Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

Student's Name(s) Fahad Karim

Title of Project Intergrated Optical Setups for Characterizing and Stabilizing Polarization States of Light

To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:

(Responses must be on the form as it is required to be displayed at student's project booth; please do not print double-sided.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher? ☑ Yes ☐ No
   a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

   b. If yes, complete questions 2 –5.

2. Is the student's research project a subset of your ongoing research or work? Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site. ☑ Yes ☐ No

3. Describe the independence and creativity with which the student:
   a. developed the hypotheses or engineering goals for the research project

      Fahad had his own aspiration to solve the problem of changes in light polarization after completing his project in 2018. He realized a trend in the data, as the R and L polarizations he calculated were not the theoretical polarizations. He also noted the implications it has in other disciplines, such as biological imaging and polymer analysis.

   b. designed the methodology for his/her research project

      After characterizing the light, Fahad helped in aligning the optical fiber so that light may be coupled through. After retrieving the pulses at another laboratory connected to the station Fahad was working at, he mounted a QWP followed by a HWP with required angles necessary to compensate for the change in polarization. The only phase of the project that I had to complete for Fahad was calibrating the laser source. Fahad modulated the amplitude of the AOMs and changed the EOM voltages.

   c. analyzed and interpreted data

      Fahad turned the QWP by a particular step size and measured the polarization by saving the data on a USB drive connected to the oscilloscope. After he measured each intensity, he ran the analysis on a code he developed in the summer of 2018 which conducts a regression and F Transformation.

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Regulated Research Institutional/Industrial Setting Form (1C) Continued

Student's Name(s) Youngshin Kim

4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

Fahad was able to conclude how the optical elements were able to alter and measure the polarization and how his analysis could be applicable in various necessities. He independently mounted all necessary components and understood what would happen as a result of the placements. He observed the changes of light intensity on the oscilloscope, but the changes in intensity were created as a result of what he did. Additionally, Fahad conducted his own analysis -I did not aid in any of the computational aspects of his project. He discovered his polarization measurements and stabilizations to be successful for the most part. Fahad interestingly leaves his conclusions open ended. He demonstrates an intriguing quality of always moving forward to solve the next problem.

5. Did the student(s) work on the project as part of a group? ☐ Yes ☑ No
If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.
I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Youngshin Kim	Digitally signed by Youngshin Kim September 20, 2019 11:51 PM	PhD Student
Supervising Adult's Printed Name	Signature	Title
Stony Brook University Department of Physics and Astronomy		09/20/19
Institution		Date Signed (must be after experimentation) (mm/dd/yy)
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Address		Email/Phone