



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Janice S. Leung	Project Number S1507
Project Title Cosmic Ray Shower Array Reconstruction	
Abstract Objectives/Goals My goals of this project is to analyze these events of these ultra-high energy cosmic ray showers and characterize their energies and apparent direction of origin. Methods/Materials The method is which I followed was to 1)Open web browser to www.chicos.edu/arraydata/showers/2)Open raw data file- list of sites involved in a shower.3)Create a map grid representing the sites that were hit. Sites that were hit are shown with color circles, corresponding with the legend.4)Create Intensity vs Time map 5)Use reconstruction software to analyze the data and open the reconstructor page (rextor).6)Tell the software to ignore the hits that seem to be accidental by comparing them with the other sites. 7)Make a LDF (Lateral Distribution Function) plot Results After months of reconstructing the showers, I loaded all the new information into web pages for easy access. The link itself shows the result of a shower; the TRG in the link is where the shower hit the hardest, therefore it should the pinpoint of the shower should be somewhat above the site along with the date and time from which it got hit. An example shower- [01-04-05 07:07:28 PST UTC: 3187696048 ns: 337624576, trg:MaranathaHS, trms:1.15, theta:36.03, phi:136.89] Conclusions/Discussion My hypothesis is both correct and incorrect. Most of the data showed that most cosmic ray shower pin point origins are from both west and north but the number of hits that occurred that wasn't from the west and north regions also got numbers very close to west and north. There isn't enough data to prove my hypothesis correct because it is not yet significant. But we are able to conclude that in between the years of 1992 and 2004, most the cosmic ray showers were pinpointed to have been from the north and west. For future research, I would like to continue analyzing further data received into Caltech archives daily; every minute there are new sets to data to be evaluate. I would also like to begin on finding possible pinpoint locations from space that would likely emit the most cosmic rays.	
Summary Statement The main purpose of my project is to provide a possible answer to the question where do ultra high energy cosmic rays originate from.	
Help Received Worked under the guidance of Theresa Lynn PhD. (CHICOS Project Coordinator) at Caltech	