NSF-REU: Sunshine Institute for the Interaction of Light with Matter
(updated August 3, 2023)

Ed Hilinski and Bridget DePrince, Directors
https://www.chem.fsu.edu/reu/
Department of Chemistry and Biochemistry
Florida State University
Tallahassee, Florida 32306-4390
NSF-REU: Sunshine Institute for the Interaction of Light with Matter

Summer 2023 - May 30 to Aug 4
Ed Hilinski and Bridget DePrince, Directors
https://www.chem.fsu.edu/reu/
Department of Chemistry and Biochemistry
Florida State University
Tallahassee, Florida 32306-4390
A Chronology
First Day - May 30, 2023
Welcome!

<table>
<thead>
<tr>
<th>REU Participant</th>
<th>Home Institution</th>
<th>In-Lab Mentor</th>
<th>Faculty Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joshua Birke</td>
<td>Southeast Missouri State U.</td>
<td>Colette Sullivan &amp; Rachel Weiss Clark</td>
<td>Lea Nienhaus</td>
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<tr>
<td>Christopher Cornejo</td>
<td>Elmhurst University</td>
<td>Brandon Nusser</td>
<td>Lei Zhu</td>
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<tr>
<td>Annaliese Franklin</td>
<td>Bridgewater College</td>
<td>Tunde Shonde &amp; Oluwadara Olasupo</td>
<td>Biwu Ma</td>
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<tr>
<td>Daniel Larsen</td>
<td>Ithaca College</td>
<td>Zana Zana Singleton</td>
<td>Justin Kennemur</td>
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<tr>
<td>Diana K. Nazario Torres</td>
<td>Pontifical Catholic U., Puerto Rico</td>
<td>Shubham Bisht &amp; Dibya Mondal</td>
<td>Michael Shatruk</td>
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<tr>
<td>Makaya Robinson</td>
<td>Saint Mary's College</td>
<td>Nikolas Dos Santos &amp; Antony Sekar Kulandai Raj</td>
<td>Igor Alabugin</td>
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<tr>
<td>Isabel Sedwick</td>
<td>Loyola University Maryland</td>
<td>Sumesh Babu Krishnan</td>
<td>Jack Saltiel</td>
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<tr>
<td>Dominic Willadsen</td>
<td>Concordia U. Wisconsin</td>
<td>Erica Knorr</td>
<td>Kenneth Hanson</td>
</tr>
</tbody>
</table>
First Week Agenda

Tuesday, May 30, 2023

8:00-8:30 a.m. Walk to DLC from McCollum Hall – Dr. Bridget DePrince
8:30-9:20 a.m. Breakfast / Mingling – DLC 123
  Introduction to the Department – DLC 123
  Dept. Chair Geoff Strouse & Dr. Ed Hilinski
9:20-10:00 a.m. Ice Breaker: Participants and Faculty Advisors Introductions
10:00-11:00 a.m. Meet the In-Lab Mentors – Lab Tours
11:00-12:00 noon Departmental Paperwork & HR
12:00-1:00 p.m. Group Lunch – Kearney Osceola Grille
  REU Participants, Drs. Jack Saltiel,
  Bridget DePrince & Ed Hilinski
1:30-2:30 p.m. Safety Training – DLC 123
  Ben Arline, Environ. Health & Safety
2:30-4:00 p.m. Departmental Paperwork & FSU ID – DLC 123 & FSU Card Center
  Dr. Ed Hilinski
First Week Agenda (continued)

Wednesday, May 31, 2023
-3:30 p.m. Work in the Research Labs
3:30-4:30 p.m. Departmental Ice Cream Social - CSL Lobby

Thursday, June 1, 2023
Work in the Research Labs

Friday, June 2, 2023
-3:30 p.m. Work in the Research Labs
3:30-5:00 p.m. REU Weekly Seminar – DLC 123 – Dr. Ed Hilinski
Entry Surveys, Baseline Quiz, summary of the first week
Research ethics, lab culture, lab notebooks, expectations
Research resources, tutorials, learning beyond lab,
Scifinder Scholar, NMR training, ChemDraw, other software

