

ELLEN CZAPLINSKI

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Updated March 2023

EDUCATION

PH.D. IN SPACE AND PLANETARY SCIENCES

University of Arkansas, Fayetteville, AR • August 2016 - June 2021

Dissertation Title: "An Experimental Study of Evaporites on Titan: Implication for Lake Composition and Future Missions"

Relevant courses: planetary geology, astrobiology, remote sensing, GPA: 4.0

BACHELOR OF SCIENCE IN PLANETARY SCIENCE

Purdue University, West Lafayette, IN • May 2016

Concentrations: planetary geology, martian surface geomorphology
Major GPA: 3.58

PUBLICATIONS

First-Authored

- Czaplinski, E. C., Vu, T. H., Cable, M. L., Choukroun, M., Malaska, M. J., Hodyss, R.** (2023) Experimental Characterization of the Pyridine:Acetylene Co-crystal and Implications for Titan's Surface. *ACS Earth and Space Chemistry*. [DOI: 10.1021/acsearthspacechem.2c00377](https://doi.org/10.1021/acsearthspacechem.2c00377)
- Czaplinski, E. C., Harrington, E. M., Bell, S. K., Tolometti, G. D., Farrant, B. E., Bickel, V. T., Honniball, C. I., Martinez, S. N., Rogaski, A., Sargeant, H. M., Kring, D. A.** (2021) Geologic Map and Rover Traverses for Human-Assisted Sample Return Missions to the Schrödinger Basin, Lunar Farside. *The Planetary Science Journal*, 2, 51. [DOI:10.3847/PSJ/abdb34](https://doi.org/10.3847/PSJ/abdb34)
- Czaplinski, E. C., Yu. X., Dzurilla, K., Chevrier, V. F.** (2020) Experimental Investigation of the Acetylene-Benzene Co-Crystal on Titan, *The Planetary Science Journal*, 1, 76. [DOI:10.3847/PSJ/abfb57](https://doi.org/10.3847/PSJ/abfb57)
- Czaplinski, E. C., Gilbertson, W. A., Farnsworth, K. K., Chevrier, V. F.** (2019) Experimental Study of Ethylene Evaporites under Titan Conditions. *ACS*

Earth and Space Chemistry, 3, 2353-2362.
[DOI:10.1021/acsearthspacechem.9b00204](https://doi.org/10.1021/acsearthspacechem.9b00204)

Co-Authored

Hossen, M. A., Kharade, S., Schmerl, B., Cámara, J., O'Kane, J. M., **Czaplinski, E. C.**, Dzurilla, K. A., Garlan, D., Jamshidi, P. (2023, under review) CaRE: Finding Root Causes of Configuration Issues in Highly-Configurable Robots. *IEEE Robotics and Automation Letters*.
[DOI: 10.48550/arXiv.2301.07690](https://doi.org/10.48550/arXiv.2301.07690)

MacKenzie, S. M. et al., including **Czaplinski, E. C.** (2021) Titan: Earth-like on the Outside, Ocean World on the Inside. *The Planetary Science Journal*, 2, 112. [DOI:10.3847/PSJ/abf7c9](https://doi.org/10.3847/PSJ/abf7c9)

Moore, K., Courville, S., Ferguson, S., Schoenfeld, A., Llera, K., Agrawal, R., Buhler, P., Brack, D., Connour, K., **Czaplinski, E.**, DeLuca, M., Deutsch, A., Hammond, N., Kuettel, D., Marusiak, A., Nerozzi, S., Stuart, J., Tarnas, J., Thelen, A., Castillo, J., Smythe, W., Landau, D., Mitchell, K., Budney, C. (2021) Bridge to the stars: A mission concept to an interstellar object, *Planetary and Space Science*, 197, 105137
[DOI:10.1016/j.pss.2020.105137](https://doi.org/10.1016/j.pss.2020.105137)

Sargeant, H. M., Bickel, V. T., Honniball, C. I., Martinez, S. N., Rogaski, A., Bell, S. K., **Czaplinski, E. C.**, Farrant, B. E., Harrington, E. M., Tolometti, G. D., Kring, D. A. (2020) Using Boulder Tracks as a Tool to Understand the Bearing Capacity of Permanently Shadowed Regions on the Moon. *JGR: Planets*, 125, e2019JE006157. [DOI:10.1029/2019JE006157](https://doi.org/10.1029/2019JE006157)

