Advanced Materials: Development & Analysis Research

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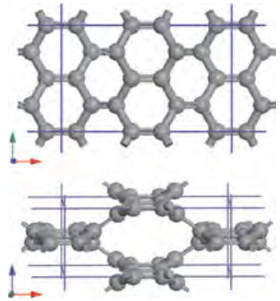
Theoretical and Computational Condensed Matter and Materials Physics

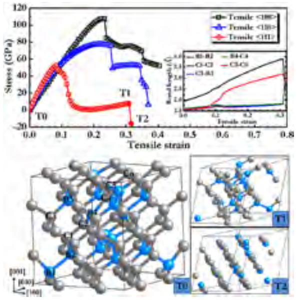
Dr. Changfeng Chen
Department of Physics and Astronomy
Phone: 702-895-4230
Email: chen@physics.unlv.edu

Expertise

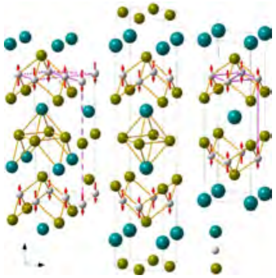
- Novel states of matter: topological insulators and semimetals
- Superior bonding structures: superhard and supertough materials
- Intriguing quantum phenomena: superconductivity and magnetism
- Extreme mechanics: stress responses to complex large strains
- Ultimate thermodynamics: materials inside Earth and other planets



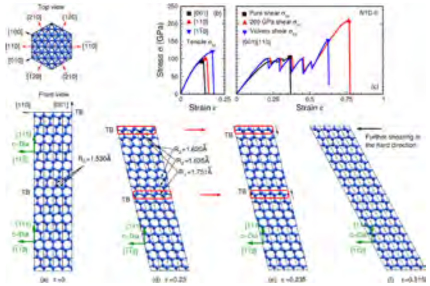
Nodal-ring Dirac semimetal states identified in bco-C_{16} crystal [Wang, Weng, Nie, Fang, Kawazoe, Chen, ***Phys. Rev. Lett.*** 116, 195501 (2016)].



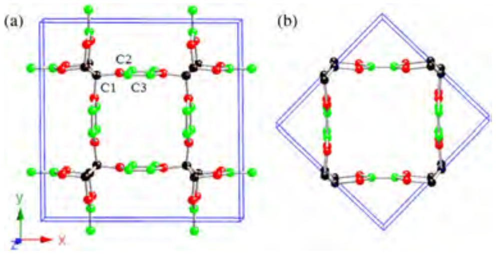
Superhard B_3C in diamond structure [Zhang, et al., ***Phys. Rev. Lett.*** 114, 015502 (2015)].



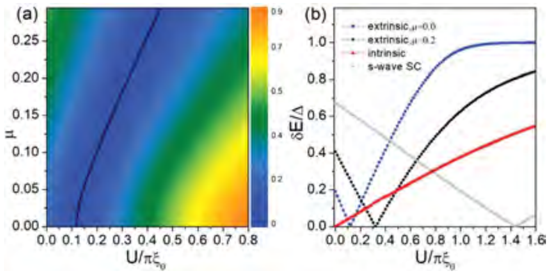
Magnetic Dirac materials $CaMnBi_2$ and $SrMnBi_2$ [Zhang, et al., ***Nature Commun.*** 7, 13833 (2016)].



Extreme mechanics of nanotwinned diamond [Li, Sun, Chen, ***Phys. Rev. Lett.*** 117, 116103 (2016)].

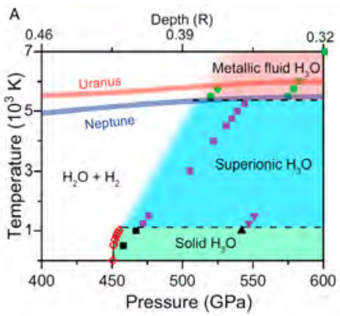


Nodal-net Dirac semimetal states in a graphene network structure [Wang, Nie, Weng, Kawazoe, Chen, ***Phys. Rev. Lett.*** 120, 026402 (2018)].

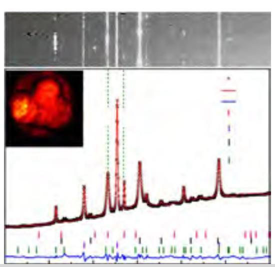


Kondo physics in 2D topological superconductors [Wang, et al., ***Phys. Rev. Lett.*** 122, 087001 (2019)].

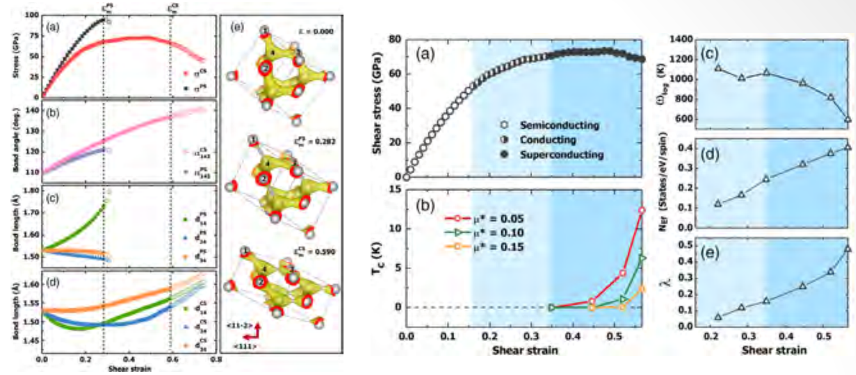
Helium-bearing compound FeO_2He predicted to stabilize at deep-Earth conditions [Zhang, et al., ***Phys. Rev. Lett.*** 121, 255703 (2018)].



Prediction of novel H_3O and implications for the magnetic fields of Uranus and Neptune [Huang, et al., ***Proc. Natl. Acad. Sci.*** 117, 5638 (2020)].



Pressure-stabilized divalent ozonide CaO_3 and its
impact on Earth's oxygen cycles [Wang, et al., ***Nature Commun.*** 11, 4702 (2020)].



Metallization and superconductivity in diamond [Liu, et al., ***Phys. Rev. Lett.*** 123, 195504 (2019); ***Phys. Rev. Lett.*** 124, 147001 (2020)].

Further Reading (selected papers by Chen Group, 2015-2020)

Anomalous Stress Response of Ultrahard WB_n Compounds, Li, Zhou, Zheng, Ma, Chen, ***Phys. Rev. Lett.*** 115, 185502 (2015).

Ultralow-Frequency Collective Compression Mode and Strong Interlayer Coupling in Multilayer Black Phosphorus, Dong, et al., ***Phys. Rev. Lett.*** 116, 087401 (2016).

Extraordinary Indentation Strain Stiffening Produces Superhard Tungsten Nitrides, Lu, Li, Ma, Chen, ***Phys. Rev. Lett.*** 119, 115503 (2017).

Xenon iron oxides predicted as potential Xe hosts in Earth's lower mantle, Peng, Song, Liu, Li, Miao, Chen, Ma, ***Nature Commun.*** 11, 5227 (2020).

Electronic and Magnetic Properties at High Pressure

Dr. Andrew Cornelius
Department of Physics & Astronomy
Phone (702) 895-1727

Expertise:

- Experimental high pressure measurements
- Magnetism
- Superconductivity

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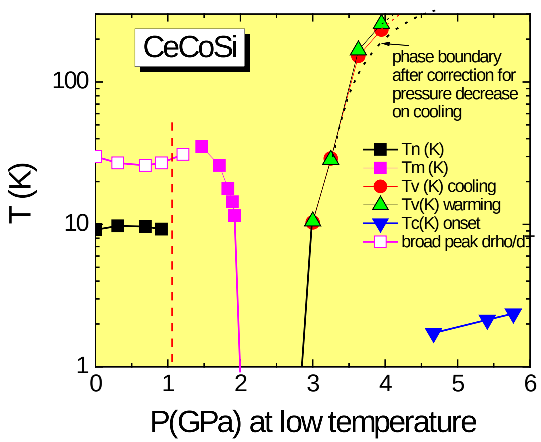
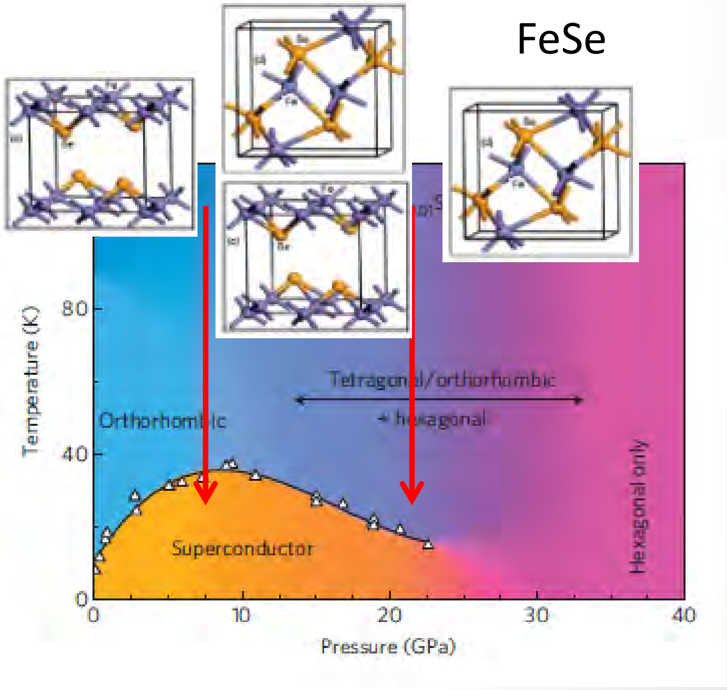
Superconductivity