Saturday, June 3, 2023
12:00 p.m. River Boat Ride, Swimming, and Dining – Wakulla Springs, FL
Dr. Ed Hilinski
<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Location, time</th>
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</thead>
<tbody>
<tr>
<td>Week 2</td>
<td>T June 6 Photochemistry Café - Dr. Biwu Ma - w/breakfast</td>
<td>DLC 123, 9:00 a.m.</td>
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<tr>
<td></td>
<td>R June 8 Tour of the Maglab at 10:00 a.m.</td>
<td>Tallahassee, FL</td>
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<tr>
<td></td>
<td>F June 9 Photochemistry Café - Dr. Jack Saltiel</td>
<td>DLC 123, 3:30 p.m.</td>
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<tr>
<td></td>
<td>REU Seminar - Ed Hilinski - discussion of research presentations</td>
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<tr>
<td>Sa June 10</td>
<td>Coffee &amp; Conversations - Dr. Ed Hilinski</td>
<td>11:00 a.m.</td>
</tr>
<tr>
<td>Week 3</td>
<td>T June 13 Photochemistry Café - Dr. Kenneth Hanson - w/breakfast</td>
<td>DLC 123, 9:00 a.m.</td>
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<tr>
<td></td>
<td>F June 16 REU Seminar (discussion of student research themes)</td>
<td>DLC 123, 3:30 p.m.</td>
</tr>
<tr>
<td>Week 4</td>
<td>T June 20 Photochemistry Café - Dr. Igor Alabugin - w/breakfast</td>
<td>DLC 123, 9:00 a.m.</td>
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<td></td>
<td>R June 22 Tour of Nammo Perry Inc (depart at 7:30 am for tour at 9 am)</td>
<td>Perry, FL</td>
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<tr>
<td></td>
<td>F June 23 REU Seminar (3-min student presentations: research themes)</td>
<td>DLC 123 3:30 p.m.</td>
</tr>
<tr>
<td>Week 5</td>
<td>T June 27 Photochemistry Café - Dr. Lea Nienhaus - w/breakfast</td>
<td>DLC 123 9:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>F June 30 REU Seminar (student presentations: research themes)</td>
<td>DLC 123 3:30 p.m.</td>
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<tr>
<td>Sa July 1</td>
<td>Coffee &amp; Conversations - Dr. Ed Hilinski</td>
<td>10:00 a.m.</td>
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<tr>
<td>Week 6</td>
<td>T July 4 Independence Day picnic</td>
<td>DePrince Residence</td>
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<tr>
<td></td>
<td>F July 7 Photochemistry Café - Dr. Justin Kennemur</td>
<td>DLC 123, 3:30 p.m.</td>
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<tr>
<td></td>
<td>REU Seminar - Dr. Ed Hilinski - weekly review and update</td>
<td>DLC 123 3:30 p.m.</td>
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<tr>
<td></td>
<td>First Friday Festivities</td>
<td>6:30 p.m.</td>
</tr>
<tr>
<td>Week 7</td>
<td>T July 11 Photochemistry Café - Dr. Mike Shatruk - w/breakfast</td>
<td>DLC 123 9:00 a.m.</td>
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<tr>
<td></td>
<td>R July 13 Tyndall Air Force Base (depart 7:40 am EDT for a 10:00 am CDT tour) Tyndall, FL</td>
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<tr>
<td></td>
<td>F July 14 REU Seminar - Dr. Ed Hilinski - weekly review and update</td>
<td>DLC 123 3:30 p.m.</td>
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</tbody>
</table>
## Weeks 2 - 10 (continued)

