

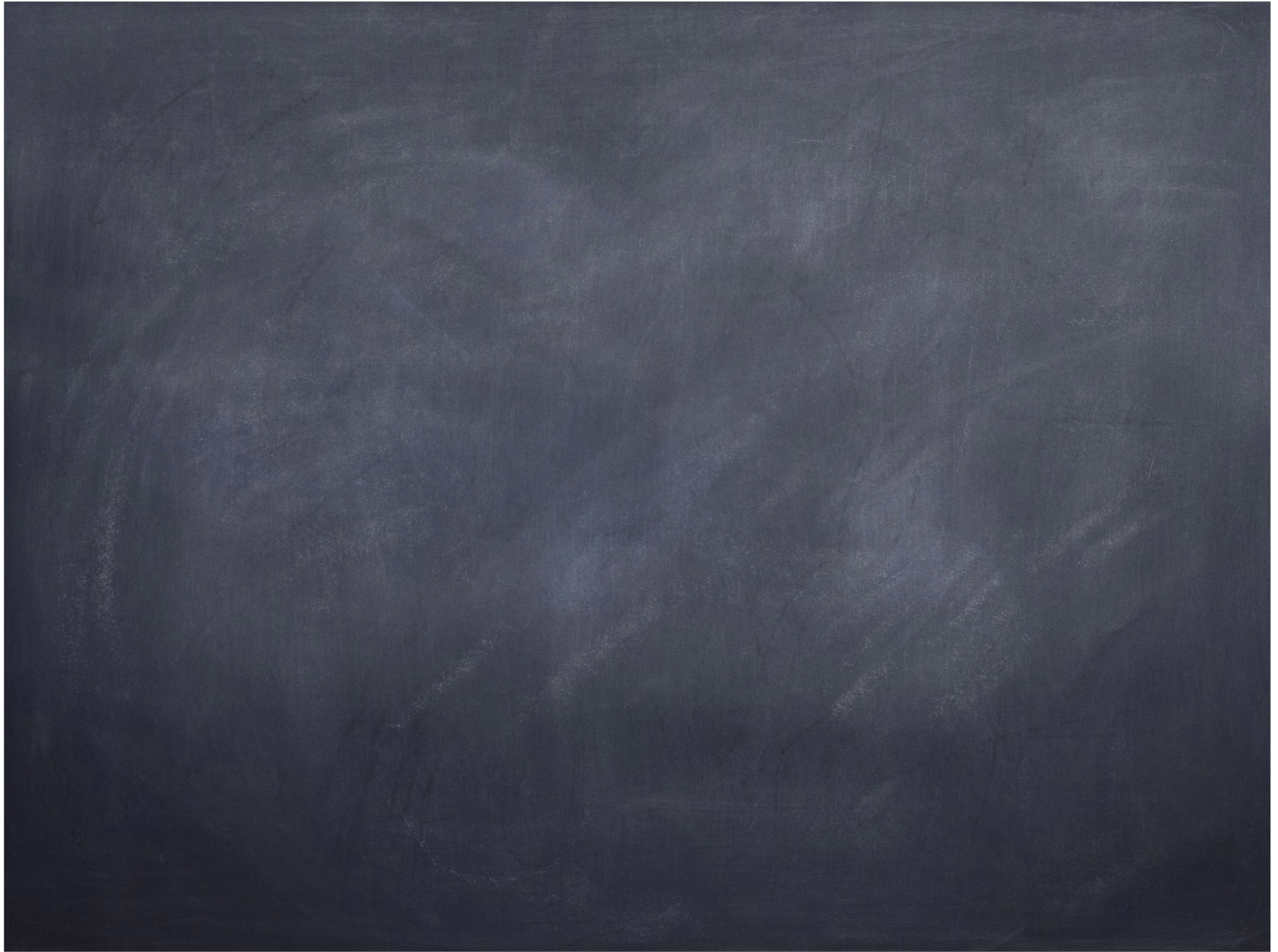
Let there be light!