Quantum Design PPMS at UNLV

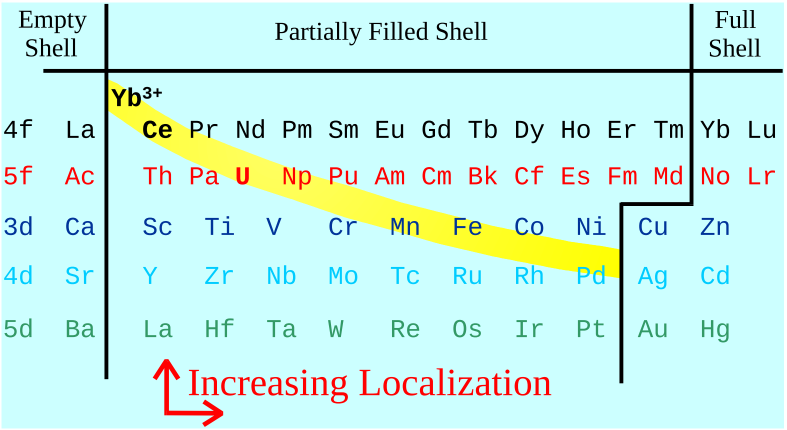
- Measurements from 0.3 K to 400 K
    - Heat capacity, electric and thermal transport, and AC/DC magnetization
- Pressure cells to measure electrical properties (clamp to 3 GPa and diamond anvil cell to >100 GPa)



Addition of high pressure synchrotron experiments (diffraction and X-ray absorption) allows mapping of complex superconducting phase diagrams

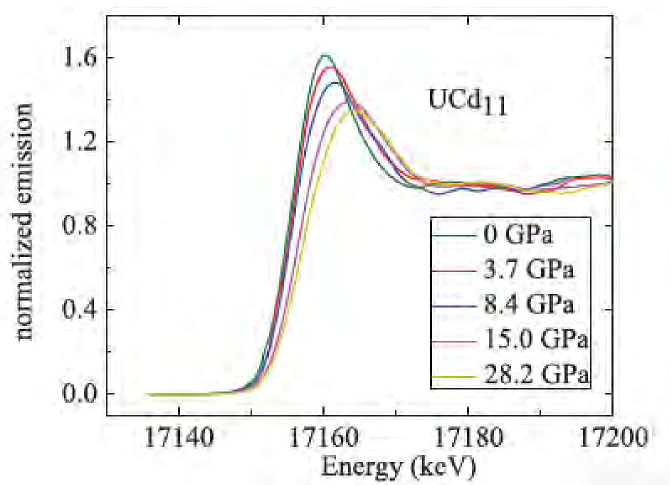


Correlated-Electron Systems

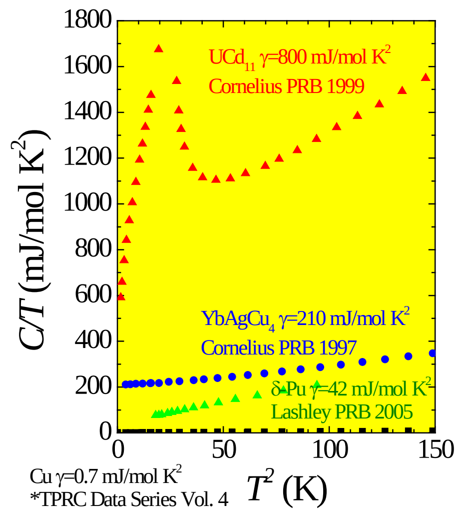


Modified periodic table

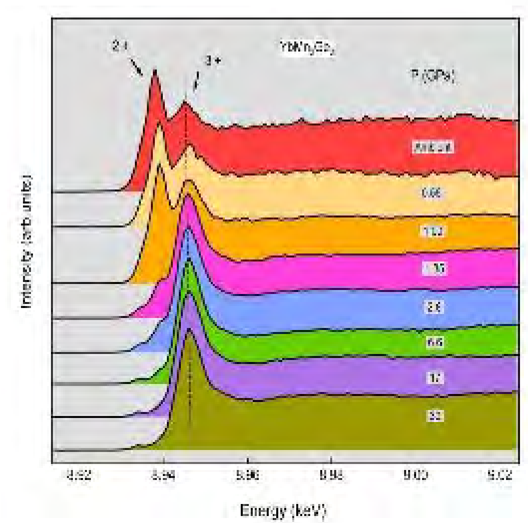
- Going from localized to delocalized electrons one often finds strong electron-electron correlations
- Correlated electron systems can yield interesting behavior: fluctuating valence, superconductivity, non-Fermi liquid, heavy fermion and many more



f-electron delocalization
X-ray absorption



Heavy fermions
Heat Capacity



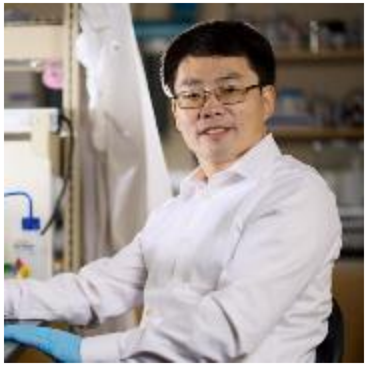
Fluctuating valence
X-ray fluorescence

Electrochemistry for Energy Storage, Environmental Remediation, and Biomedical Applications

- **Dr. Zhange Feng**
- Assistant Professor
- Department of Chemistry & Biochemistry
- Email: zhange.feng@unlv.edu
- Website: https://zfeng.faculty.unlv.edu/

Expertise

- Water and soil remediation
- Rechargeable batteries
- Electrocatalysis
- Electrosynthesis
- Electrochemical Manufacturing
- Electrical neural stimulation



A combination of electrochemistry, *in situ* spectroscopy, and theoretical calculations to study electrified interfaces

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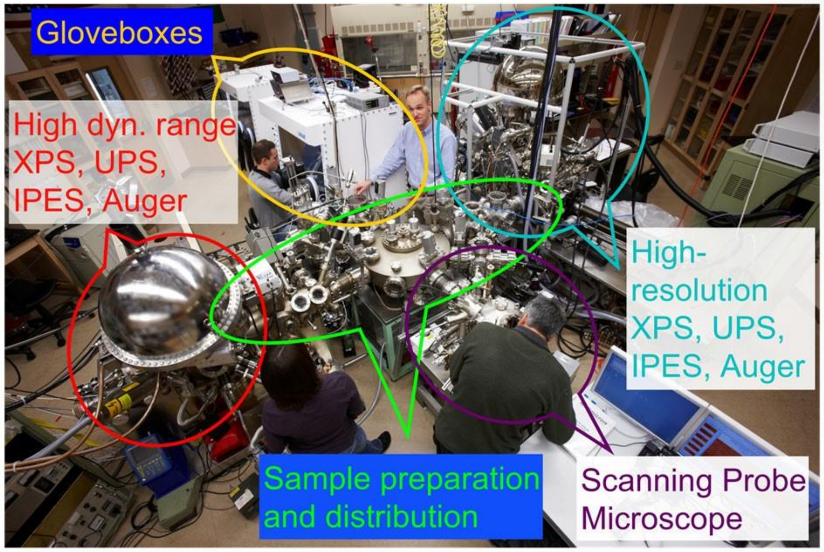
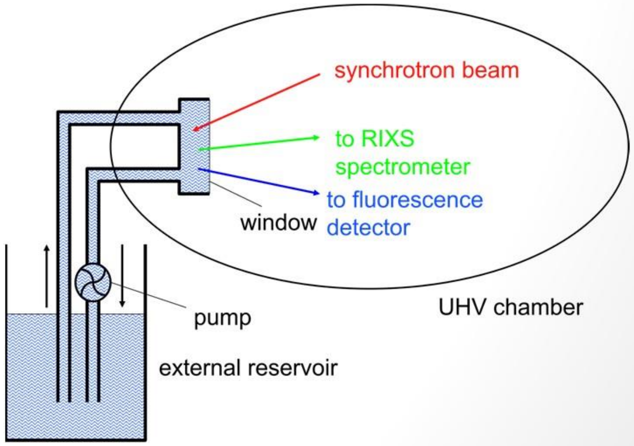
Surface and Interface Characterization of Materials for Energy Conversion

- **Dr. Clemens Heske**
- Professor
- Department of Chemistry and Biochemistry
- Email: heske@unlv.nevada.edu
- Website: https://heske.faculty.unlv.edu//



Expertise

- Electronic and Chemical Structure of Energy-Conversion Materials
- Surface and Interface Characterization
- Soft x-ray and Electron Spectroscopy
- Scanning Probe Microscopy
- Synchrotron Radiation