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Location, time</th>
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<tbody>
<tr>
<td>Week 8</td>
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<tr>
<td>T July 18</td>
<td>Photochemistry Café - Dr. Kenneth Hanson - w/breakfast</td>
<td>DLC 123 9:00 a.m.</td>
</tr>
<tr>
<td>F July 21</td>
<td>REU seminar (student 15-min research presentations)</td>
<td>DLC 123, 3:30 p.m.</td>
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<tr>
<td></td>
<td>1. Daniel Larsen</td>
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<td></td>
<td>2. Annaliese Franklin</td>
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<tr>
<td>Week 9</td>
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<tr>
<td>M July 24</td>
<td>Dinner with REU Students, In-Lab Mentors &amp; Faculty</td>
<td>Kool Beanz, 6:00 p.m.</td>
</tr>
<tr>
<td>T July 25</td>
<td>Photochemistry Café - Dr. Lei Zhu - w/breakfast</td>
<td>DLC 123, 9:00 a.m.</td>
</tr>
<tr>
<td>R July 27</td>
<td>REU seminar (student 15-min research presentations)</td>
<td>DLC 123, 3:30 p.m.</td>
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<tr>
<td></td>
<td>3. Christopher Cornejo</td>
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<td></td>
<td>4. Dominic Willadsen</td>
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<td>5. Makaya Robinson</td>
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<tr>
<td>F July 28</td>
<td>REU seminar (student 15-min research presentations)</td>
<td>DLC 123, 3:30 p.m.</td>
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<td>6. Isabel Sedwick</td>
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<td></td>
<td>7. Diana Nazario Torres</td>
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<td></td>
<td>8. Joshua Birke</td>
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<tr>
<td>Sa July 29</td>
<td>Coffee &amp; Conversations - Dr. Ed Hilinski</td>
<td>12:00 p.m.</td>
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<tr>
<td>Week 10</td>
<td></td>
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<tr>
<td>T Aug 1</td>
<td>Photochemistry Café - Dr. Ed Hilinski - w/breakfast</td>
<td>DLC 123, 9:00 a.m.</td>
</tr>
<tr>
<td>R Aug 3</td>
<td>Poster Session (student research presentations)</td>
<td>CSL lobby, 3:00 p.m..</td>
</tr>
<tr>
<td>F Aug 4</td>
<td>Exit interviews and surveys</td>
<td>DLC 5th Floor Conf. Rm.</td>
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<tr>
<td>F Aug 4</td>
<td>REU seminar</td>
<td>DLC 123, 3:30 p.m.</td>
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<td></td>
<td>First Friday Festivities</td>
<td>6:30 p.m.</td>
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<tr>
<td>SaSu Aug 5-6</td>
<td>Coffee &amp; Conversations, Meals &amp; Student departures</td>
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</tbody>
</table>
REU In-Lab Mentors Meeting
May 24, 2023 - Chemical Sciences Laboratory (CSL) Room 1005
with Drs. Bridget DePrince and Ed Hilinski

left to right: Oluwadara Olasupo; Tunde Shonde; Zana Zana Singleton
Nikolas Dos Santos; Sumesh Babu Krishnan; Brandon Nusser;
Erica Knorr; Rachel Weiss Clark; Colette Sullivan; Sarah Bennett;
Bridget DePrince
The REU participants have some morning beverages

May 29, 2023 - Black Dog Café, Tallahassee, Florida with Dr. Ed. Hilinski

clockwise from 8 o’clock: Isabel Sedwick; Diana K. Nazario Torres; Annaliese Franklin; Makaya Robinson; Dominic Willadsen; Daniel Larsen; Josh Birke; Christopher Cornejo
The REU participants have some lunch
May 29, 2023 - Midtown Caboose, Tallahassee, Florida with Dr. Ed Hilinski

left to right: Dominic Willadsen; Christopher Cornejo; Daniel Larsen; Josh Birke; Makaya Robinson; Isabel Sedwick; Diana K. Nazario Torres; Annaliese Franklin
... and some dinner

May 29, 2023 - Mayuri Indian Restaurant, Tallahassee, Florida with Dr. Ed Hilinski

[left to right: Annaliese Franklin; Isabel Sedwick; Dominic Willadsen; Josh Birke; Daniel Larsen; Christopher Cornejo; Makaya Robinson; Diana K. Nazario Torres]
Lunch – Kearney Osceola Grille at the Dunlap Champions Club

https://fsuchampionsclub.com/

May 30, 2023, 12:00 p.m.

