Center for Nonlinear Studies (CNLS) Leader Position

IRC 91223 Scientist 5/6

Irene Qualters
ALD for Simulation and Computation

February 8, 2022
Theoretical Division (T) and the National Security Education Center (NSEC) are searching for a Director for the Center for Nonlinear Studies (CNLS)

The Center Director provides **scientific leadership and line management of the CNLS** while fostering collaborations with scientists throughout the Laboratory. The CNLS Center Director is expected to develop and lead a program to target and **create cooperative long-term research programs consistent with the Laboratory’s strategic research objectives**, to **develop a strong working relationship with the CNLS External Advisory Committee**, and to maintain effective working relationships throughout all levels of the Laboratory, government entities, academia and industry. The successful candidate will be expected to **maintain an active research program while providing technical vision** to nurture and support existing programs of others at the Center.
CNLS

Mission

• **Identifies and studies** fundamental complex nonlinear *research* challenges
• **Promotes use of results** in *applied* research
• **Stimulates** interdisciplinary approaches to nonlinear research
• **Facilitates** intellectual interchange with *external centers of excellence*

Current Scientific Themes

• Machine Learning Enhanced Modeling
• Theory and Computation of Quantum Systems
• Dynamics of Systems Far From Equilibrium
• Mechanistic Studies of Human Disease
CNLS Executive Committees determine research direction

Kipton Barros  
Condensed Matter Theory  
T-1

Russell Bent  
Optimization Theory  
T-5

Malcolm Boshier  
AMO/Quantum  
MPA-Q

Jeffrey De'Haven Hyman  
Earth Sciences  
EES-16

Sara Del Valle  
Applied Mathematics  
A-1

Gian Luca Delzanno  
Space Plasmas  
T-5

Chris Fryer  
Astrophysics  
CCS-2

Gnana Gnanakaran  
Biophysics  
T-6

Jenn Hollingsworth  
Nanomaterials  
MPA-CINT

Eddy Timmermans  
XCP-5

Sergei Tretiak  
Quantum Chemistry  
T-1
CNLS Research Themes are regularly reviewed and revised

**Dynamic of Systems Far From Equilibrium**
- Applied mathematics methods for plasma physics
- Space plasmas
- Structural properties of materials
- Fluid dynamics and turbulence
- Soft matter
- Active matter
- Dynamical systems
- Mechanistic Studies of Human Disease

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**Machine Learning Enhanced Modeling**
- Physics informed machine learning
- Deep learning
- Optimization theory
- Applications to grids
- Materials and Biology
- Interference and Algorithms
- Smart Grid applications
- Complex Networks
- Materials Informatics

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**Theory and Computation of Quantum Systems**
- Quantum information
- Quantum many-body physics
- Bose-Einstein condensates
- Strongly correlated electron systems
- Molecular physics
- Non-adiabatic excited-state dynamics
- Warm dense matter

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**Mechanistic Studies of Human Disease**
- Stochastic gene regulation
- Biomolecular simulations
- Disease modeling
- Viral dynamics
CNLS Scientific Themes support LANL’s Capability Pillars

- **Theory and Computation of Quantum Systems**
  - IS&T: Quantum computing
  - Materials for the Future: correlated electron systems, quantum materials, functional materials
- **Machine Learning Enhanced Modeling**
  - IS&T: Machine learning, HPC, theory and algorithms
  - CNES: Modeling infrastructure
  - WS: algorithms, multiscale physics, reduced dimensionality
- **Dynamics of Systems Far From Equilibrium**
  - IS&T: Applied mathematics, numerical methods
  - Materials for the Future: mechanical deformations in metals at the mesoscale
  - NPF: Astrophysics, High Energy Density Plasmas and Fluids
  - SOS: environmental impacts, climate modeling
  - WS: Advanced manufacturing, algorithms, multiscale physics
- **Mechanistic Studies of Human Disease**
  - CNES: Modeling biological systems; Global security biosciences
  - Materials for the Future: Biomimetic materials
  - SOS: Global health, Biofuel research, National Security, Global Security

**Materials for the Future**
- Defects and Interfaces
- Extreme Environments
- Emergent Phenomena

**Nuclear and Particle Futures**
- Accelerator Science & Technology
- Applied Nuclear Science & Engineering
- High Energy Density Plasmas & Fluids
- Nuclear, Particle, Astrophysics & Cosmology

**Integrating Information, Science, and Technology for Prediction**
- Computing Platforms
- Computational Methods
- Data Science