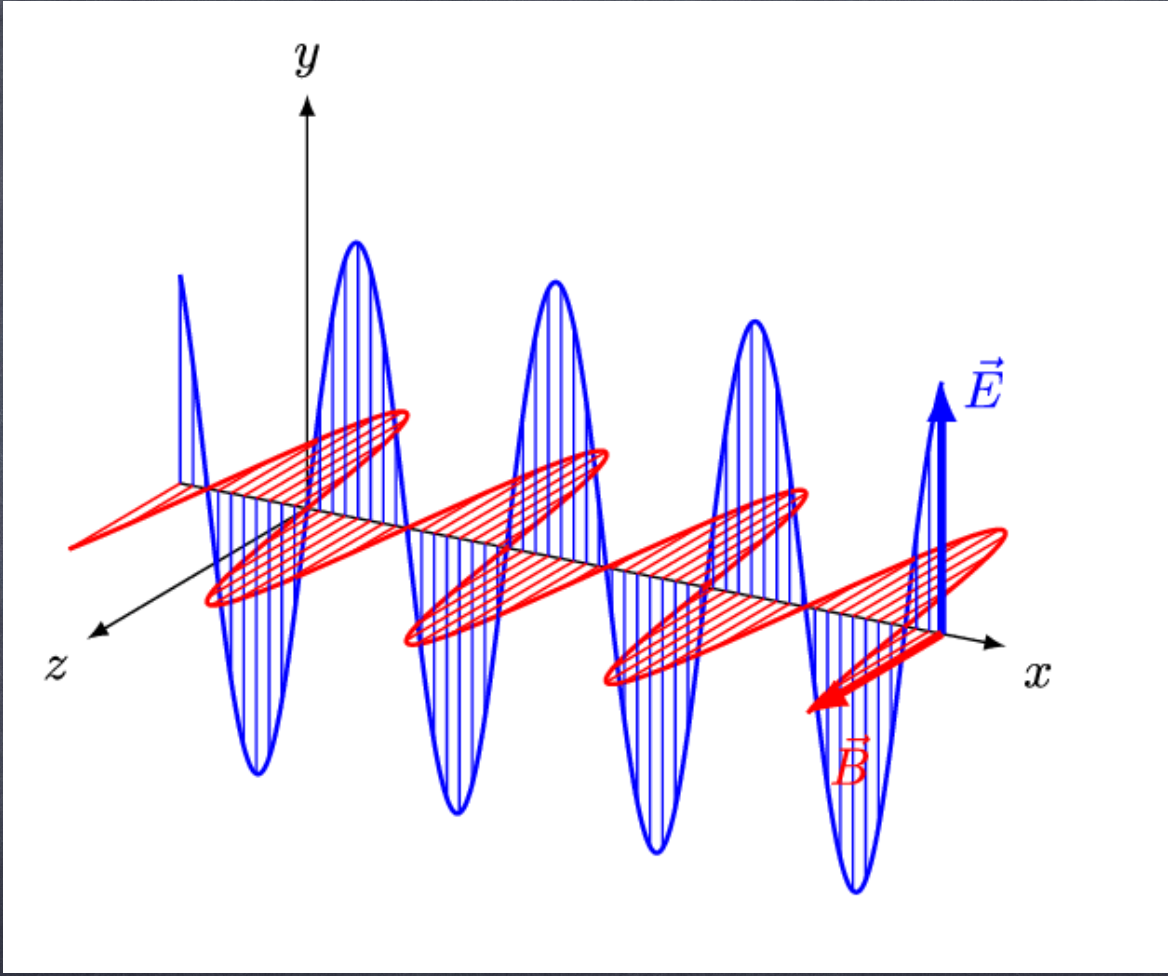
PHY 117 HS2023

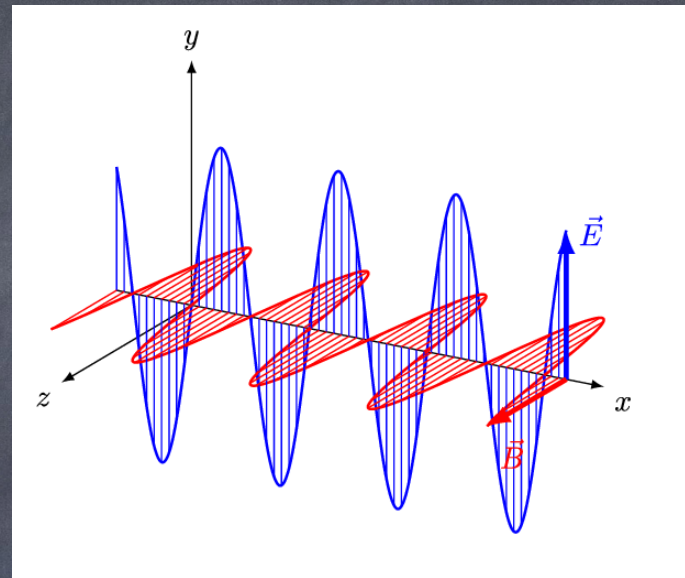
Week 13, Lecture 1

Dec. 12th, 2023

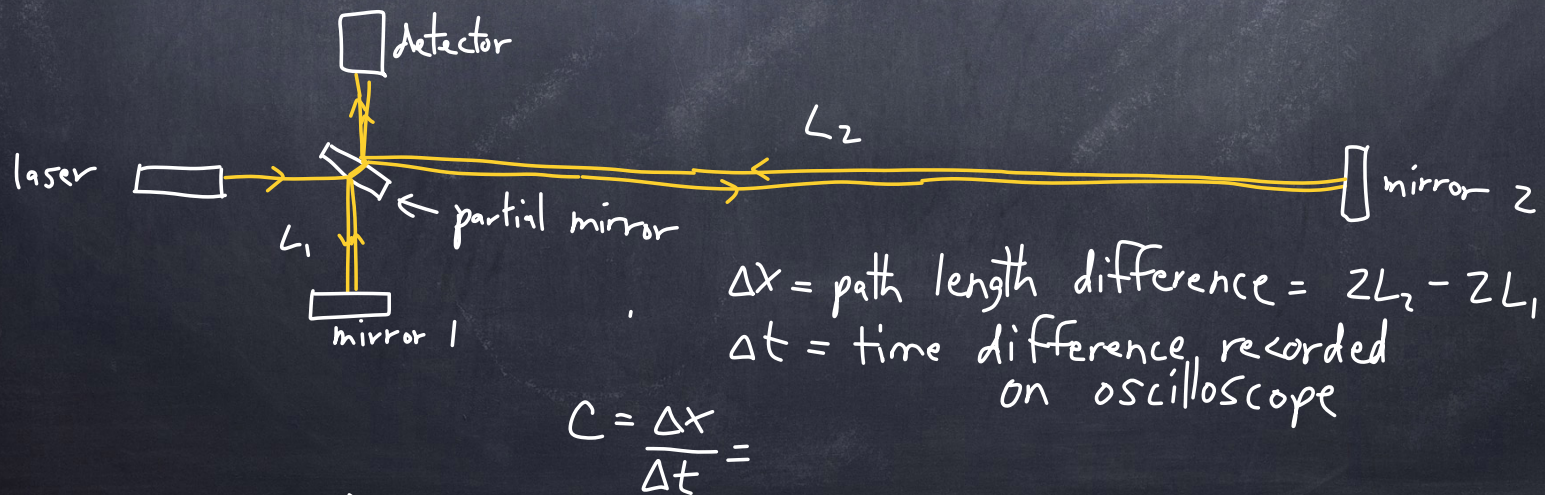
Prof. Ben Kilminster

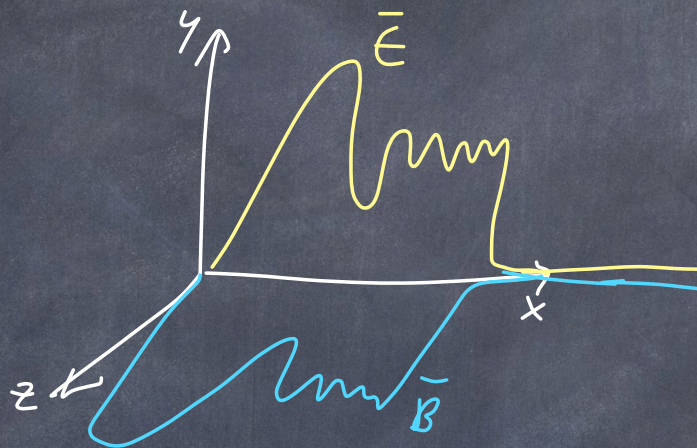


