope JWST. Scientists from other institutions, including prestigious universities such as Caltech, Princeton, Harvard and Penn State and national labs such as NASA Goddard Space Flight Center, Marshall Space Flight Center, and Los Alamos National Laboratory will be invited to be associated with NCfA, which will further facilitate collaborations in both scientific paper writing and grant applications.

In summary, I see great promise and opportunities for the establishment of NCfA and give it my strongest recommendation..

Date: January 21, 2022

To: Council for Centers, Institutes, Museums, and Labs

From: Edmund J. Synakowski  
Vice President for Research  
Professor, Physics, and Astronomy

Re: Support for the establishment of the Nevada Center for Astrophysics

Dear Colleagues,

I write to express my strong support for the establishment of a new Nevada Center for Astrophysics (NCfA), to be led by Professor Bing Zhang, Distinguished Professor in the Department of Physics and Astronomy. My support is based on several considerations.

First, the research area that will serve as the kernel for this Center is called out by the National Science Foundation as being of the highest level of scientific importance, one of ten so identified. With the subject heading described by NSF as “Windows on the Universe: The Era of Multi-Messenger Astrophysics,” the domain of this research emphasis will engage scientists in using the combined measurements of electromagnetic waves, high-energy particles, and gravitational waves to develop understanding of extraordinary phenomena that strain the imagination. Departmental faculty will join Professor Zhang in immediately assuming an internationally leading role in the interpretation of these phenomena. A benefit of a Center is that they will be joined by institutions and individuals from outside of campus to form a highly competitive research enterprise that will be able to attract new, bright faculty and staff active in observation. Already highly ranked, the astrophysics activity on this campus will be further elevated into the realm of national leadership.

Second, I am confident the Center will be well led. It will have a leader in Professor Zhang who has exhibited a rare combination of research and administrative excellence. I have come to know this in my short time here through his work as Associate Dean for Research for the College of Sciences. The proposal he is sharing with you reveals a clear vision for how the Center will function and, the proposal already contains a list of invited participating or endorsing institutions that are world-class. The creation of this Center will serve as a compelling brand for UNLV to leading universities, national and other federal labs, and research institutions from other continents, conveying that our research is second to none. UNLV's involvement with the partners listed will represent a strong positive step in strengthening research ties beyond our boundaries.

Third, this Center will promote engagement across campus that would otherwise be unlikely. Such engagement is in the interest of promoting interdisciplinarity and increasing the national

profile of this university. In my office, I will be initiating a campus-wide conversation regarding machine learning and artificial intelligence. Feedback from the Colleges reveals we have expertise across the campus that few outside of their own domains knows about. Practitioners of AI and machine learning that will be part of this Center are leaders in their research fields. This Center can thus become a campus-wide leading force in artificial intelligence, and it will contribute strongly to a broad campus initiative I hope to launch to organize this class of work so as to create a locus of scholarship in AI and machine learning, as well as of campus-wide service.

And finally, the Center will create a conspicuous focal point for research that invariably captures public attention. There are few topics that capture the public interest in as compelling a way as do black hole collisions, binary neutron stars, and gravity wave formation. Wrapping this kind of research in the NCfA will enable the faculty performing the work to serve as ambassadors for UNLV as they share excitement with Las Vegans and others nationally of extraordinary developments in this field, and tell the story of their leadership in it.

Thank you for your kind consideration.

Yours sincerely,



Edmund J. Synakowski