California Science Center

CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Colin S. Gaines

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
Whether Weather Affects Laser Based Telecommunication Systems

Science Fair Use Only

J0611

Division
X **Junior (6-8)** _ **Senior (9-12)**

Preferred Category (See page 5 for descriptions.)
6 - Electricity & Electronics

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: The objective of this experiment was to determine how various weather conditions affected the transmission of a laser beam in a telecommunication system, and how transmission quality could be improved.

Materials and Methods: Different sprinkler heads on a pipe connected to a hose simulated varying degrees of rain, and a humidified was used to simulate fog. The simulated weather conditions then interrupted the laser beam and the intensity of the beam was measured. To see exactly what the rain would do to a telecommunication system a VCR was connected to a laser that sent the VCR signal to a receiver connected to a television. The weather was simulated and the decrease in picture quality seen on the TV screen was documented. Pulsing the laser beam and doubling the intensity of the beam were tested as a means to improve transmission quality.

Results: As the intensity of the simulated weather conditions was increased the disruption (measured in mW and subjectively) was found to increase. Pulsing only marginally increased reception quality and doubling the intensity of the laser system dramatically improved transmission quality.

Conclusion: My conclusion was that weather does indeed affect laser transmission and that more intense storms cause greater disruption. Increasing the laser beam#s intensity was found to be the most successful way to improve transmission trough various weather conditions.

Summary Statement (In one sentence, state what your project is about.)
I tested how various weather conditions (fog, mist, drizzle, light, medium, and heavy rain) affect the intensity of a laser beam and quality of a video transmission in a telecommunication system, and how to improve transmission quality.

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.