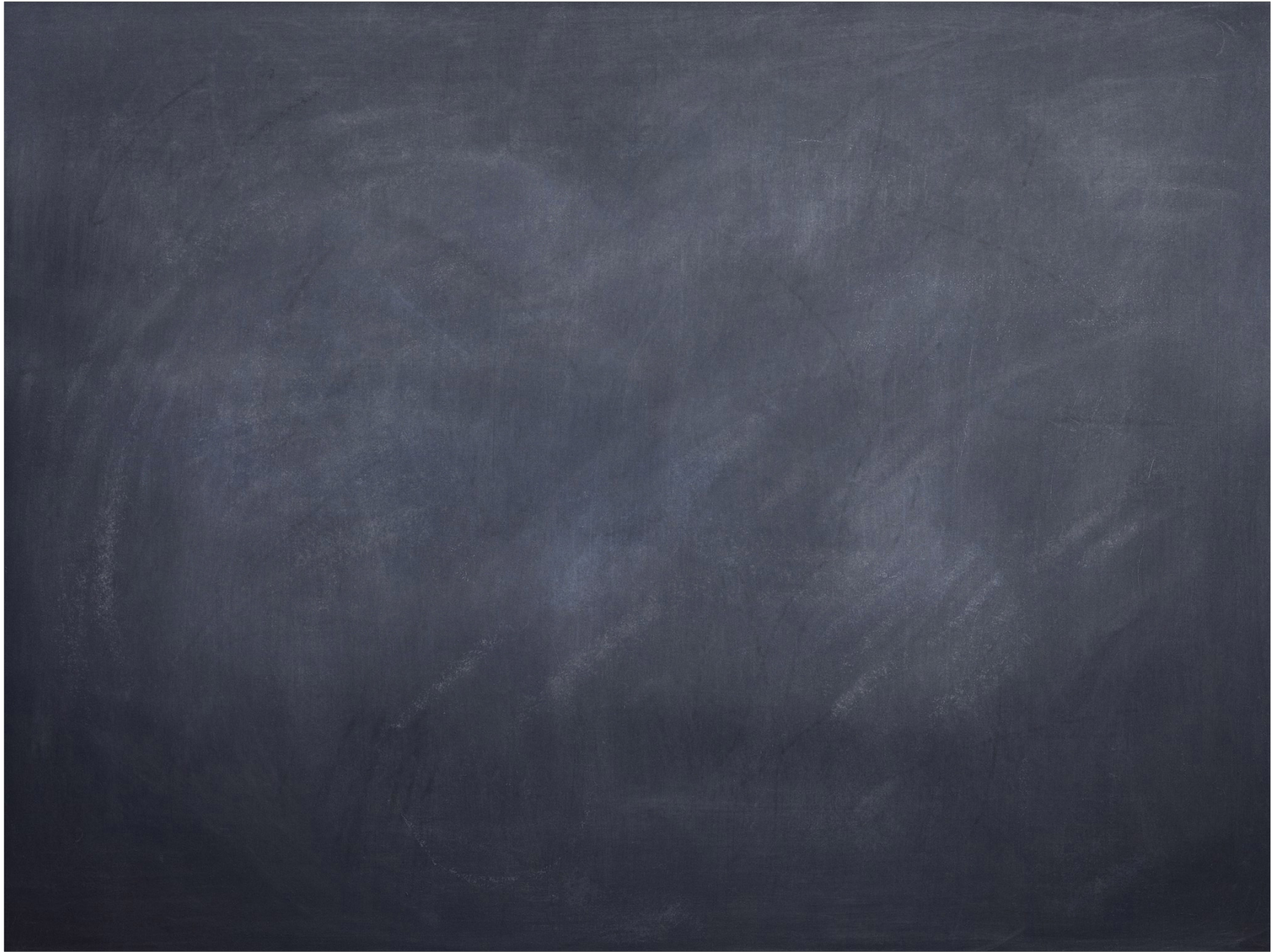




speed of light measurement







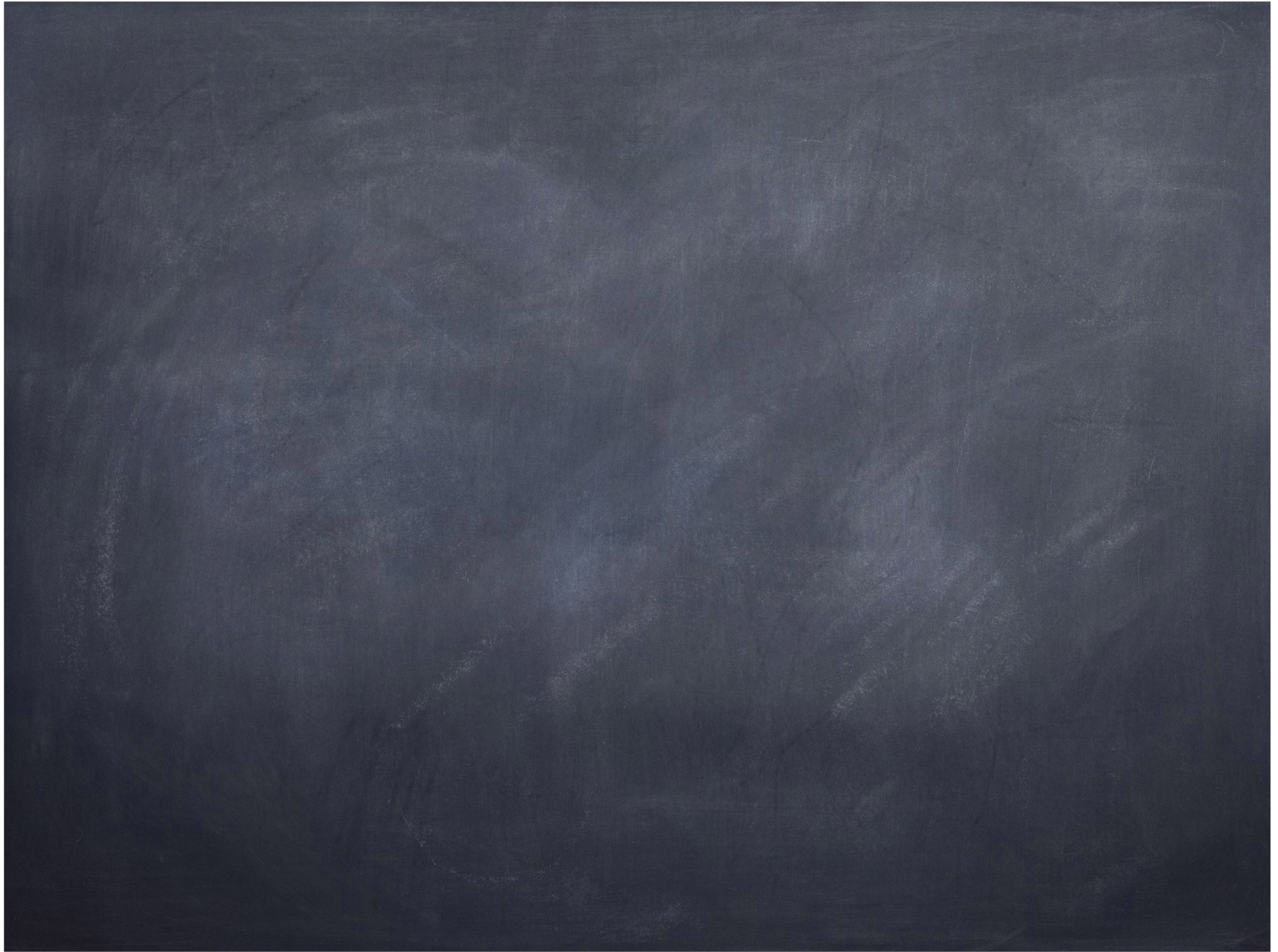




Table 13.1: Rough classification of electromagnetic spectrum and its applications.

Class	Wavelength λ	Frequency f	Application