Bickel, V. T., Honniball, C. I., Martinez, S. N., Rogaski, A., Sargeant, H. M., Bell, S. K., **Czaplinski, E. C.**, Farrant, B. E., Harrington, E. M., Tolometti, G. D., Kring, D. A. (2019) Analysis of Lunar Boulder Tracks: Implications for Trafficability of Pyroclastic Deposits. *JGR: Planets*, 124, 1296-1314.
[DOI:10.1029/2018JE005876](https://doi.org/10.1029/2018JE005876)

SKILLS

Experimental Techniques

- Extensive experience maintaining a pressurized [chamber](#) to simulate Titan atmospheric and surface conditions
 - Expertise with liquid nitrogen-cooled cryosystems, cryostages, and detectors
 - Proficient in safely handling explosive and reactive pressurized gas cylinders – N₂, CH₄, C₂H₂, C₂H₄, C₂H₆
 - Thermocouple replacement and fabrication
- Benchtop experiments and preparation for handling hazardous and carcinogenic organic compounds (C₆H₆, CH₃CN, C₅H₅N, CH₂N₂)
- Proficiency performing and teaching microbiology techniques
 - Culturing and incubating bacteria
 - Inoculating nutrient and blood agar plates/tubes
 - Aseptic technique, quadrant streak, pour plates
 - Staining – gram, acid-fast, endospore, capsule

Instrumentation Techniques

- Nicolet 6700 Fourier Transform Infrared Spectrometer
- Horiba Jobin-Yvon LabRam HR micro-Raman spectrometer
- Liquid nitrogen-cooled optical cryostage (LTS 350, Linkham Scientific Instruments, Ltd.)
- Olympus BX51 Microscope
- Bruker D8 Discover Da Vinci X-ray diffractometer
- ASD QualitySpec Trek Handheld NIR Spectrometer

Software

- Omnic
- LabVIEW
- LabSpec
- Mercury/encipher
- JMARS
- LROC QuickMap
- ArcGIS
- MoonTrek
- Diffrac.EVA - Pawley refinement
- IGORPro
- Python – Jupyter, pandas, seaborn
- Unix

EXPERIENCE

NASA POSTDOCTORAL PROGRAM FELLOW -

Laboratory Studies of Chemistry on Titan's Surface • JPL • Jan. 2022 – Present

- Conducting laboratory experiments on Titan's surface materials to further understand the kinetics of formation and reactions between molecules, such as co-crystallization, and implications for habitability. Using spectroscopy (micro-Raman, IR, and UV) and powder XRD techniques to analyze these samples, which gives crystal structure information and how they may affect timescales of landscape evolution, as well as preferred orientations on Titan's surface. Co-crystal systems explored include [pyridine:acetylene](#) and cyanamide:acetylene.
- Imaging common Titan surface compounds (acetylene, butane, methane, ethane, etc.) at the microscope scale to better understand how crystal structure influences microscope-scale morphology. This will allow for a better understanding of the DragonCam-scale morphology differences among large-scale crystal structures of surface-relevant compounds. Cataloging these morphologies may help to contextualize in situ observations from Dragonfly. [LPSC LIV Abstract](#)
- Assessing the viability of membrane formation in Titan liquids by performing experiments with acrylonitrile (C_2H_3CN), a molecule which may form a vesicle structure called an "azotosome." If thermodynamic stability exists in this system, C_2H_3CN may self-assemble into the azotosome, which gives information as to the habitability of Titan's liquids.

NASA AUTONOMOUS ROBOTICS RESEARCH FOR OCEAN WORLDS (ARROW) – SCIENCE CONSULTANT

February 2020 – December 2022

- Provided input to roboticists/engineers regarding the geologic processes, chemical compounds, and surface environments on ocean worlds such as Europa, Enceladus, and Titan. Assisted with testing Resource Adaptive Software Purpose-Built for Extraordinary Robotic Research Yields – Science Instruments (RASPBerry – SI) in both virtual and physical ocean worlds testbeds. [LPSC LIII Abstract](#)

