



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Krishna Choudhary	Project Number J0107
Project Title Twinkle, Twinkle, Little Star: Turbulence in the Kitchen	
Abstract Objectives/Goals The objective of my project is to investigate the nature of turbulence produced in heated air. The goal is to measure the properties of time variability of the refractive index distribution over the source of heat. Methods/Materials The turbulence was produced by a heated stove in the kitchen. The laser beam propagated through the turbulent air before focusing on a sheet of graph paper. Because of the turbulent motion of the heated air above the stoves, the laser point on the graph sheet moved from my control point. The control point was determined by the point the laser on the graph sheet, when it travelled in a straight line. I took ten second videos for each heat level with a commercial Kodak digital camera and I repeated the experiment three times. I determined the distance the of the laser beam from the control point on every fifth frame. The time of each frame was determined from a clock in the field of view. Results The distance between the laser beam and the control point increased as a function of the heat level. Within the measured range of heat, the beam displacement was nearly liner. Conclusions/Discussion The results of the experiment show that as the heat level increases, the refractive index of the air pockets increase. This is because the laser beam bends due to the refraction caused by heated air. Understanding the nature of air turbulence and refraction is a vital part in designing "adaptive optics" for obtaining sharp images through turbulent medium. The application of adaptive optics benefits astronomical imaging and remote sensing of earth resources from space. Such studies through turbulent water would help underground photography.	
Summary Statement My project investigates the Twinkling of Stars	
Help Received Mother helped glue the Board	