Radio waves	$> 1 \text{ m}$	$< 300 \text{ MHz}$	Radio & TV broadcast, telecommunications maritime navigation
Microwaves	$1 \text{ mm} - 1 \text{ m}$	$300 \text{ MHz} - 300 \text{ GHz}$	Microwave oven, radar, mobile phones, 4G, Wi-Fi, satellite communications, GPS, cosmic microwave background
Infrared	$750 \text{ nm} - 1 \text{ mm}$	$300 \text{ GHz} - 400 \text{ THz}$	Thermal imaging, TV remote control, night vision, bio imaging, optical fibers
Visible	$400 \text{ nm} - 750 \text{ nm}$	$400 \text{ THz} - 750 \text{ THz}$	Human vision, illumination, photography, microscopes, lasers
Ultraviolet	$10 \text{ nm} - 400 \text{ nm}$	$750 \text{ THz} - 30 \text{ PHz}$	Disinfection, dental curing, black lights, sun tanning, counterfeit detector
X rays	$0.01 \text{ nm} - 10 \text{ nm}$	$30 \text{ PHz} - 30 \text{ EHz}$	Crystallography, radiation therapy, medical imaging, security scans
Gamma rays	$< 0.01 \text{ nm}$	$> 30 \text{ EHz}$	Radioactive sources, cancer treatments, PET scans, cargo container screening

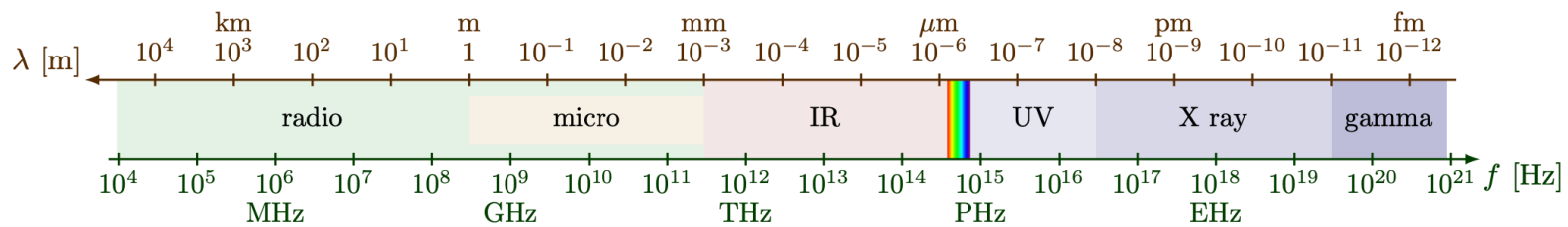
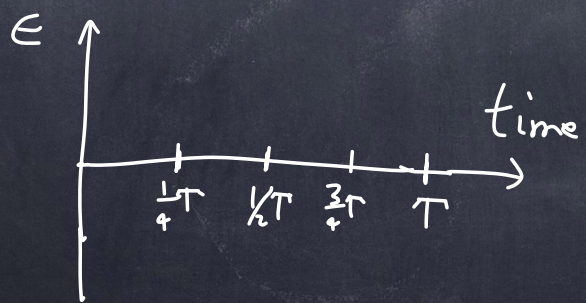