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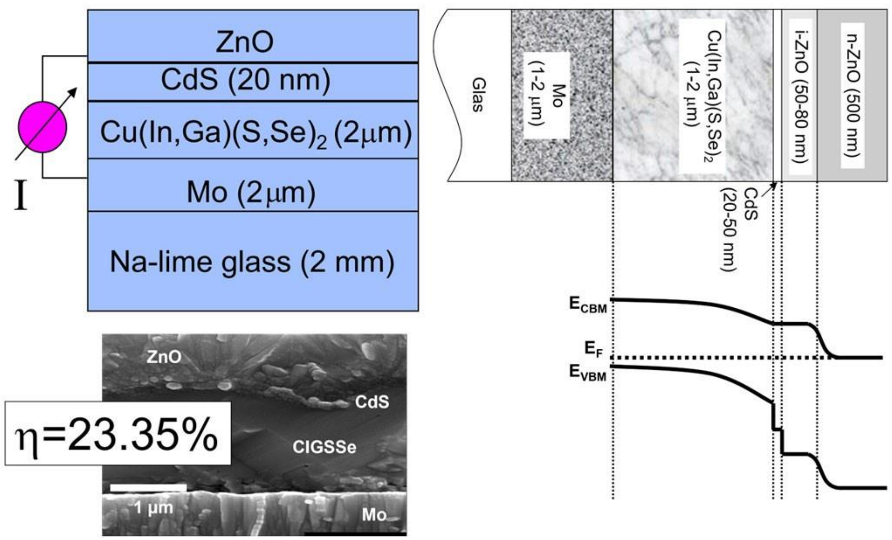
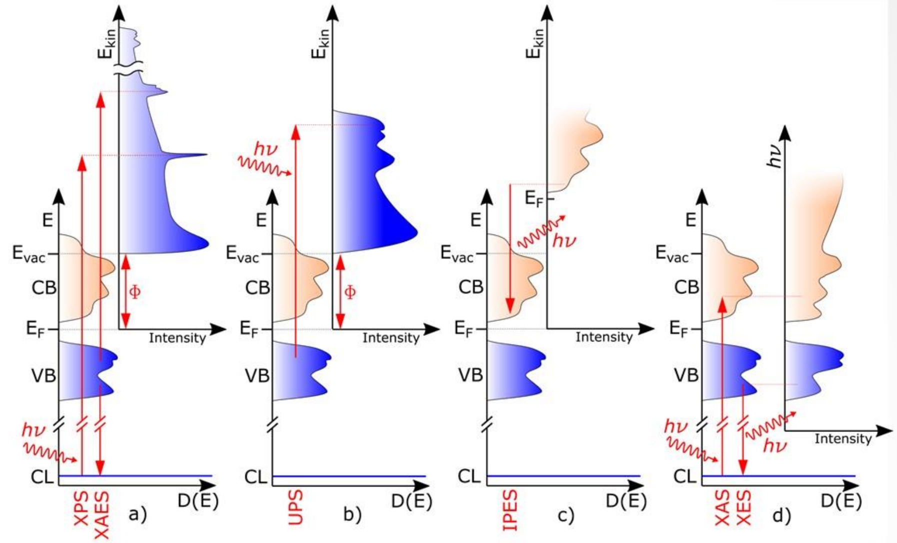
Surface and Interface Characterization of Materials for Energy Conversion

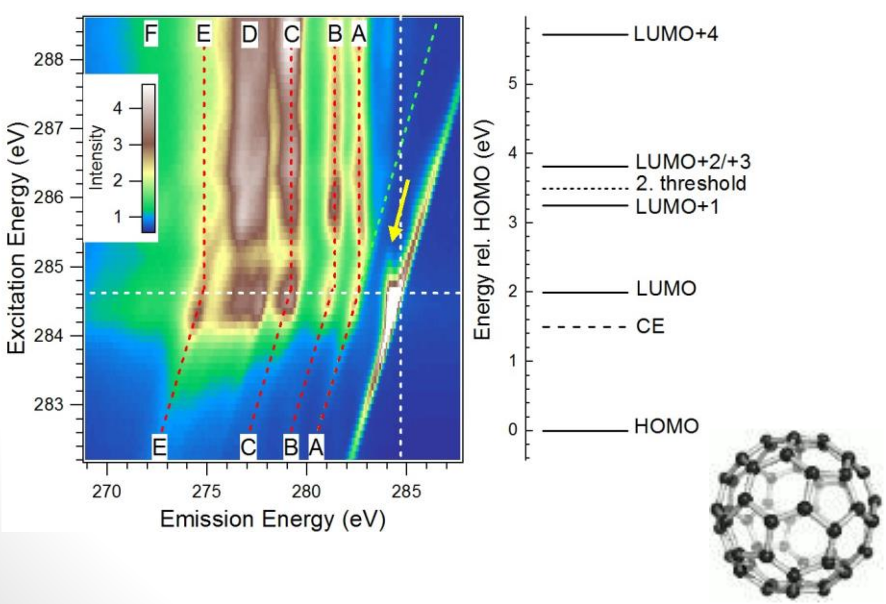
Cu(In,Ga)(S,Se)$_2$ Thin-Film PV Device



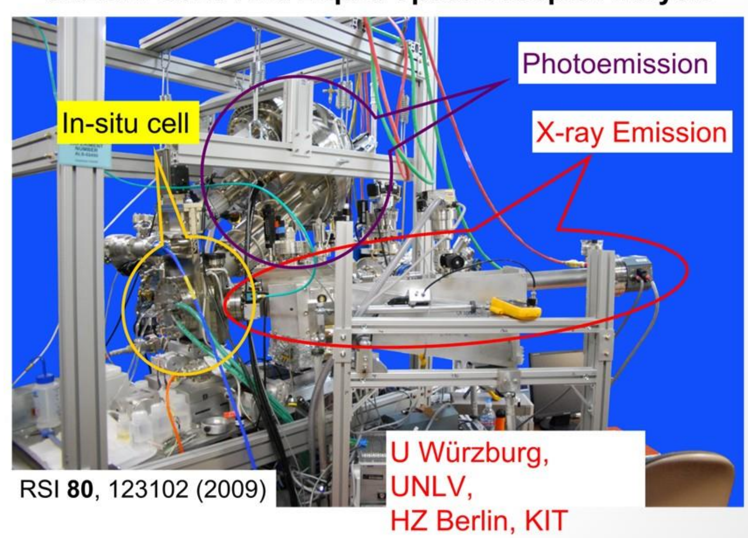
Method development



Electronic structure of C$_{60}$



SALSA: Solid And Liquid Spectroscopic Analysis



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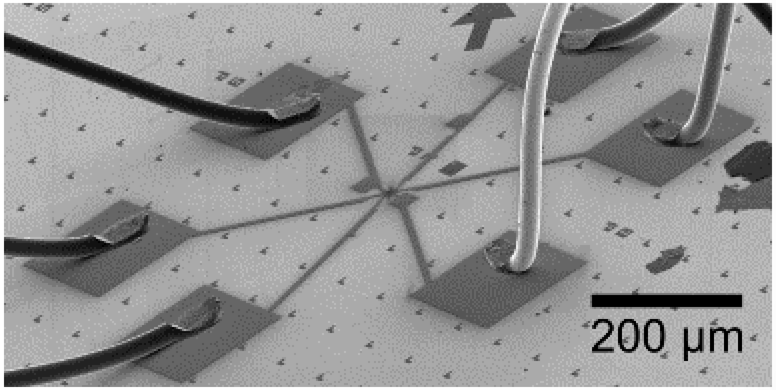
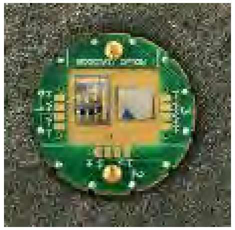
Island – Quantum computing, quantum sensing

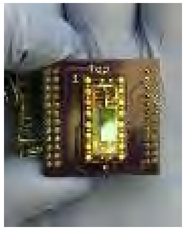
The Nanoscale Physics Group @ UNLV

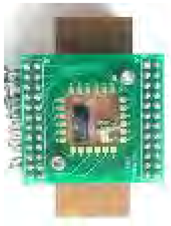
Areas of Research

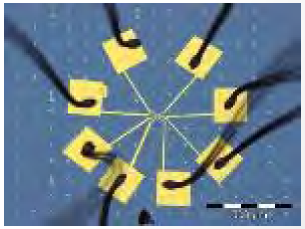
- Nanotechnology, device physics
- Photodetection and quantum sensing
- Quantum computing, topological qubits
- Non-equilibrium, driven systems
- Superconductivity, proximity effects
- Low dimensional materials











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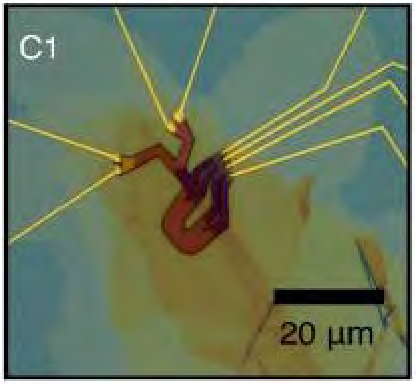
[Island's Lab website]

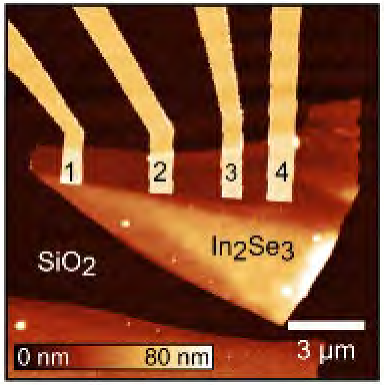
Island – Quantum computing, quantum sensing

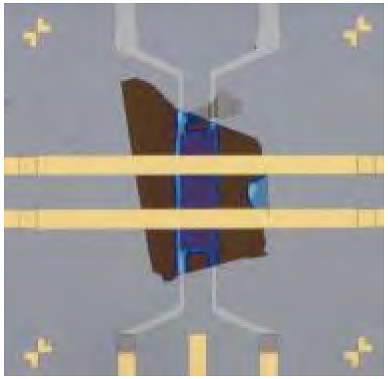
Quantum computing: Topological phases for fault-tolerant, universal quantum computing.

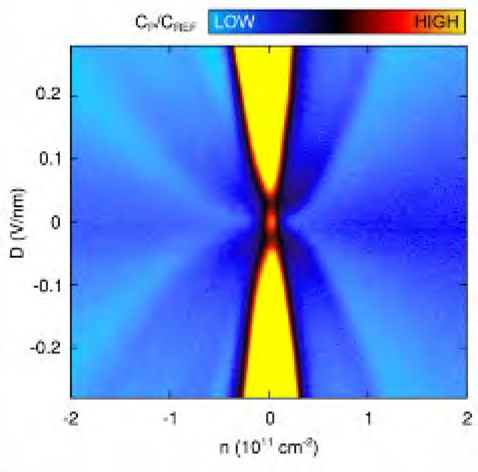
Industry-disruptive photodetectors: Ultra-sensitive phototransistors designed with 2D materials and heterostructures.

