PHYSICS DEPARTMENT ORAL PRESENTATIONS

Presenter	Title	Description	MCLT	Start -End	Day
Sheyla Trudo	A Computational Approach to Modeling Vehicle Braking	A model for vehicle braking in 1D and 2D is developed. Due to the unique dynamics of vehicles, the coefficient of friction between the tires and the road depends on a slip parameter. Counterintuitively, the largest braking torque does not lead to the shortest braking distances!	105	1:00 -1:15 PM	F
Tyler Peterson	Paraxial Ray Optics and the Invisibility Cloak	Lenses and standard optical components are used to demonstrate a 3-D, transmitting, passive, continuously multidirectional cloak for small objects in the visible light spectrum. Commercial ray optics software is used to model the cloaking behavior, and a succinct formalism is presented that yields perfect optical cloaks in the paraxial limit.	105	1:15 -1:30 PM	F
Alex Hart	Thermoacoustic Heat Pump	A thermoacoustic heat pump was designed, then constructed from an audio speaker, a wooden box, polycarbonate tubing, and an aluminum cap. The heat stack was made using celluloid film, fishing line, and spray adhesive. The material of the stack walls and the placement of the stack within the resonating tube were varied to optimize the efficiency of the heat pump.	105	1:30 -1:45 PM	F
Michelle Zhai	Moving Clocks Run Slower: Calculating Time Dilation With an Android App	Have you heard that moving clocks run slower? Time dilation is a prediction of Einstein's Special Relativity, confirmed by experiments using atomic clocks. In this project, I have developed an Android app to calculate the user's cumulative time dilation, using GPS sensors to track motion. The app can also show the hypothetical time dilation effect if the speed of light were much smaller.	105	1:45 -2:00 PM	F
Jesus Rosales	Investigation of the Phase Diagram of Functionalized Dicarboximide Diblock Copolymers Using Wide Angle X-Ray Scattering and Optical Birefringence.	Solid polymer electrolytes are an alternative to Li-ion materials in battery construction. We synthesize functionalized diblock copolymer electrolytes and investigate their nanostructure. A 55% ethylene oxide diblock shows evidence of self-assembly. This morphology forms conductive regions connecting the electrodes, which could enhance battery performance.	105	2:00 -2:15 PM	F

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Patrick Opie	Physics in Computer Graphics	Physics-based simulations play a significant role in interactive design. My presentation considers models of inextensible hair and fur, buoyancy, and wave propagation. I discuss the applications of these physical models into simulation environments such as OpenGL or the Unreal Engine.	105	2:15 -2:30 PM	F
		POSTER PRESENTATION SESSION: Morken Center 1st Floor **SNACK BUFFET**: Atrium	**Floor 1**	**2:30 -3:30 PM**	**F**
Jonathan Julius	Frequency Analysis of Trombone Tone	Single notes were played on a trombone, using mouthpieces of various rim sizes, and digitally captured. The frequency spectra were analyzed and compared to try and quantify musical characteristics of the sound. From this, the effects of each mouthpiece were determined.	105	3:30 -3:45 PM	F
Erik Hogeberg	Railgun Physics: An investigation into Electrodynamics	A charged capacitor bank is discharged through copper rails to accelerate a metallic slug. This railgun demonstrates an application of the Lorentz force. This presentation includes the theory behind a railgun, engineering difficulties, transfer efficiency, and concludes with a demonstration	105	3:45 -4:00 PM	F
Sean Larkin	Heat of the Sun: Design Optimization of the Mesh Solar Heater	A solar heater captures the energy of the sun's rays, converts it to thermal energy to heat up air, then pipes it into a building. A "mesh solar heater" is the cheapest, easiest to build and most efficient form of homemade space solar heater. This project determines the optimal number of mesh layers and optimal hole size and also analyzes the overall viability of this design. Topics include the economic and environmental benefits of using less energy, the difficulty and cost of construction, and the practicality of such a design in the cloudy Pacific Northwest.	105	4:00 -4:15 PM	F