

Personal Statement

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My name is Zoe Siegelnickel and I am an undergraduate studying math at Boston University. I am interested in the International REU in Commutative Algebra because it would be an invaluable opportunity to develop my mathematical background and skill.

Last summer, I completed an REU at UMass Amherst under the supervision of Owen Gwilliam, in which we attempted to classify the orbits of the adjoint action on the twists of 2D and 3D superconformal algebras. I tremendously enjoyed this project, and contributed to its solution by classifying the orbits of the group action of various matrix groups on the complex 2×2 matrices. During the UMass REU, I got the opportunity to attend a summer school on Mathematical QFT, which, along with the experience of participating in a research environment, cemented my interest in attending graduate school and pursuing math professionally. As a neurodivergent student, I often struggle with standard features of college coursework, like taking exams and retaining information that is presented in a lecture format. This has not only affected my academic performance significantly, but has also made it harder for me to evaluate my own mathematical potential since my performance on exams is consistently poor, especially in more computational subjects. However, my experience at the UMass REU showed me that I thrive in a research environment, where I can pursue problems that truly interest and engage me. This experience also showed me that I learn far better in a research environment where all the math I am learning fits clearly into the background for a problem or result. I know now that my understanding of group theory and linear algebra was solidified far more by working on the twists project than it would have been in a classroom or independent study environment. For these reasons, the UMass REU has intensely motivated me to seek out more research opportunities in math, which I have started to do by reaching out to Professor Brian Williams to do an undergraduate thesis and setting up a directed study with Professor Bertonoli Meli on Local Class Field theory, both of which began this semester.

The UMass REU, my ongoing thesis work, and my coursework in algebra and algebraic number theory

have led me to develop a broader interest in algebraic geometry. My graduate algebra 2 professor has motivated much of the commutative algebra we have done in class with algebraic geometry, and although I was already fairly comfortable with the basics of commutative algebra, seeing a geometric motivation and in particular, thinking about relating characteristics of a ring to the geometry of the prime spectrum of that ring has reignited my interest in commutative algebra. In fact, much of the math that I have seen so far in college has included some aspect of commutative algebra, and the International REU would provide me with an invaluable opportunity to explore this area of math that has been foundational in my education and that I have grown to greatly appreciate.

I believe that my algebra coursework, along with my previous research experience qualifies me for this opportunity, and it seems that the environment at the International REU would be especially conducive to my productivity and education, allowing me to make meaningful contributions to whatever project I end up working on. I would love the opportunity to develop my mathematical skill and connect with the international math community, and I believe that the International REU would be the ideal environment in which to do so.