GRADUATE RESEARCH – TITAN EVAPORITE EXPERIMENTS

University of Arkansas • June 2016 – June 2021

- Performed and published [evaporite/co-crystal](#) experiments using hydrocarbons relevant to Titan's lakes. Analyzed resulting mixtures via FTIR spectroscopy and mass to determine saturation values, evaporation rates, and sample thickness. Proficient in analyzing band depth, band area, peak positions, and phase transitions. Updated/engineered several systems (electronics, cooling, etc.) on the Titan chamber. Implemented a Raman spectrometer into the chamber. Oral presentations at LPSC 2017-2020, Titan Surface Meetings, and DPS 2018-2019. Poster presentations at AGU 2017-2020, Titan After Cassini-Huygens 2019. [Awarded the 2017 NASA Earth and Space Sciences Fellowship \(NESSF\) for this research.](#)

JPL PLANETARY SCIENCE SUMMER SEMINAR – PARTICIPANT

NASA Jet Propulsion Laboratory • May – Aug 2019

- Helped plan a spacecraft mission concept to study an interstellar object. Co-authored [manuscript](#). Determined how to best study object's molecular composition. Designed spacecraft in mechanical/structures role. Worked directly with JPL Team X mentors and Architecture Team.

MARS DESERT RESEARCH STATION – CREW GEOLOGIST

Hanksville, UT • Dec 2018 – Jan 2019

- Performed 10 field expeditions in a simulated space suit. Measured and analyzed spectra of geologic samples using a TREK visible/IR portable spectrometer. Observed the Sun using the Musk Observatory. Collected and identified ~100 samples of clay, fluvial, and evaporite minerals.

EXPLORATION SCIENCE SUMMER INTERN – LUNAR GEOLOGY

The Lunar and Planetary Institute • May 2018 – Aug 2018

- Explored future robotic mission sites in the Schrödinger basin, lunar south pole, farside. Created and [published](#) a geologic map of the SW Schrödinger peak ring. Used geologic map as a guide to design robotic traverses in SW peak ring. Served as a beta tester and implemented improved Lunar Reconnaissance Orbiter imagery for JPL's Moon Trek software for exploring lunar datasets.

TEACHING ASSISTANT – MICROBIOLOGY

University of Arkansas • Aug 2016 – May 2017

- Taught the lab portion of the course for 2 semesters. Topics taught include: identifying unknown bacteria, preparing various stains (Gram, acid-fast, endospore, capsule), microscopy techniques, aseptic technique, and *Staphylococcus/Streptococcus* identification.

UNDERGRADUATE RESEARCH – MARTIAN GEOMORPHOLOGY

Purdue University • Feb 2014 – May 2016

- Performed a planet-wide survey of slipface features on Martian dune fields. Categorized slipface features based on morphology. Determined most probable origination environment. Presented research at LPSC 2016 – 2018.

AWARDS & DISTINCTIONS

Invited speaker; The Southern California Section of the American Chemical Society (SCALACS) Research Symposium, *“Titan in a Test Tube: Organic Cryominerals Formed in the Lab”* • 2022

Invited speaker; UC Santa Cruz, Institute of Geophysics & Planetary Physics seminar, *“Laboratory Studies of Organic Cryominerals: Implications for Titan’s Geology and Chemistry”* • 2022

Committee Member for the DPS Publications Subcommittee • 2022 - 2025

Board Member for the Scientific Society for Astrobiology • 2022

NPP (JPL) – Laboratory Studies of Chemistry on Titan's Surface • 2022

UArk Women’s Giving Circle Award for a new Planetarium (\$15,000) • 2021

Arkansas Space Grant Consortium STEM/Minority Grant • Arkansas, 2017, 2021

Early Career Observer for the Europa Clipper science team meeting • 2020

American Geophysical Union Volunteer Grant/Travel Grant • 2017/2020

Zonta International Amelia Earhart Fellowship • 2020

Student Representative for the UArk Space Center • 2019 – 2020

Hartmann Student Travel Grant – Division for Planetary Sciences • 2019

3 Minute Thesis Runner-Up over Titan research • 2018

NASA Earth and Space Science Fellowship (Titan research) • 2017

Learning Beyond the Classroom Certificate (Purdue) • 2016

Ascarelli Research Scholarship (Purdue) • 2012

Presidential Scholarship (Purdue) • 2012

COMMUNITY SERVICE

Science Organizing Committee, DPS-EPSC • 2023

Session Chair for Titan Craters, Chemistry, & Exploration session, DPS • 2022

Peer Reviewer: *Icarus*, Earth and Space Science Journal

Proposal Reviewer: NASA ROSES (2019 – 2022)