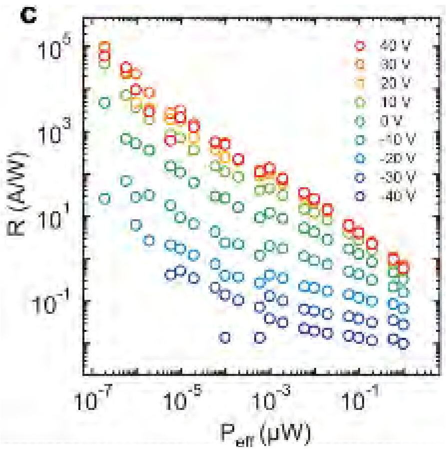
Transient phases of driven systems: Non-equilibrium response of pumped nanomaterials below the diffraction limit.

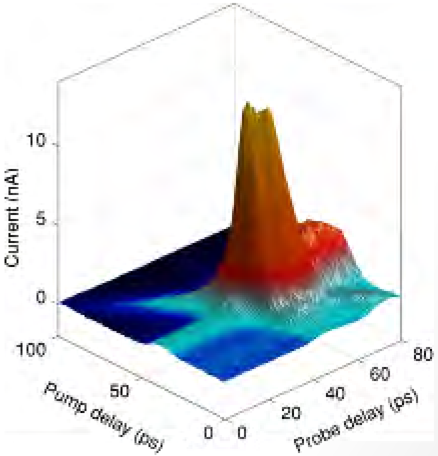












Island, J. O., et al. *Nature* **571** (2019): 85–89.

Island, J. O., et al. *Nano Letters* **15** (2015): 7853-7858.

Island's Lab website

Island – Quantum computing, quantum sensing

Journal publications:

Spin-orbit-driven band inversion in bilayer graphene by van der Waals proximity effect
J.O. Island, X. Cui, C. Lewandowski, J.Y. Khoo, E.M. Spanton, H. Zhou, D. Rhodes, J.C. Hone, T. Taniguchi, K. Watanabe, L.S. Levitov, M.P. Zaletel, A.F. Young, Nature, **571**, 85-89 (2019). (arXiv)

Enhanced superconductivity in atomically thin TaS2
E. Navano-Moiatalla*, J.O. Island*, S. Manas-Valero, E. Pinilla-Cienfuegos, A. Castellanos-Gomez, J. Queieda, G. Rubio- Bollinger, L. Chirolli, J.A. Silva-Guilin, N. Agrat, G.A. Steele, F. Guinea, H.S.J. van der Zant, E. Coronado, Nature Communications, **15**, 7853 (2016). (arXiv)

Proximity-induced Shiba states in a molecular junction
J. O. Island, R. Gaudenzi, J. de Bruijckere, E. Burzuri, C. Franco, M. Mas-Torrent, C. Rovira, J. Veciana, T. M. Klapwijk, R. Aguado, H.S.J. van der Zant, Physical Review Letters, **118**, 117001 (2017). (arXiv)

T1S3 transistors with tailored morphology and electrical properties
J.O. Island, M. Barawi, R. Biele, A. Almazan, J.M. Clamagirand, J.R. Ares, C. Sanchez, H.S.J. van der Zant, J.V. Alvarez, R. D'Agosta, I.J. Ferrer, A. Castellanos-Gomez, Advanced Materials, **27**, 2595 (2015). (arXiv)

Environmental instability of few-layer black phosphorus
J.O. Island, G.A. Steele. H.S.J. van der Zant, and A. Castellanos-Gomez, 2D Materials, **2**, 011002 (2015). (arXiv)

Ultrahigh photoresponse of few-layer TiS3 nanoribbon transistors
J.O. Island, M. Buscema, M. Barawi, J.M. Clamagirand. J.R. Ares, C. Sanchez, I.J. Ferrer, G.A. Steele, H.S. J van der Zant, and A. Castellanos-Gomez, Advanced Optical Materials, **2**, 641 (2014). (arXiv)

Gate controlled photocurrent generation mechanisms in high-gain ln2Se3 phototransistors
J.O. Island*, S.I. Blanter*, M. Buscema, H.S.J. van der Zant, and A. Castellanos-Gomez, Nano Letters, **15**, 7853(2015). (arXiv)

Precise and reversible band gap tuning In single-layer MoSe2 by uniaxial strain
J.O. Island, A. Kuc, E.U. Diependaal, H.S.J. van der Zant, T. Heine, and A. Castellanos- Gomez, Nanoscale, **8,** 2589 (2016). (arXiv)

Island's Lab website

Main-Group and Organometallic Chemistry

- **Dr. Arumugam Jayaraman**
- Assistant Professor, Inorganic Chemistry
- Department of Chemistry and Biochemistry
- Email: arumugam.jayaraman@unlv.edu
- Website: https://jayaramangroup.faculty.unlv.edu/

Expertise

- Chemistry of Low-valent Boron, Carbon and Phosphorus Compounds
- Antiaromatic and Aromatic Main-Group Heterocyclic Materials
- Sustainable Transformation of Burnt Fossil Fuels to Chemical Feedstock
- Green Catalysis and Technology Transfer to Fine-Chemical Industry
- Synthetic Inorganic Antibiotics
- Computational Organometallic Chemistry of *p*- and *d*-block compounds
- Single-Crystal X-ray Crystallography

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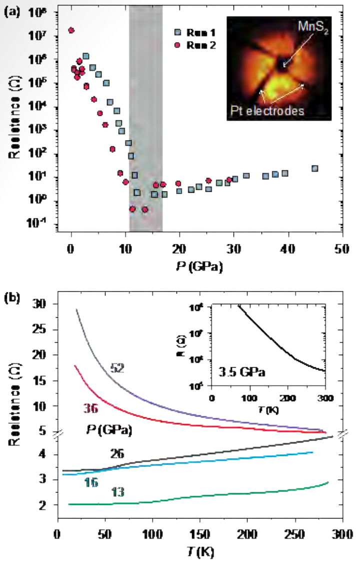
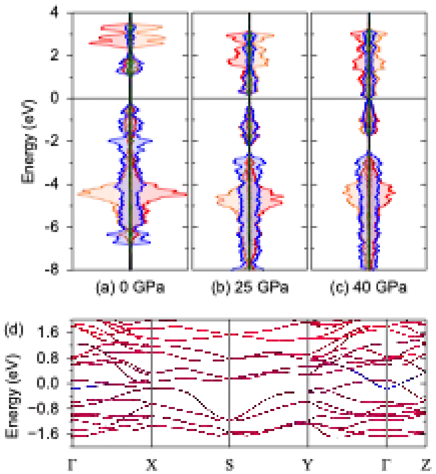
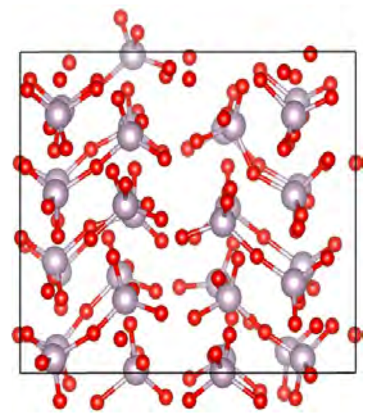
Selected Publications

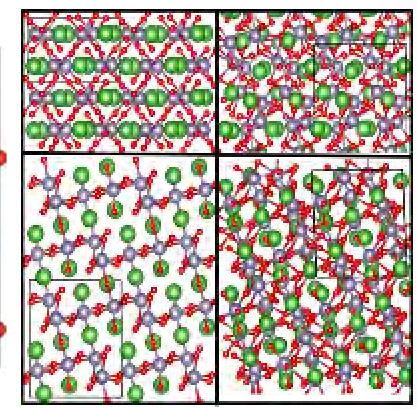
1) *Olefin π-coordination chemistry at low-oxidation-state boron*, M. Michel, M. Weber, A. Jayaraman, R. D. Dewhurst, I. Krummenacher, C. Voigt, M. Härterich, A. Vargas, H. Braunschweig, Nature Chem., 2025, in press.
2) *Formation and metallomimetic reactivity of a transient dicoordinate alkylborylene*, Y. Konrad, A. Jayaraman, I. Krummenacher, H. Braunschweig, Angew. Chem. Int. Ed., 2025, e202423669
3) *Straightforward formation of borirenes from boroles and dialkynes*, P. H. R. Oliveira, M. O. Rodrigues, C. D. G. Da Silva, J. L. Bohlen, M. Arrowsmith, A. Jayaraman, L .Lubczyk, F. Fantuzzi, E. N. da Silva Júnior, H. Braunschweig, Angew. Chem. Int. Ed., 2025, e202423391
4) *Intermolecular 1,2-aminoboration of alkynes and the critical role of electron-rich alkynes*, S. Dotzauer, A. Jayaraman, D. Reinhart, H. Braunschweig, Angew. Chem. Int. Ed., 2024, 63, e202413370
5) *Experimental observation of a terminal borylene-dinitrogen adduct via cleavage of a 1,2,3,4,5-diboratriazoline* A. Jayaraman, B. Ritschel, M. Arrowsmith, C. Markl, M. Jürgensen, A. Halkić, Y. Konrad, A. Stoy, K. Radacki, H. Braunschweig, Angew. Chem. Int. Ed., 2024, 63, e202412307
6) *Full electron delocalization across the cluster in 1,12-bis $BMes_2$-p-carborane radical anion*, L. Wu, X. Zhang, M. Moos, I. Krummenacher, M. Dietz, A. Jayaraman, R. Bertermann, Q. Ye, M. Finze, C. Lambert, H. Braunschweig, L. Ji, J. Am. Chem. Soc., 2024, 146, 17956–17963
7) *An unsymmetrical, cyclic diborene based on a chelating CAAC ligand and its small-molecule activation and rearrangement chemistry*, W. Lu, A. Jayaraman, F. Fantuzzi, R. D. Dewhurst, M. Härterich, M. Dietz, S. Hagspiel, I. Krummenacher, K. Hammond, J. Cui and H. Braunschweig, Angew. Chem. Int. Ed., 2022, 61, e202113947
8) *Palladium-catalyzed homocoupling of highly fluorinated arylboronates: studies of the influence of strongly vs weakly coordinating solvents on the reductive elimination process* Y. Budiman, A. Jayaraman, A. Friedrich, F. Kerner, U. Radius, T. B. Marder J. Am. Chem. Soc., 2020, 142, 6036–6050
9) *Practical and scalable synthesis of borylated heterocycles using stable precursor of metal-free Lewis pair catalysts*, A. Jayaraman, L. C. Misal Castro, F.-G. Fontaine, Org. Process Res. Dev., 2018, 22 (11), 1489–1499
10) *Metal-free borylation of heteroarenes using ambiphilic aminoboranes: on the importance of sterics in frustrated Lewis pair C-H bond activation*, J. L. Lavergne, A. Jayaraman, L. C. Misal Castro, É. Rochette, F.-G. Fontaine, J. Am. Chem. Soc., 2017, 139 (41), 14714-14723
11) *A potent synthetic inorganic antibiotic with activity against drug-resistant pathogens*, S. Hubick, A. Jayaraman, S. Reid, J. Alcorn, J. Stavrinides, B. T. Sterenberg, Sci. Rep. (Nature), 2017, 7, 41999



