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Physics 420: Presentation Synopsis

This demonstration was presented to two high school Physics classes in British Columbia's Lower Mainland. By using students' knowledge of visible light and its properties as a base, I was able to effectively put across new physical concepts and highlight areas where these concepts meshed with previous ones. The presentation of this project dealt with implications for electromagnetism, spectroscopy, environmental issues (global warming, holes in the ozone layer), infrared and other types of astronomy, telecommunication, and infrared imaging, and drew several links between these different fields of Physics.

Students responded very well to this presentation. During the preparation of this demonstration, I made a conscious effort to stay away from math, as I felt it would slow down the presentation, and I felt I may lose the attention of the students. The closest I ever got to using math was when I described the relationships of inverse proportionality between the wavelength and frequency of electromagnetic light, which I felt was an important concept to grasp. It was necessary to give particular focus to the idea of black body radiation. Students had no trouble visualizing the theoretic objects absorbing all wavelengths (it helped when I linked this idea to a black object absorbing all wavelengths of visible light), but they had difficulty linking this to the characteristic emission spectrum. Also, it was necessary to remind the students more than once that while heated objects emit infrared radiation, infrared radiation is not heat itself, it is merely emitted by heated objects.

The demonstration itself was very effective in putting across the ideas of infrared transmission, absorption, reflection and emission, helping link its nature to that of visible light. While I had planned to use several heat producing objects in my demo, I opted for using a portable stove top. I had planned on using an incandescent light bulb with a variac in order to show that it emitted at the infrared before it became visible, but the filament appeared very small and dim through the camera. The stove top, on the other hand, emitted very brightly before it started to glow. The students were also very impressed with the "invisible flashlight" demo, where the infrared filters were placed on the flashlight, blocking out its emitted visible light, but transmitting the infrared. This demo also allowed us to observe the reflection of infrared radiation. Finally, we observed the pulsed infrared emission from a television remote control, which allowed for an aside on telecommunication. This spurred many questions from the students about their cell phones and computers.

This presentation was successful in creating interest in the students and stimulating discussion on physical concepts. The camera demonstration helped concretize the concepts being discussed and added a "cool" factor necessary to keep the students' attention. Together, the presentation and demonstrations allowed me to introduce new physical ideas to the students and to discuss the practical applications of infrared light.