Session moderator for Lunar Exploration Activities session, LPSC • 2022

Dwornik judge for LPSC • 2022

Astronomy Outreach Club Vice President/Treasurer • 2018-2021

Science Org. Committee – Experimental Outer Solar System Workshop • 2020
(Canceled due to the COVID-19 pandemic)

Peer Reviewer for *Icarus* Journal • 2020

Senior Division Judge – Northwest AR Regional Science Fair • 2019-2020

Future Engineers Judge – NASA “Name the Rover” contest for Mars 2020
Rover; Lunabotics Junior • 2019, 2022

CONFERENCE PUBLICATIONS

First-Authored Abstracts:

E. Czaplinski, R. Hodyss, M.L. Cable, S. M. MacKenzie, J. I. Núñez, C. M. Ernst, E. P. Turtle, L. C. Quick. (2023) Microscopic Imaging of Titan Surface Materials in Preparation for Dragonfly. *LPSC LIV*, Abstract #2778. (Poster)

- E. **Czaplinski**, R. Hodyss, T. Vu, M. Cable. (2022) A new Titan cryomineral: The pyridine:acetylene co-crystal. *DPS 54*, 509.03. (Oral)
- E. **Czaplinski**, R. Hodyss, T. Vu, M. Cable. (2022). The acetylene-pyridine co-crystal. *Titan NAI Team Meeting*. (Oral)
- E. **C. Czaplinski**, J. Cámara, K. Dzurilla, M. A. Hossen, B. Schmerl, J. Su, and P. Jamshidi. (2022). AI for Addressing Unknown Unknowns in Outer Solar System Missions. *LPSC LIII*, Abstract #2734. (Poster)
- E. **Czaplinski**, X. Yu, K. Dzurilla, V. Chevrier. Experimental Investigation of the Acetylene-Benzene Co-Crystal on Titan. *AGU Fall Meeting 2020*, P067-0004. (Poster)
- E. **Czaplinski**, K. Farnsworth, X. Yu, K. Dzurilla, V. Chevrier. Experimental Study of Evaporites on Titan. *DPS 52*, 408.01D. (Oral – Dissertation Talk)
- E.C. **Czaplinski**, V.F. Chevrier, X. Yu, K. Dzurilla. (2020). Experimental Study of C₂H₂ Crystal Structure Changes Under Titan Conditions. *LPSC LI*, Abstract #1694. (Oral – cancelled due to the COVID-19 pandemic).
- E.C. **Czaplinski**, W.A. Gilbertson, K.K. Farnsworth, V.F. Chevrier. (2019). Characterizing Evaporites on Titan Using an Experimental Chamber. *EPSC-DPS Joint Meeting*, Abstract #1132. (Oral)
- E.C. **Czaplinski**, W.A. Gilbertson, K.K. Farnsworth, V.F. Chevrier. (2019). Characterizing Evaporites on Titan Using an Experimental Chamber. (2019). *Titan After Cassini Huygens Workshop*. (Poster).
- E.C. **Czaplinski**, K.K. Farnsworth, V.F. Chevrier. (2019). Experimental study of ethylene and benzene evaporites under Titan conditions. *LPSC L*, Abstract #1153. (Oral)
- E.C. **Czaplinski**, C.J. Ahrens, V.F. Chevrier. (2019). Comparative morphologies between dune slope streaks and recurring slope lineae on Mars. *LPSC L*, Abstract #1160. (Poster)
- E. **Czaplinski**, K. Farnsworth, V. Chevrier. (2018). An Experimental Study of Evaporites on Titan. *Experimental Analysis of the Outer Solar System Workshop*. Abstract #3009. (Oral)
- E. **Czaplinski**, K. Farnsworth, V. Chevrier. (2018). Experimental Studies of Benzene and Acetylene Evaporites on Titan. *Titan Surface Meeting, Cornell University*. (Oral)
- E. **Czaplinski**, K. Farnsworth, V. Chevrier. (2017). Experimental simulations of ethylene evaporites on Titan. *AGU*, Abstract #213124. (Poster)
- E. **Czaplinski**, K. Farnsworth, V. Chevrier. (2017). Experimental Simulations of Ethylene Evaporites. *Titan Surface Meeting, MIT*. (Oral)