**Science of Signatures**
- Nuclear Detonation
- Nuclear Processing, Movement, Weaponization
- Natural and Anthropogenic Phenomena

**Complex Natural and Engineered Systems**
- Human–Natural System Interactions: Nuclear Engineered Systems
- Human–Natural System Interactions: Non-Nuclear

**Weapons Systems**
- Design
- Manufacturing
- Analysis
As a National Security Education Center, CNLS

- Stimulates interdisciplinary research and information exchange inside and outside the Laboratory
- Provides a Laboratory focal point for collaboration with academic and other centers of excellence in nonlinear science
- Introduces students and postdoc researchers to nonlinear science
- Focuses on attracting and retaining excellence through student, postdoc, university and industry collaborations
- Supports seminars, workshops, conferences, visitors and a resident scholars program.
CNLS achieves its goals through:

- A robust and diverse postdoctoral fellowships that pairs postdoctoral fellows with laboratory staff (PD fellows from: Cambridge, Oxford, MIT, Stanford, ETH, Columbia, UPenn, Northwestern, UIUC, UCSD, etc.)

- A large visitors program (~200 visitors/ year from academia and industry). Visits range from a few days to 4 months.

- Active colloquium and seminar series (CNLS Colloquium, Quantum lunch, Postdoctoral fellows seminar, and other visitors seminars)

- Organization of international conferences that explore science at the interfaces (~10-12 / year, before COVID-19)

- The Ulam Scholar program that hosts long term (sabbatical) visitors at CNLS

- A graduate student program during the calendar year (typically PhD students) and a summer student program that hosts HS, UG and Graduate students from New Mexico and elsewhere.
CNLS jointly hosts a vibrant, diverse community of Postdoctoral Research Associates/ Fellows

- Allen, Alice (aallen@lanl.gov) - T-1/CNLS
- Andrews, Elizabeth (eandrews@lanl.gov) - EES-16/CNLS
- Brunner, James (jdbrunner@lanl.gov) - B-11/CNLS
- Bryant, Eric (ecbryant@lanl.gov) - W-13/CNLS
- Burrill, Daniel (djburrim@lanl.gov) - T-1/CNLS
- Capodaglio, Giacomo (gcapodaglio@lanl.gov) - CCS-2/CNLS
- Cerezo de la Roca, Marco (cerozo@lanl.gov) - T-4/CNLS
- Chakraborty, Srirupa (srirupac@lanl.gov) - T-6/CNLS
- Cen, Julia (juliacen@lanl.gov) - T-4/CNLS
- De Santis, Derek (ddesantis@lanl.gov) - T-1/T-3/CNLS
- Forde, Aaron (aforde@lanl.gov) - T-1/CNLS
- Fox, Zachary (zachfox@lanl.gov) - CCS-3/CNLS
- Gorris, Morgan (mgorris@lanl.gov) - A-1/CNLS, Director's Fellow
- Holmes, Zoe (zholmes@lanl.gov) - CCS-3-1/CNLS, Kac Fellow
- Kannan, Rohit (rohit.kannan@lanl.gov) - T-5/CNLS
- Kerdreux, Thomas (tkerdreux@lanl.gov) - EES-17/CNLS
- Kurtakoti, Prajvala (prajvala@lanl.gov) - T3/CNLS
- Kazi, Saif (skazi@lanl.gov) - T-5/CNLS
- Larocca, Martin (larocca@lanl.gov) - T-4/CNLS
- Li, Wenting (wenting@lanl.gov) - T-5/CNLS
- Malla, Rajesh (malla@lanl.gov) - T-4/CNLS
- Ngo, Ahn Van (ngov@lanl.gov) - CNLS, Director's Funded
- Park, Sungwoo (sungwoo@lanl.gov) - T-2/CNLS
- Patel, Lara (lapatel@lanl.gov) - T-6/CNLS
- Rupe, Adam (adamrupe@lanl.gov) - EES-16/CNLS
- Saccone, Michael (msaccone@lanl.gov) - T-4/CNLS
- Sadler, James (james4sadler@lanl.gov) - T-2/CNLS
- Sharma, Vidushi (vidushil@lanl.gov) - T-1/CNLS
- Wang, Kun (kunw@lanl.gov) - T-3/EES-16, CNLS
- Wych, David (dwych@lanl.gov) - CCS-3/CNLS
- Yan, Bin (byan@lanl.gov) - T-4/CNLS
- Zhou, Guoqing (guoqingz@lanl.gov) - T-1/CNLS
CNLS resides in T Division