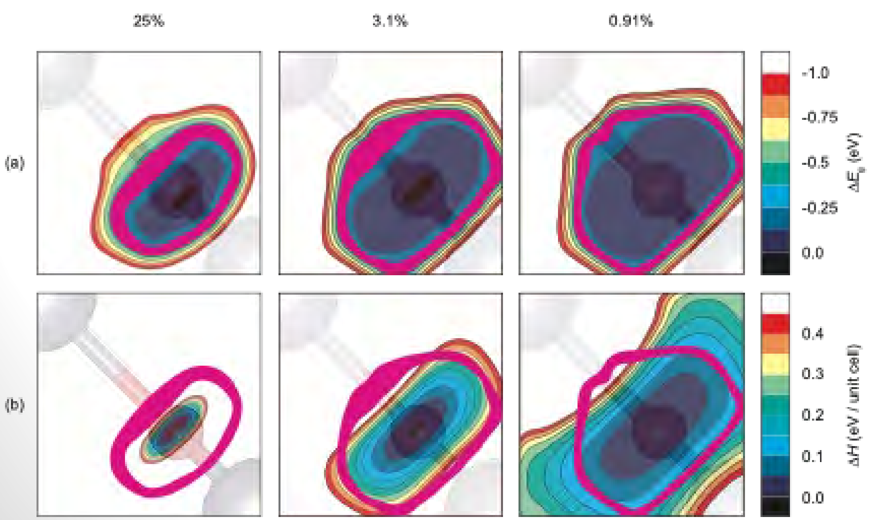


We primarily perform electronic structure simulations to understand pressure driven phenomenon particularly related to correlated electron systems and changes in bonding.



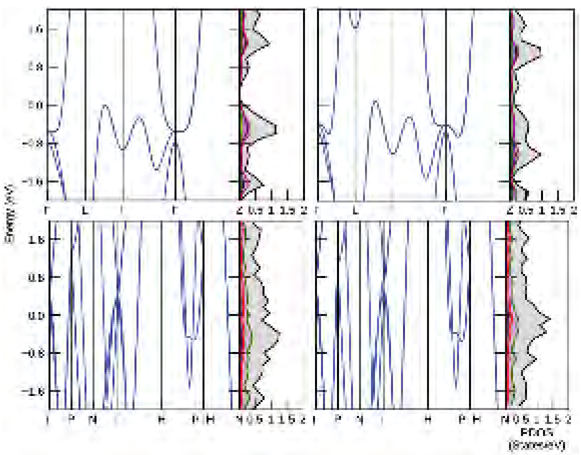


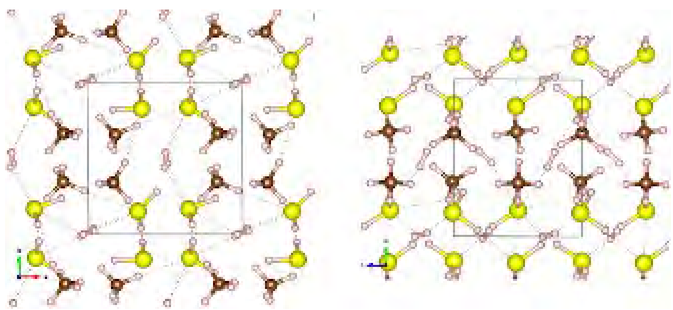
This includes molecular dynamics to understand the thermal behavior of materials and melts,

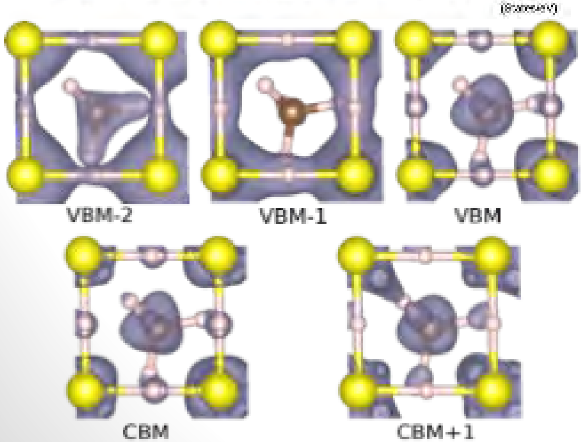


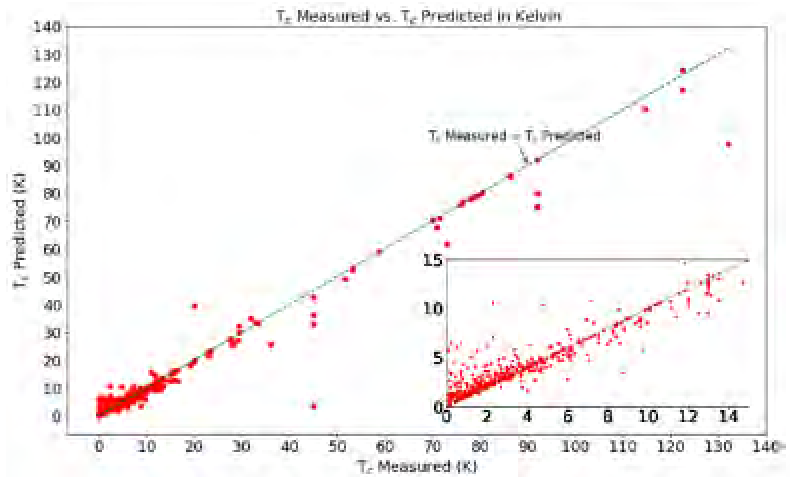
as well as crystal structure prediction and the electronic response to pressure driven perturbations in crystalline lattices.

Our group is also focused on understanding and predicting high temperature superconductivity in pressurized systems. As part of the team that reported room temperature superconductivity in a carbonaceous sulfur hydride system, we have been focused on understanding the molecular pathway to that system, the fundamental interactions driving its superconductivity, and building machine learning tools to predict such properties in new materials.









Scientific Computing and Mathematical Modeling

- **Dr. Jichun Li**
- Full Professor
- Department Mathematical Sciences
- Email: jichun.li@unlv.edu
- Website: http://faculty.unlv.edu/jichun/

Expertise

- Computational Electromagnetics: wave propagation in metamaterials, graphene, and other complex media.
- Develop, analyze, and implement various numerical methods for solving various Differential Equations (DEs) in sciences and engineering.
- Machine Learning; Math finance; Numerical Analysis.

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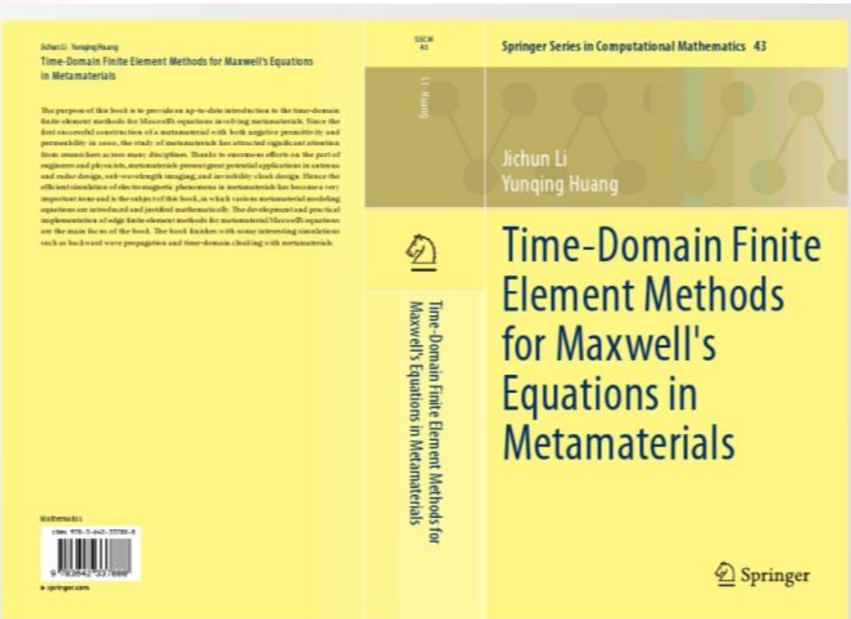
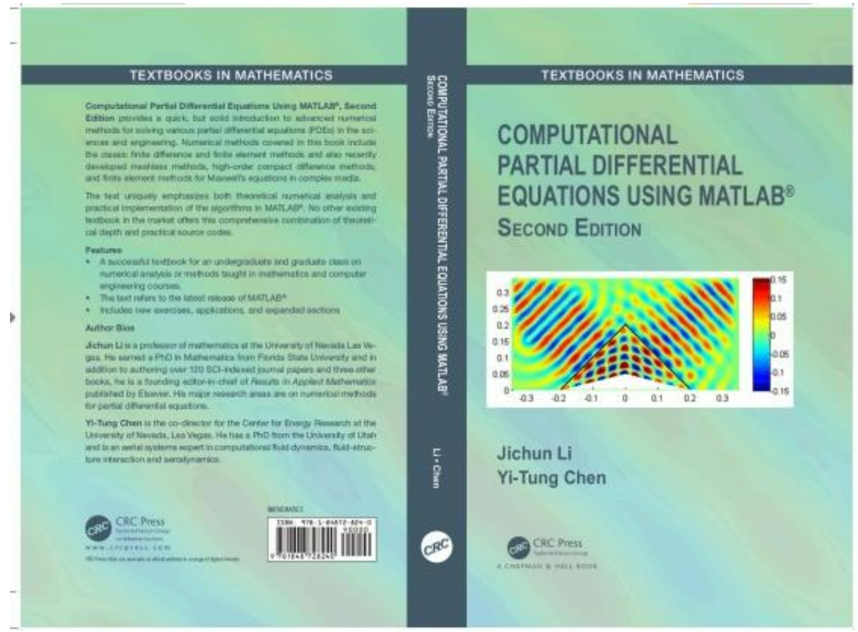
Published over 2 books, and over140 SCI papers