225 Champions Way, Building B, Tallahassee, Florida
Ice Cream Social
May 31, 2023 - CSL Lobby
Experiments Are Underway
June 1, 2023

Josh Birke
and in-lab mentor
Colette Sullivan
doing optical alignments
in the Nienhaus Laser Lab

Isabel Sedwick
performing a light-sensitive column chromatography in the Saltiel Lab
REU Weekly Seminar
June 2, 2023 - DLC 123, 3:30-5:00 p.m. with Dr. Ed Hilinski

Entry survey, entry quiz, summary of the first week
Research ethics, lab culture, lab notebooks, expectations
Research resources, tutorials, learning beyond lab,
SciFinder Scholar, NMR training, ChemDraw, other software

Clockwise from 8 to 4 o’clock
Josh Birke
Daniel Larsen
Annaliese Franklin
Diana K. Nazario Torres
Makaya Robinson
Isabel Sedwick
Dominic Willadsen
Chris Cornejo
Trip to Wakulla Springs
www.floridastateparks.org/parks-and-trails/edward-ball-wakulla-springs-state-park
June 3, 2023
Wakulla, Florida
with Ed Hilinski
Photochemistry Café
“Low Dimensional Metal Halide Perovskites and Hybrids: From Synthetic Control to Device Integration”
http://www.chem.fsu.edu/reu-links/
Prof. Biwu Ma
June 6, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Photochemistry Café
“Low Dimensional Metal Halide Perovskites and Hybrids: From Synthetic Control to Device Integration”
http://www.chem.fsu.edu/reu-links/
Prof. Biwu Ma
June 6, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida

Click here to watch the video.
Tour of the National High Magnetic Field Laboratory

nationalmaglab.org/

June 8, 2023, 10:00-11:00 a.m. - Innovation Park, Tallahassee, Florida
Depart from 1st Floor DLC Lobby at 9:30 a.m.
Lunch – Renegade Grille at Seminole Legacy Golf Club

https://www.seminolelegacygolfclub.com/

June 8, 2023, 11:30 a.m. - 2550 Pottsdamer Street, Tallahassee, Florida
Photochemistry Café
“Elementary Photophysical Transitions and Photochemical Reactions”

http://www.chem.fsu.edu/reu-links/

Prof. Jack Saltiel
June 9, 2023, 3:30-4:30 p.m.
DLC 123, Tallahassee, Florida

Triplet Sensitized Stilbene Photoisomerization


Multidimensional Isomerization – Conical Intersections – Trapping Twisted Intermediates


Photochemistry Café
“Elementary Photophysical Transitions and Photochemical Reactions”
http://www.chem.fsu.edu/reu-links/
Prof. Jack Saltiel
June 9, 2023, 3:30-4:30 p.m.
DLC 123, Tallahassee, Florida
REU Weekly Seminar
June 9, 2023 - DLC 123, 4:30 p.m. with Dr. Ed Hilinski

Survey about the first two weeks,
Discussion about activities of the preceding week and research
research resources - https://guides.lib.fsu.edu/c.php?g=352310&p=2380486
tutorials, learning beyond lab - http://www.chem.fsu.edu/reu-links/
SciFinder Scholar – first time users need to register - https://guides.lib.fsu.edu/c.php?g=352310&p=2380486
NMR training, ChemDraw and Chem3D, other software
The REU participants have some morning beverages

June 10, 2023 - Black Dog Café, Tallahassee, Florida with Dr. Ed. Hilinski
Photochemistry Café
“Graduate School Demystified”
http://www.chem.fsu.edu/reu-links/
Prof. Kenneth Hanson
June 13, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida

Where to Apply?