- E. Czaplinski**, K. Farnsworth, D. Laxton, V. Chevrier, S. Singh. (2017). Experimental results of evaporite deposits on Titan using a surface simulation chamber. *Titan Through Time IV Workshop, NASA Goddard*. (Oral)
- E. Czaplinski**, K. Farnsworth, D. Laxton, V. Chevrier, M. Heslar, S. Singh. (2017). Experimental results of evaporite deposits on Titan using a surface simulation chamber. *LPSC XLVIII*, Abstract #1537. (Oral)
- E.C. Czaplinski**, C.J. Ahrens, B.H.N. Horgan, V. F. Chevrier. (2017). Dune Slipface Feature Morphologies and Their Relationship to Mineralogy. *LPSC XLVIII*, Abstract #2049. (Poster)
- E. Czaplinski** and B. Horgan. (2016). Constraining the Mechanisms of Slipface Failure on Martian Sand Dunes from a New Global Survey. *LPSC XLVII*, Abstract #2006. (Poster)

Co-Authored Abstracts:

- A. Shahid, T. Sheng, J. B. Murray, A. Mishra, **E. Czaplinski**, S. Sharma, D. Gentry. Statistical Classification of Biosignature Information: Improving Life-Detection Confidence Using Machine Learning. (2023) *LPSC LIV*, Abstract #2880. (Poster)
- T. L. Williams, **E. C. Czaplinski**, and V. F. Chevrier. Experimental Investigation of the Acetylene-Carbon Dioxide Co-Crystal Under Titan Conditions. (2023) *LPSC LIV*, Abstract #2551. (Poster)
- T. L. Williams, **E. C. Czaplinski**, and V. F. Chevrier. Interactions between ethylene and benzene under Titan conditions. (2022) *LPSC LIII*, Abstract #2716. (Poster)
- E.M. Harrington, S.K. Bell, **E.C. Czaplinski**, B.E. Farrant, G.D. Tolometti, V.T. Bickel, C.I. Honniball, S.N. Martinez, A. Rogaski, H.M. Sargeant, and D.A. Kring. (2021). Proposed human-assisted robotic traverses in the northwest peak ring of the Schrödinger basin. *International Astronautical Congress – 21*.
- E.M. Harrington, **E.C. Czaplinski**, S.K. Bell, G.D. Tolometti, B.E. Farrant, V.T. Bickel, C.I. Honniball, S.N. Martinez, A. Rogaski, H.M. Sargeant, and D.A. Kring. (2021). Geologic Map of a Segment of the Schrödinger Peak Ring and Potential Rover Traverses. *NASA Exploration Science Forum*.
- G.D. Tolometti, V.T. Bickel, **E.C. Czaplinski**, and H.M. Sargeant. (2020). Using Temperature Constraints to Identify Potentially Traversable Permanently Shadowed Regions at the Lunar South Pole. *NASA Exploration Science Forum*, NESF2020-073. (Poster)