In 2023, ranked #1097 (out of total 1138) in United States and #2638 in the world in The 2nd edition of Research.com ranking of the best scholars in the arena of Mathematics: https://research.com/scientists-rankings/mathematics/

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Numerical methods for material science

- **Dr. Frederic Marazzato**
- Assistant Professor
- Department of Mathematical Sciences
- Email: frederic.marazzato@unlv.edu

Expertise

- **Numerical analysis (Finite element methods)**
- **Calculus of variations**
- **Structural engineering: fracture, nonlinear elasticity, plasticity, higher-order materials**
- **Mechanical metamaterials (origami)**

Novel chemistry and biology using highly ionizing radiation

Michael Pravica, Ph.D.
Professor of Physics
Department of Physics and Astronomy
Phone: (702)895-1723
Email: michael.Pravica@unlv.edu

Expertise:
Useful Hard X-ray photochemistry
High pressure
Spectroscopy
Ion Beam Nuclear Transmutation Doping
High quality synthesis of vaccines using tuned hard x-rays

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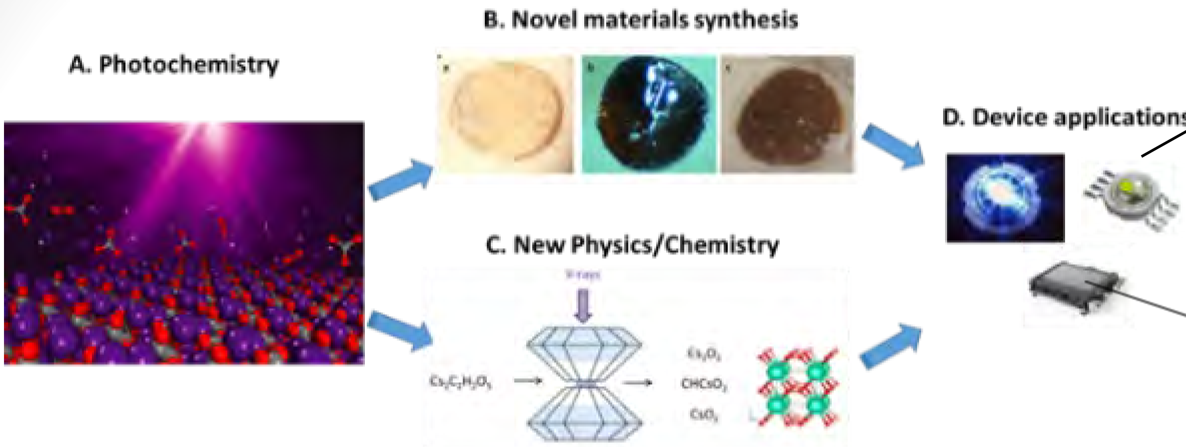
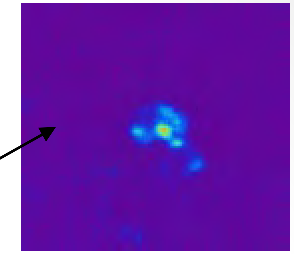
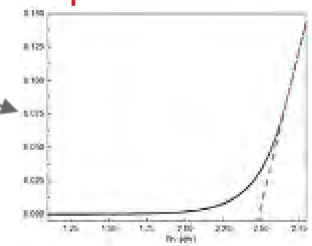
Pravica Group Research





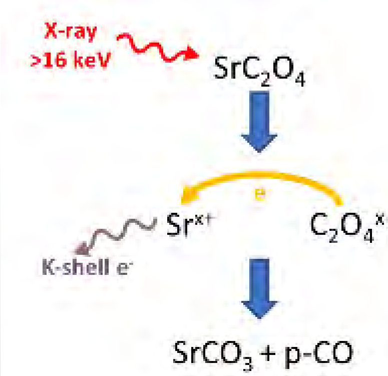
Optical mixer

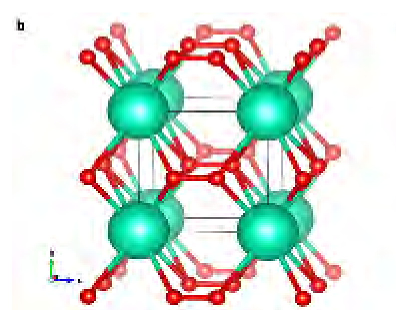


Wide bandgap semiconductor

Radiation-hardened sensors/direct energy conversion devices for EXTREME CONDITIONS or tuned solar materials

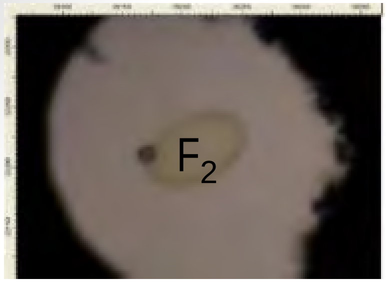
Useful hard x-ray photochemistry

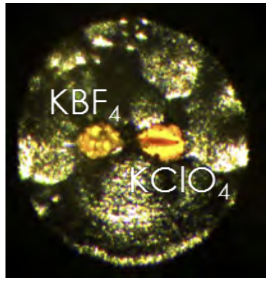




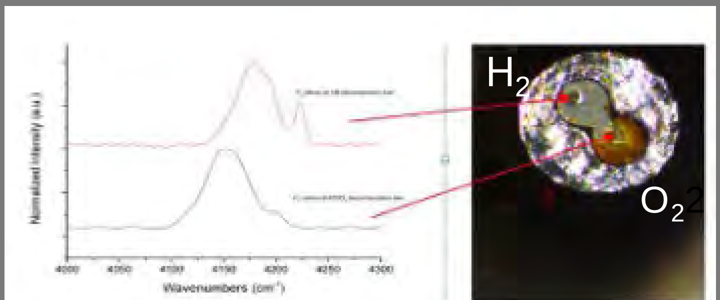
Novel structures of known materials produced
With hard x-rays and high pressure (e.g. CsO_2)

High Pressure Fluorine Chemistry



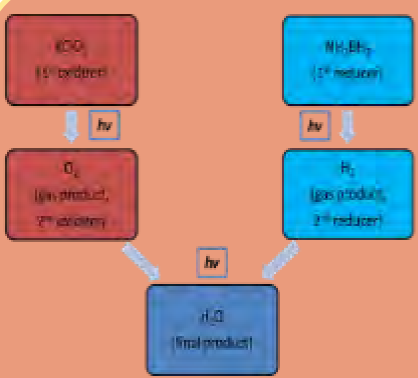


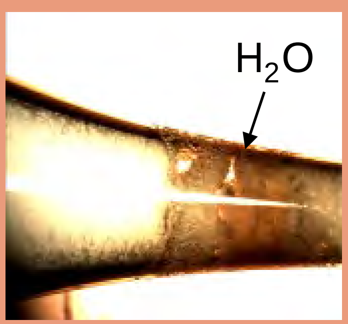
$$2F_2 + O_2 \xrightarrow{hv} 2OF_2 \text{ @ 3 GPa}$$



5 GPa

Molecular mixtures at high pressure



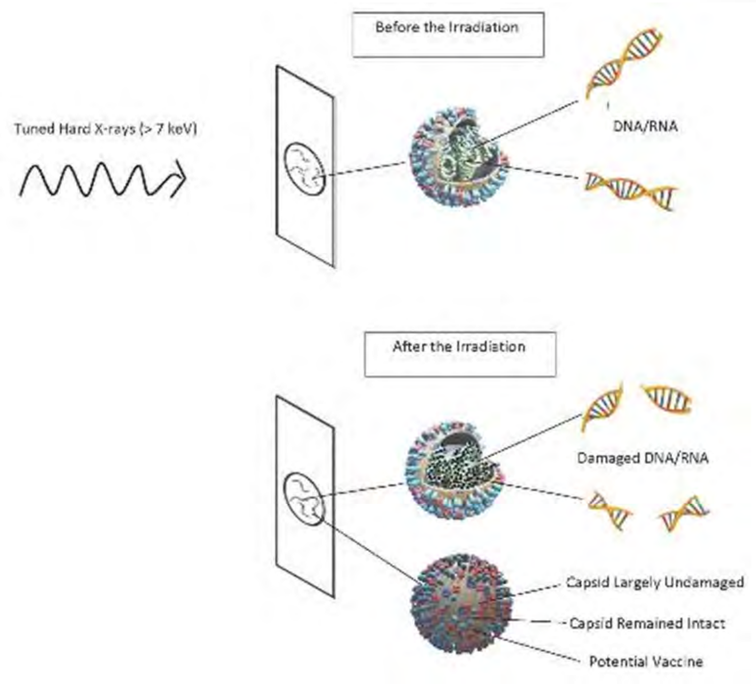


X-ray induced combustion

Inner shell chemistry at high pressure

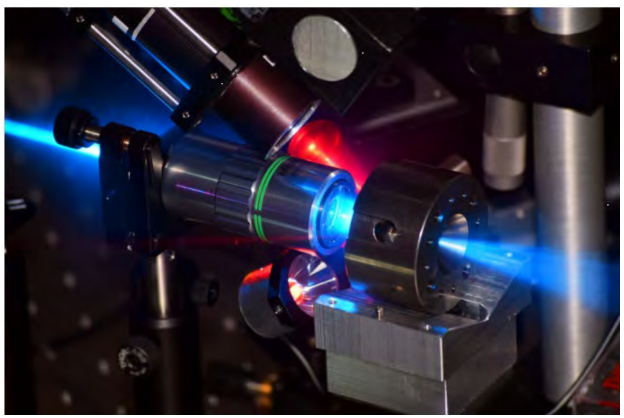
$XeF_2 \xrightarrow{hv} Xe + F_2$ (*in situ* x-ray fluorination)