- Department Size
- Research Strengths
- Collegiality
- Social/Networking
- Success rates
- Graduate Student Union
- Collaborative vs. Competitive

Ph.D at FSU: Timeline
4th-6th Year  Thesis and Defense (average 5.2 years)

Thesis/Dissertation:
A compilation of your graduate research
Highlights a unique contribution to science
Typically, 100-300 pages

Defense:
Open, 50 min presentation
10 min. for Q from audience
30-60 min. Q from the committee
Photochemistry Café
“Graduate School Demystified”
http://www.chem.fsu.edu/reu-links/
Prof. Kenneth Hanson
June 13, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
REU Weekly Seminar
June 16, 2023 - DLC 123, 3:30 p.m. with Dr. Ed Hilinski

Discussion about activities of the preceding week and research
Discussion about comments given on the June 7 survey
Brief board talks about research:
Christopher Cornejo; Daniel Larsen; Isabel Sedwick; Makaya Robinson
Biphenyl photocyclization


Short de novo synthesis

Photochemistry Café
“De Novo Photochemical Synthesis of Non-Symmetric Pyrenes”

http://www.chem.fsu.edu/reu-links/

Prof. Igor Alabugin
June 20, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Photochemistry Café
“De Novo Photochemical Synthesis of Non-Symmetric Pyrenes”
http://www.chem.fsu.edu/reu-links/
Prof. Igor Alabugin
June 20, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Visit to Nammo Perry Inc

https://www.nammo.com/location/perry/

June 22, 2023 - Perry, Florida
(depart 7:30 a.m. EDT for 9:00 a.m. EDT tour)
REU Weekly Seminar
“3-Minute Student Presentations: Research Themes”
moderated by Ed Hilinski
June 23, 2023 - DLC 123, 3:30-5:00 p.m.
Nanoplatelet Sensitizers

- Stacking can cause inaccessible transmitter ligands - not TET active.
- Stacking can reduce the sites transmitter ligands can bind to.


Near-Infrared-to-Visible Upconversion

Converting infrared (low energy) light to visible (high energy) light via sensitized triplet-triplet annihilation.

QD-based upconversion
Limited by poor exciton diffusion
Current benchmark: <1% absorption

Perovskite-based upconversion
Current benchmark: up to 60% absorption

Photochemistry Café
“Research in the Nienhaus Lab”
http://www.chem.fsu.edu/reu-links/
Prof. Lea Nienhaus
June 27, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Photochemistry Café
“Research in the Nienhaus Lab”
http://www.chem.fsu.edu/reu-links/
Prof. Lea Nienhaus
June 27, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
REU Weekly Seminar
June 30, 2023 - DLC 123, 3:30 p.m. with Dr. Ed Hilinski

Discussion about activities of the preceding week and research
The REU participants and beverages and some food

July 1, 2023 - The Power Plant Café, Cascades Park, Tallahassee, Florida with Dr. Ed Hilinski

https://www.edisontally.com/cafe
Independence Day Picnic
July 4, 2023
The DePrince Residence
Annaliese Franklin working with air-sensitive materials in the research group of Prof. Biwu Ma

Isabel Sedwick viewing femtosecond-resolved absorption data as part of her research in the Saltiel group

REU Students in the Lab
Summer 2023
Photochemistry Café
“Research in the Kennemur Lab”
http://www.chem.fsu.edu/reu-links/
Prof. Justin Kennemur
July 7, 2023, 3:30-4:30 p.m.
DLC 123, Tallahassee, Florida
Photochemistry Café
“Research in the Kennemur Lab”
http://www.chem.fsu.edu/reu-links/
Prof. Justin Kennemur
July 7, 2023, 3:30-4:30 p.m.
DLC 123, Tallahassee, Florida
Light-Induced Excited Spin-State Trapping

LIESST in [Fe(tpma)(xbim)](ClO₄)₂

UV-visible spectrum

Magnetic Optical

Photochemistry Café
“Bistability in Molecular Materials: From Spin-State Switching to Controlling Molecular Spin Qubits”
http://www.chem.fsu.edu/reu-links/
Prof. Michael Shatruk
July 11, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Trip to Tyndall Air Force Base

www.tyndall.af.mil

July 13, 2023

(depart 7:40 a.m. EDT for a 10:00 a.m. CDT tour)
... and Then to
Mexico Beach, Florida
July 13, 2023
REU Weekly Seminar
July 14, 2023 - DLC 123, 3:30 p.m. with Dr. Ed Hilinski