- V.T. Bickel, C.I. Honniball, S.N. Martinez, A. Rogaski, H.M. Sargeant, S.K. Bell, **E.C. Czaplinski**, B.E. Farrant, E.M. Harrington, G.D. Tolometti, and D.A. Kring. (2019). Analysis of Lunar Boulder Tracks: Implications for Rover Mobility on Pyroclastic Deposits. (2019). *LPSC L*, Abstract #1587. (Poster)
- K. Farnsworth, V. Chevrier, **E. Czaplinski**, and J.M. Soderblom. (2019). Freezing Points of Methane-Ethane-Nitrogen Mixtures under Titan Surface Pressure. *LPSC L*, Abstract #2672 (Oral)
- K. Farnsworth, J.M. Soderblom, S. Rodriguez, **E. Czaplinski**, and V. Chevrier. (2019). Constraining Ethane Concentration in Titan's Lakes and Seas. *LPSC L*, Abstract #1488 (Poster)
- B.E. Farrant, S.K. Bell, **E.C. Czaplinski**, E.M. Harrington, G.D. Tolometti, V.T. Bickel, C.I. Honniball, S.N. Martinez, A. Rogaski, H.M. Sargeant, and D.A. Kring. (2019). Geologic Map and Potential Rover Traverses for Human-Assisted Sample Return Missions to the Schrödinger Basin, Lunar Farside. *LPSC L*, Abstract #1790. (Poster)
- H.M. Sargeant, V.T. Bickel, C.I. Honniball, S.N. Martinez, A. Rogaski, S.K. Bell, **E.C. Czaplinski**, B.E. Farrant, E.M. Harrington, G.D. Tolometti, and D.A. Kring. (2019). Determining the Bearing Capacity of Permanently Shadowed Regions of the Moon Using Boulder Tracks. *LPSC L*, Abstract #1792. (Oral)
- K. Farnsworth, Z. McMahon, D. Laxton, **E. Czaplinski**, V. Chevrier, A. Luspakuti, and S. Singh. (2017). Experimental Study of Nitrogen Dissolution in Methane-Ethane Mixtures under Titan Surface Conditions. *LPSC XLVIII*, Abstract #1932. (Poster)
- M. Heslar, K. Farnsworth, V. Chevrier, **E. Czaplinski**, and D. Laxton. (2017). Simulations of Titan Lakes: Potential Methane-Ethylene Evaporitic Deposits. *LPSC XLVIII*, Abstract #2657. (Oral)
- S. Singh, T. McCord, J-P. Combe, G. Singh, K. Farnsworth, D. Laxton, E. Czaplinski, and V.F. Chevrier. (2017). Impact of Acetylene and Tholins Mixtures on 1.55 μm Absorption Band. *LPSC XLVIII*, Abstract #2951 (Poster)

MENTORSHIP & LEADERSHIP

EXTERNAL COMMITTEE MEMBER

January 2023 – present

- Troy Williams, Ph.D. Candidate, Space and Planetary Sciences, University of Arkansas
- Dissertation Title: *Experimental Formation of Binary and Ternary Co-crystals: Implications for Titan Surface Chemistry*
- Attend yearly committee meetings and ensure the student is meeting research standards for the broader Titan/planetary science community

JPL “BUDDY PROGRAM” MENTOR

October 2022 – present

- Providing mentorship and leadership for incoming Lab Studies Group postdocs
- Hold regular, weekly meetings to discuss goals, research, and navigating JPL

FUTURE LEADERS OF OCEAN WORLDS (FLOW) – **Member**

February 2022 – present

- FLOW is an early career organization supported by the NASA Network for Ocean Worlds Research Coordination Network. Attend monthly meetings and provide input to the community.

MENTOR TO EARLY CAREER POSTDOCS AND GRADUATE STUDENTS

Aug 2020 – present

- Provided direction and research guidance to graduate students and early career postdocs. Topics include: teaching experimental apparatus techniques, abstract/proposal/manuscript review, bi-monthly meetings and check-ins, moral support.

PROFESSIONAL SOCIETIES

*American Chemical Society • Southern California Section
Division for Planetary Sciences
American Geophysical Union
JPL Advisory Council for Women*

OUTREACH & EXTRACURRICULARS

PILOT GROUND SCHOOL

Sep – Dec 2022

- Learned the basics of visual flight rules (VFR) for a single engine piston plane
- Topics covered include: aerodynamics, airspace, chart-reading, engines & systems, instruments, rules & regulations, atmospheric science & weather, navigation with E6B/Plotter, aeromedical factors, decision-making

SPACE HOGS, ASTRONOMY OUTREACH GROUP – V.P.

University of Arkansas • Aug 2018 – December 2021

- Presented space science educational lectures to ~2,000 people a year from the community. Traveled to local community groups to present mobile planetarium shows. Ran hands-on space science activities for K-12 students. Lead a successful fundraising campaign to purchase a new, mobile StarLab planetarium. Awarded a \$15,000 grant from UArk Women's Giving Circle towards the new planetarium.

ROCK CLIMBING

Feb 2017 – Present

- ATC, GriGri, and Lead climbing/belaying certified. Climbed the height of El Capitan during Feb 2019 and Feb 2020. Outdoor expeditions in CA, AK, AR, AZ, WA.

PURDUE BANDS AND ORCHESTRAS - PERCUSSION

Purdue University • 2013 – 2016

- Marched snare drum. Proficient in various concert percussion instruments in the Wind Ensemble, Percussion Ensemble, and Orchestra.