$HgF_2 + F_2 \xrightarrow{hv} HgF_4$

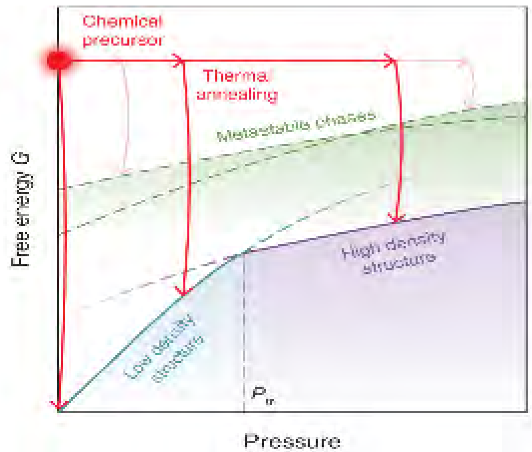


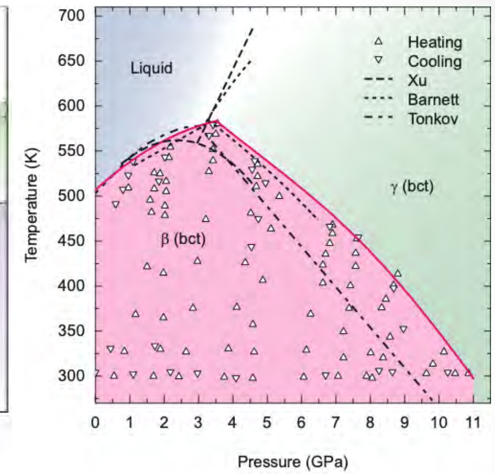
Using tuned hard x-rays to damage viruses to create high quality vaccines by targeting specific molecular groups/bonds that resonantly absorb x-ray energy leading to decomposition chemistry.

Salamat Group – Collaboration with MSTS

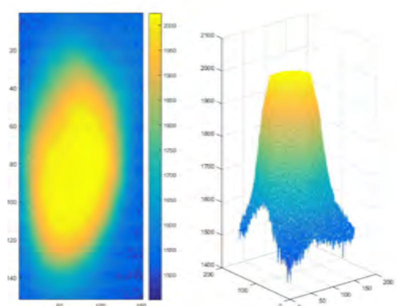


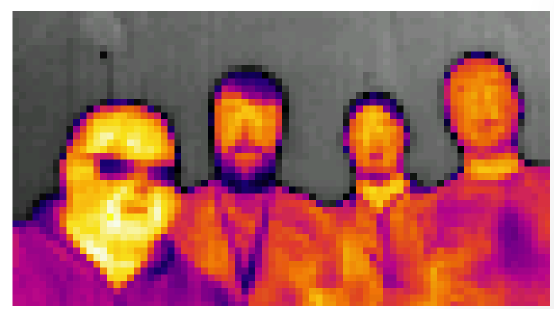
Metrology – accurate mapping of P, V, T



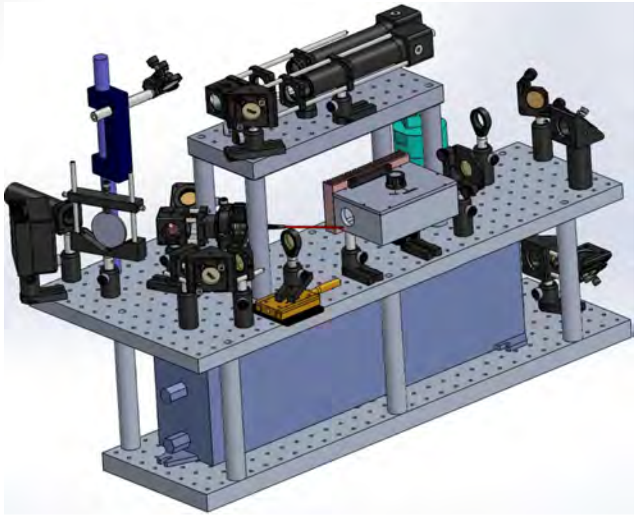


High temperature modelling – understanding emissivity under extreme conditions



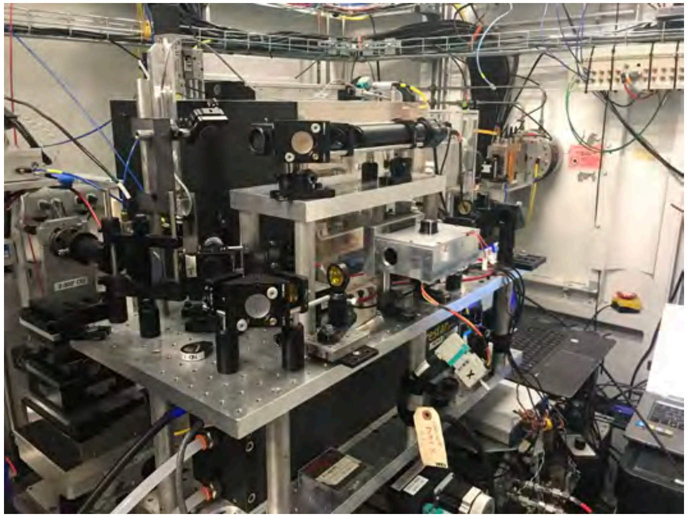


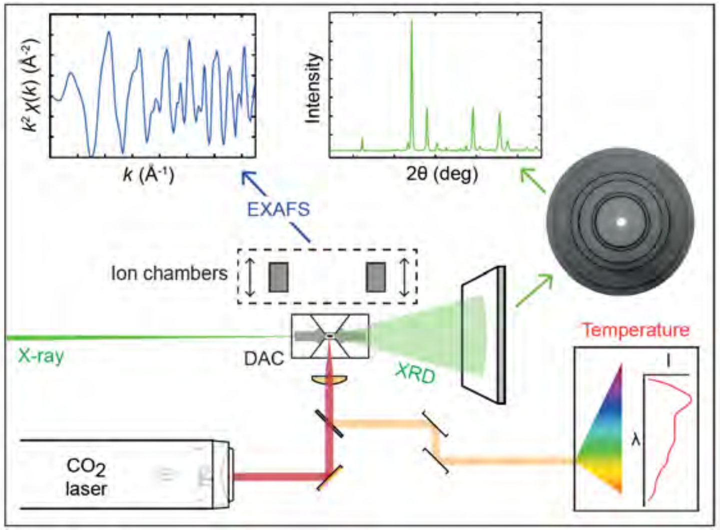
Warm dense matter – probed using EXAFS



- Development of a CO_2 laser heating
- Direct heating of non-metallic systems in a DAC
- First HTHP EXAFS measurements of insulators

- In situ and post heating measurements
- Determining absolute temperature from X-ray spectroscopy





Publications

(1) D. Smith, D. Sneed, N. Dasenbrock-Gammon, E. Snider, G. A. Smith, C. Childs, J. S. Pigott, N. Velisavljevic, C. Park, K. V. Lawler, R. P Dias, A. Salamat*, Anomalous Conductivity in the Rutile Structure Driven by Local Disorder The Journal of Physical Chemistry Letters 10 18 5351-5356 (2019)
(2) J. Kearney M. Grauzinyte D. Smith A. Gulans D. Sneed C. Childs, J. Hinton C. Park J. S. Smith, E. Kim, S. D. S. Fitch, A. L. Hector, C. J. Pickard J. A. Flores-Livas, A. Salamat*, Pressure tuneable visible range band gap in the ionic spinel tin nitride Angewandte Chemie International Edition, 57, 11623-11628 (2018)
(3) C. Childs, K. V. Lawler, A. L. Hector, S. Petitgirard, O. Noked, J. S. Smith, D. Daisenberger, L. Bezacier, M. Jura, C. J Pickard, A. Salamat*, Covalency is Frustrating: $La_2Sn_2O_7$ and the Nature of Bonding in Pyrochlores under High Pressure Temperature Conditions Inorganic chemistry, 57, 15051-15061, (2018)
(4) D. Smith, K. V. Lawler, M. Martinez-Canales, A. W. Daykin, Z. Fussell, G. A. Smith, C. Childs, J. S. Smith, C. J. Pickard, and A. Salamat*, Postaragonite phases of $CaCO_3$ at lower mantle pressures Physical Review M 2, 013605 (2018)
(5) D. Smith, J. S. Smith, C. Childs, E. Rod, R. Hrubiak, G. Shen, A. Salamat*, A CO_2 laser heating system for in situ high pressure-temperature experiments at HPCAT Review of Scientific Instruments 89, 083901 (2018)
(6) R. Briggs, D. Daisenberger, O. T. Lord, A. Salamat, E. Bailey, M. J. Walter, P. F. McMillan*, High-pressure melting behavior of tin up to 105 GPa Physical Review B 95, 054102 (2017)
(7) M. Zaghoo, A. Salamat, I. F. Silvera*, A first order phase transition to metallic hydrogen. Physical Review B 93, 155128 (2016)
(8) A. Salamat*, R. Fischer, R. Briggs, M. I. McMahon, S. Petitgirard, In situ synchrotron X-ray diffraction in the laser heated diamond anvil cell: melting phenomena and synthesis of new materials. Coordination Chemistry Reviews 277-278, 15 (2014)

Research Oliver Tschauner

- **Dr. Oliver Tschauner**
- Professor of Research
- Department Geoscience
- Email: oliver.Tschauner@unlv.edu
- Website: https://geoscience.unlv.edu/people/department-faculty/oliver-tschauner/

Natural diamond with CO_2 inclusions at a pressure of 20000 atmospheres

Expertise

- Crystallography.
- Mineralogy.
- Physics and Chemistry at high pressure.
- Dynamic compression.

