



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Chiyoung Kim	Project Number S1808
Project Title Three's a Crowd: An Investigation of the Absence of an Asymmetric, Stable Three-Body System	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Except for figure-eight systems, trinary stars that are non-hierarchical and stable are extremely rare, or do not exist, as they have currently not been observed. This research investigated the cause for such an absence of these systems.</p> <p>Methods/Materials A simulation attempting to simulate and cover as many possible three-body systems was set up to find stable, non-hierarchical orbits.</p> <p>Results The bodies either collided or flew off, resulting in an unstable system. There were, however, systems in which one star escaped and the final two stars orbited around each other, approximating a two-body orbit as the third body flew farther and farther away, i.e. becoming a hierarchical system. Some cases, however, showed a stable orbit between three bodies for the time period of three years.</p> <p>Conclusions/Discussion The results show that only in very special cases does this happen, while most configurations lead to unstable orbits. Because the research looked for cases that may occur in nature, the special cases found in this research are cases that are important in theory but not for practical applications.</p>	
Summary Statement The project investigates a special case of the three-body problem and describes the results and the trivial stable orbits.	
Help Received Dr. James Choi helped me debug the code when I could not find the source of the error.	