

Davidson Fellow
Rebecca Chen

\$10,000 Scholarship Recipient



Personal Info

Age: 16
Carmel, Indiana

School, College and Career Plans

Rebecca is a senior at Park Tudor School in Indianapolis, Indiana. She is applying to Harvard, Stanford, Yale, Princeton, and MIT for college and plans to major in computer science or mathematics. Rebecca will pursue an academic career related to those two fields.

Davidson Fellows Submission: Mathematics

Rebecca's project is, "Generalized Yang-Baxter Equations and Braiding Quantum Gates." The Yang-Baxter equation provides a systematic method for discovering braid group representations, important in topology and quantum information science. Using algebraic computations and computer numerical checking, she classified three families of 8×8 matrix solutions to the generalized Yang-Baxter equation. These solutions provide a way to generate braiding quantum gates needed in quantum computing, and contribute to the ongoing effort to build a large-scale quantum computer, bringing advances in fields as far ranging as materials sciences and cryptography.

Biography

Rebecca developed an interest in mathematics at a young age and has always enjoyed the challenge of unraveling a difficult problem. She entered her first math contest in fourth grade and was immediately drawn in by the wide variety of fascinating questions. She feels that math allows her to contribute positively to society while pursuing her passions.

Rebecca's research is potentially an important step toward building a working quantum computer. Being more efficient than a classical one, a quantum computer might be used in tasks such as modeling complicated molecules, which would increase our understanding of the microscopic world, or simulating quantum physics, which would have important implications for cutting-edge technology in that field. During her final year of high school, Rebecca will take Calculus II, English Literature and Composition, and an independent study in computer science, among other classes.

Along with math and computer science, Rebecca has numerous interests and activities. She enjoys writing poetry, reading science fiction, playing board games, spending time with fellow math enthusiasts in a Sunday afternoon club at a local university, learning about chemistry and writing games in Java. Rebecca is on the editorial board of the *Artisan*, a nationally recognized high school art and literary magazine. She is in the Japan club, on her school's golf and debate teams and has played violin in the school orchestra.

Please see next page.



Davidson Fellow
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(cont.)

- 2011 Davidson Fellow
- 2011 Intel International Science and Engineering Fair, Fourth Place in Mathematical Sciences
- 2011 Research Science Institute (RSI) Scholar
- 2011 US National Chemistry Olympiad exam Top Twenty
- 2011, 2010, 2009 AIME three-time qualifier
- 2011 American Chemical Society (ACS) Indiana section exam, Second Place
- 2010, 2009 American Computer Science League (ACSL) regular season contest, perfect score
- 2010 NCWIT Indiana Aspirations in Computing Award, Winner
- 2009 ACSL All-Star Contest Eighth Place
- 2009 Math Prize for Girls in New York, Honorable Mention
- 2009 Miami of Ohio High School Programming Contest, Second Place
- 2008 Rose-Hulman High School Mathematics Contest, Fourth Place

Community Activities

Rebecca is a member of a team that designed a website for Connect2Help, a central Indiana nonprofit organization that connects people in need to human service providers. She is actively involved in the Legacy Initiative Project, which publishes oral and written accounts of veterans' wartime experiences in a *Words of War* book series. Rebecca frequently volunteers at Carmel High School swim meets.