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Selected Publications

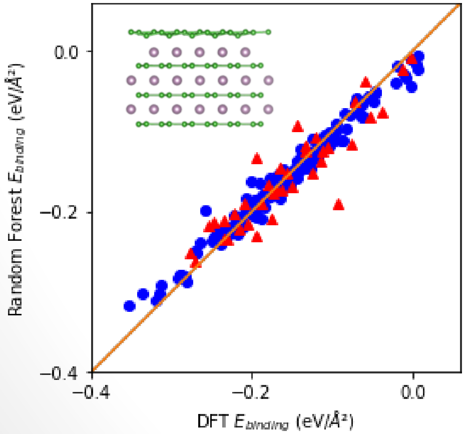
- Discovery of davemaoite, $CaSiO_3$-perovskite as a mineral from the lower mantle. O. Tschauner, S. Huang, S. Yang, M. Humayun, W. Liu, S. N. Gilbert Corder, H. A. Bechtel, J. Tischler, G. R. Rossman, **Science** 374, 891-894 (2021).
- Ice-VII inclusions in diamonds – evidence for aqueous fluid in the Earth's deep mantle O. Tschauner, S. Huang, E. Greenberg, V.B. Prakapenka, C. Ma , G. R. Rossman, A.H. Shen, M. Newville, A. Lanzirotti, K. Tait, **Science** 359, Issue: 6380, 1136 (2018) 10.1126/science.aao3030.
- Discovery of Bridgmanite – the most abundant mineral in Earth, in a shocked meteorite, O. Tschauner, C. Ma, J. Beckett, C. Prescher, V. Prakapenka, G.Rossman, **Science** 346, 1100 (2014), DOI: 10.1126/science.1259369
- Is merrillite shock-transformed whitlockite? Implications for the water budget of Mars, C. Adcock, O. Tschauner. E. Hausrath, A. Udry, Y. Cai, S.N. Luo, **Nature Communications** 8, Article Number: 14667 (2017).
- Tissintite (Ca, Na, ☐) $AlSi_2O_6$, a Highly Defective, Shock-Induced, High-Pressure Pyroxene in the Tissint Martian Meteorite. Chi Ma, Oliver Tschauner, John Beckett, Yang Liu, George Rossman, Kirill Zuravlev, Vasili Prakapenka, Przemyslav Dera and Lawrence A. Taylor, **Earth Planet. Sci. Lett.** 422,194-205 (2015).
- Ahrensite, gamma-Fe_2SiO_4, a new shock-metamorphic mineral from the Tissint meteorite: Implications for the Tissint shock event on Mars. Ma, C. ; Tschauner, O.; Beckett, J.R.; Liu, Y.; Rossman, G.R.; Sinogeikin, S.V.; Smith, J.S.; Taylor, L.A. **Geochim. Cosmochim. Acta** 184, 240-256 (2016). DOI: 10.1016/j.gca.2016.04.042
- Tschauner, O., Ma, C. (2023). Discovering High-Pressure and High-Temperature Minerals. In: Bindi, L., Cruciani, G. (eds) **Celebrating the International Year of Mineralogy. Springer Mineralogy.** Springer, Cham. https://doi.org/10.1007/978-3-031-28805-0_8

Computational Materials Science

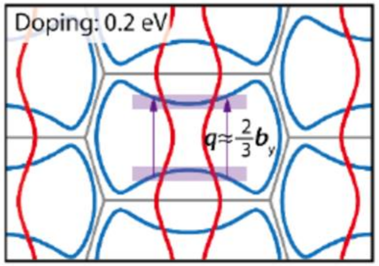
- **Dr. Luqing Wang**
- Assistant Professor - Physics
- Department of Physics and Astronomy
- Email: luqing.wang@unlv.edu
- Office: BPB 232

Expertise

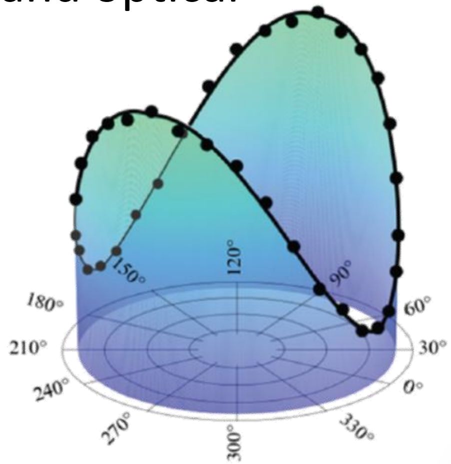
- Density functional theory calculations and machine learning.
- Two-dimensional (2D) materials functionalization and quantum effect.
- Electronic, mechanical, thermodynamic, chemical and optical properties of materials.
- Energy conversion & sustainability.



2D Materials Synthesis



2D Electronic and Quantum



2D Electro-Mechanics

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Zhou Lab – Experimental AMO physics

- **Dr. Yan Zhou**
- Assistant Professor
- Department of Physics and Astronomy
- Email: yan.zhou@unlv.edu
- Website: https://www.physics.unlv.edu/~yanzhou/index.html

Research projects

- Explore new physics beyond the Standard Model by precision measurements using quantum logically controlled molecular ions
- Precision metrology and spectroscopy using optical frequency combs
- Quantum transducer – link ion trap and superconducting quantum computers
- Experimental astrochemistry – cold ion-radical collisions

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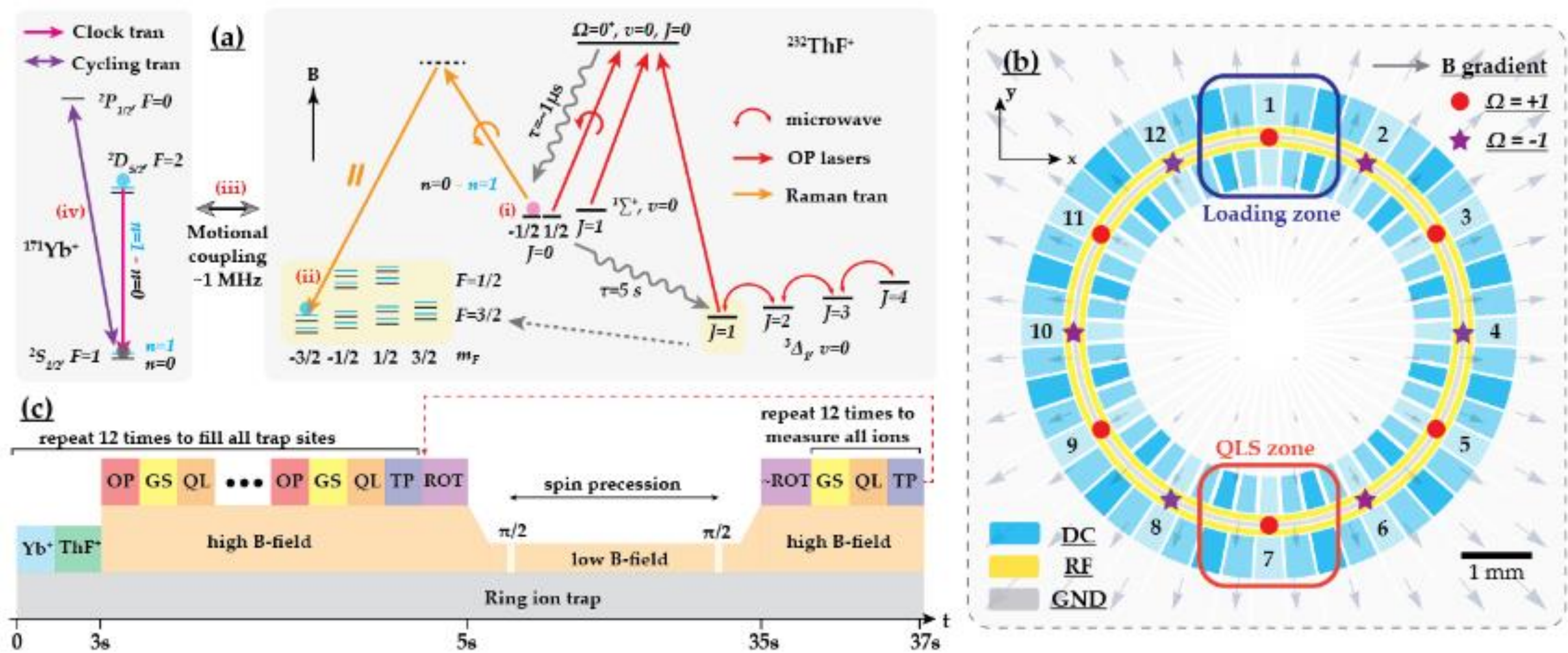
Search for *T,P*-odd symmetry violation



- On-chip Quantum sensors
- Entanglement between atomic ions and molecular ions
- Scalability and multiplexing measurements
- New table-top platform to investigate nuclear physics