Division Leader
Marianne Francois
Deputy Division Leader
Joel Kress

Staff Operations Manager
Danielle Bergemann
Administrative Support
Marisa K. Chavez

Physics and Chemistry of Materials (T-1)
Group Leader
James Colgan
Deputy Group Leader
Sergei Tretiak
Administrative Support
Melissa Day
Courtney Dal Porto

Nuclear and Particle Physics, Astrophysics and Cosmology (T-2)
Group Leader
Anna Hayes-Storbenz
Deputy Group Leader
Ionel Stetcu (Acting)
Administrative Support
Lori Lopez
Ashley Mondragon

Fluid Dynamics and Solid Mechanics (T-3)
Group Leader
DJ Luscher
Deputy Group Leader
Hashem Mourad (Acting)
Administrative Support
Ashley Mondragon
Roberta Torrez

Physics and Condensed Matter and Complex Systems (T-4)
Group Leader
Avadh Saxena
Deputy Group Leader
El Ben-Naim
Administrative Support
Leslie Martinez

Applied Mathematics and Plasma Physics (T-5)
Group Leader
Wesley Even
Deputy Group Leader
Gian Luca Delzanno
Administrative Support
Brandy Rendon

Theoretical Biology and Biophysics (T-6)
Group Leader
Benjamin McMahon
Deputy Group Leader
Carrie Manore
Administrative Support
Martha Perkins

Center for Nonlinear Studies (CNLS)
Center Leader
Nick Hengartner (Acting)
Deputy Center Leader
Enrique Batista
Professional Staff Assistant
Vanessa Gonzales
Administrative Support
Diane Duback
Conference Coordinator
Leah Buines
Minimum Qualifications of Center Leader

• Demonstrated **record of scientific accomplishment** in one or more areas relevant to the Center as evidenced by an outstanding publication portfolio and/or a demonstrable national or international reputation.

• Demonstrated **experience in establishing and maintaining research collaborations**, from the identification of new potential topics to forming teams, promoting proposals and executing projects.

• Experience and accomplishments in strategic and tactical planning and in collaborative execution of the plans.

• Ability to **balance competing interests with available resources** and establish clear priorities and focus.

• Demonstrated **record of effective management and leadership** in the following areas: financial management, facilities and operational management (safety, security, environment), and personnel management.

• Demonstrated **effective interpersonal skills**, including uncompromising honesty and integrity; and ability to earn the respect of subordinates, supervisors, peers, and customers.

• Record of effective two-way written and oral communications skills, as evidenced by internal and external interactions, including briefings, presentations, publications, and meetings.
Desired Qualifications

- Research experience with DOE/NNSA laboratories and US Universities.
- Knowledge of national and international programs of relevance to the Center’s activities.
- Ability to obtain and maintain a DOE Q clearance, which generally requires U.S. citizenship.
Search details

- Screening Committee Chair: Sergei Tretiak, (CNLS Executive Committee, T-1)
  - Gowri Srinivasan (P), Jennifer Hollingsworth (CNLS EC, MPA-CINT), Sandrasegaram Gnanakaran (CNLS EC, T-6), Alan Bishop (DDSTE), Bill Daughton (XTD), Vanessa Gonzales (CNLS), David Campbell (Boston University)

- HR Generalist: Melanie Vigil
- Talent Acquisition Specialist: Lorna Hall
- Final Candidate Interviews: Marianne Francois (T), Dave Clark (NSEC)
- Hiring Official: Irene Qualters (ALDSC)
Priorities

• Candidates drawn from a Diverse qualified pool:
  – internal/external candidates; a range of relevant disciplines represented among candidates; gender/cultural diversity

• Ability to execute the Center Mission:
  – Identifies and studies fundamental complex nonlinear research challenges
  – Promotes use of results in applied research
  – Stimulates interdisciplinary approaches to nonlinear research
  – Facilitates intellectual interchange with external centers of excellence

• Function as an NSEC Center, residence within T division, and funding through (LDRD)
  – A robust and diverse postdoctoral fellowships that pairs postdoctoral fellows with laboratory staff
  – A large visitors program (~200 visitors/year from academia and industry).
  – Active colloquium and seminar series
  – Organization of international conferences that explore science at the interfaces
  – The Ulam Scholar program that hosts long term (sabbatical) visitors at CNLS
  – A graduate student program during the calendar year (typically PhD students) and a summer student program that hosts HS, UG and Graduate students from New Mexico and elsewhere.

• Thrust priorities may naturally change as part of new leadership