



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

<p>Your Name (List all student names if multiple authors.) Heather M. Black</p>	<p>Science Fair Use Only</p>
<p>Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) The Lines Inside: Holographic Interferometry & Thermal Expansion</p>	<p style="font-size: 2em; font-weight: bold;">S1403</p>
<p>Preferred Category (See page 5 for descriptions.) 14 - Physics & Astronomy</p>	<p>Division <u>S</u> Junior (6-8) <u>S</u> Senior (9-12)</p>
<p>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.</p> <p>Objective: By using interference patterns from a double exposed holographic plate, determine minute amounts of expansion of an object changing temperature.</p> <p>Materials and Method: First, construct and test a vibration free environment in which to conduct holography. Then, after heating a pyrex beaker, place it in the vibration-free apparatus and take a first exposure. Wait for a designated amount of time and then take a second exposure of the beaker. From the constructive and destructive interference lines that take place, measure the amount of contraction that took place by interpreting the pattern in wavelengths.</p> <p>Results: The holographic plates made to date show definite evidence of movement happening with the beaker after being heating and then allowed to cool. The varying patterns observed so far suggest that the beaker does not always contract symmetrically.</p> <p>Discussion: Quantifying the results proves challenging, but analysis work is still being done in order to find a clear relationship between the lines, temperature change, and the amount of expansion. It may be possible to use this method of measuring small amounts of change to determine the coefficient of expansion for a solid material.</p>	
<p>Summary Statement (In one sentence, state what your project is about.) By using interference patterns from a double exposed holographic plate, determine minute amounts of expansion of an object changing temperature.</p>	
<p>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. Experimenting conducted at North Salinas High under supervision of Jeff Sweet, Write-up edited by Mr. Sweet, Analysis help from Dr. Gareth Williams of SJSU.</p>	