Discussion about activities of the preceding week and research
and a survey
Photochemistry Café
“Understanding and Controlling Molecular Excited State Processes Using Metal Oxide Surfaces”
http://www.chem.fsu.edu/reu-links/
Prof. Kenneth Hanson
July 18, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Photochemistry Café
“Understanding and Controlling Molecular Excited State Processes Using Metal Oxide Surfaces”
http://www.chem.fsu.edu/reu-links/
Prof. Kenneth Hanson
July 18, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Student Research Presentation

“Scrubbing Terminal Olefin Contaminants to Optimize ROMP of Cyclopentene Derivatives”

Daniel W. Larsen - Ithaca College

Nadia Z. Singleton & Prof. Justin Kennemur - Florida State University

July 21, 2023 - DLC 123, Tallahassee, Florida
Dinner at Kool Beanz Café
http://www.koolbeanz-cafe.com/
with
REU Participants, In-Lab Mentors & Faculty Advisors
July 25, 2023 - 6:00 p.m.
Tallahassee, Florida
Photochemistry Café
“Fluorescent Organic Molecules”
http://www.chem.fsu.edu/reu-links/
Prof. Lei Zhu
July 25, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Photochemistry Café
“Fluorescent Organic Molecules”
http://www.chem.fsu.edu/reu-links/
Prof. Lei Zhu
July 25, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida
Student Research Presentation
“Synthesis of Lamellarins Through Photochemical Reactions”
Christopher Cornejo – Elmhurst University
Brandon Nusser & Prof. Lei Zhu - Florida State University
July 27, 2023 - DLC 123, Tallahassee, Florida
Student Research Presentation

“Influencing Excited State Properties of PDI Using ALD”
 Dominic J. Willadsen – Concordia University, Wisconsin
 Erica Knorr & Prof. Kenneth Hanson - Florida State University
 July 27, 2023 - DLC 123, Tallahassee, Florida
Student Research Presentation

“A Novel Strategy for the Synthesis of Non-Symmetrical Pyrenes”

Makaya Robinson – St. Mary’s College
Nikolas Dos Santos & Prof. Igor Alabugin - Florida State University

July 28, 2023 - DLC 123, Tallahassee, Florida
Student Research Presentation

“Photochemistry of 1,4-Diphenyl-1,3-Butadiene (DPB)”

Isabel Sedwick – Loyola University Maryland
Sumesh Krishnan & Prof. Jack Saltiel - Florida State University

July 28, 2023 - DLC 123, Tallahassee, Florida
Student Research Presentation

“Tetranuclear Clusters for Application in Quantum Information Science”

Diana Nazario Torres – Pontifical Catholic Univ., Puerto Rico
Shubham Bisht, Dibya Mondal & Prof. Michael Shatruk - Florida State University

July 28, 2023 - DLC 123, Tallahassee, Florida
Student Research Presentation

“Organic Semiconductor Annihilators for Triplet-Triplet Annihilation Upconversion”

Josh Birke – Southeast Missouri State University

Colette Sullivan, Rachel Weiss & Prof. Lea Nienhaus - Florida State University

July 28, 2023 - DLC 123, Tallahassee, Florida
The REU participants have some morning beverages

July 29, 2023 - Black Dog Café, Tallahassee, Florida with Dr. Ed. Hilinski
Photochemistry Café
“A State Energy Diagram, Photophysical Processes, and Photochemistry”
http://www.chem.fsu.edu/reu-links/
Prof. Ed Hilinski
August 1, 2023, 9:00-10:00 a.m.
DLC 123, Tallahassee, Florida

Dirac’s Mystery Instrument

Molecules 2023, 28, 4086, doi: 10.3390/molecules28104086
Student Poster Session
August 3, 2023 in CSL Lobby

NSF-REU: Sunshine Institute for the Interaction of Light with Matter
Department of Chemistry and Biochemistry, Florida State University