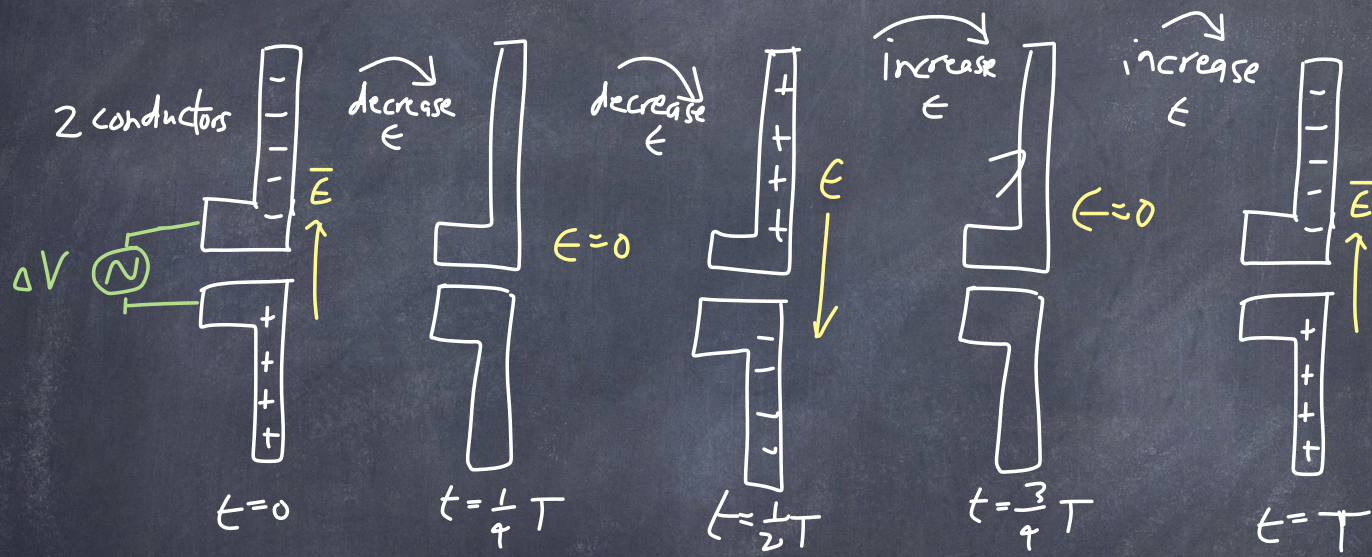
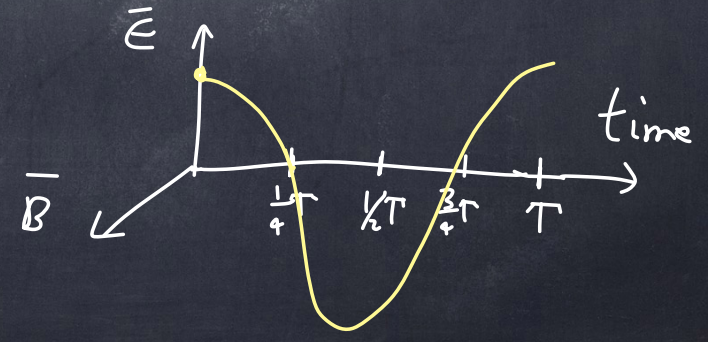
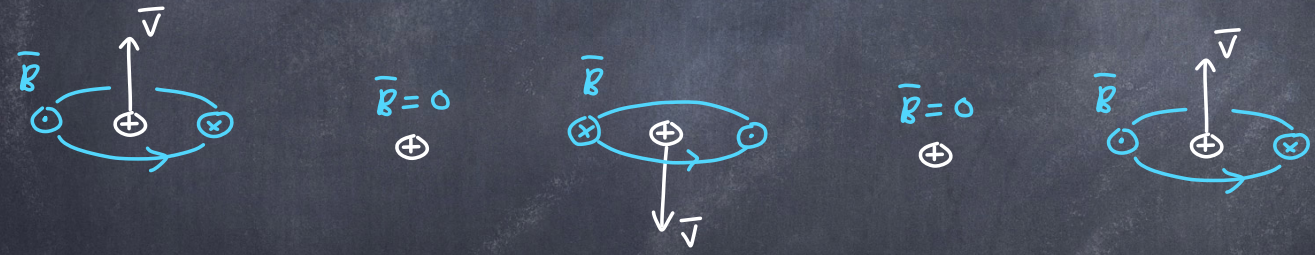
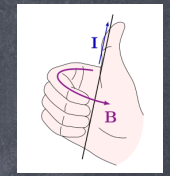
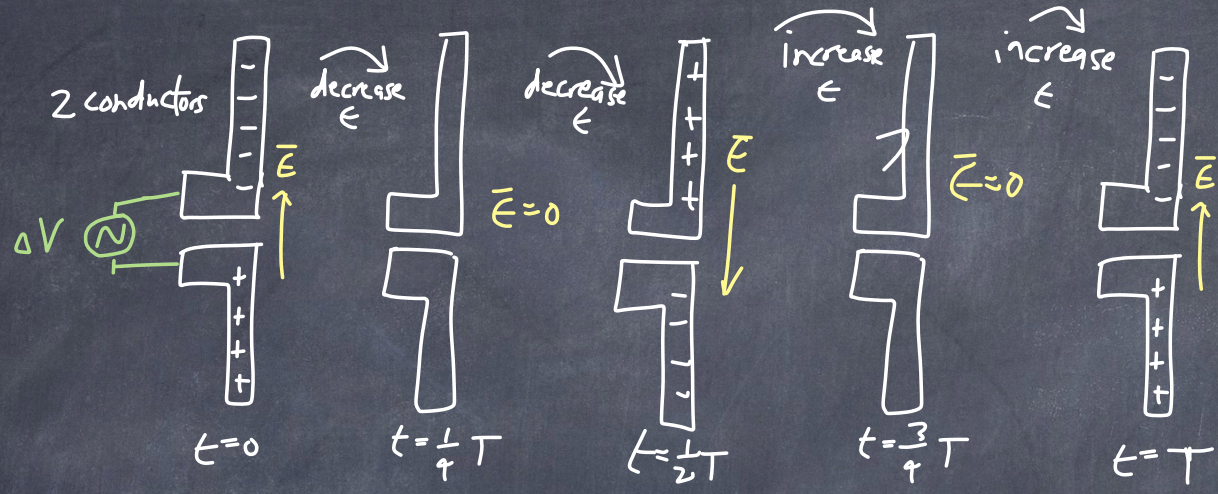
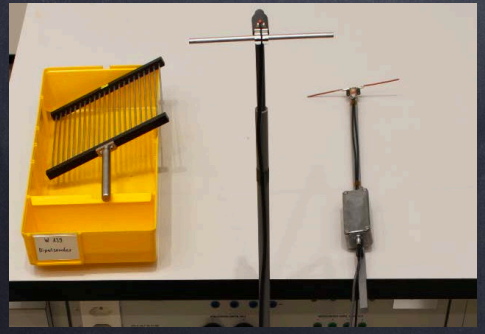
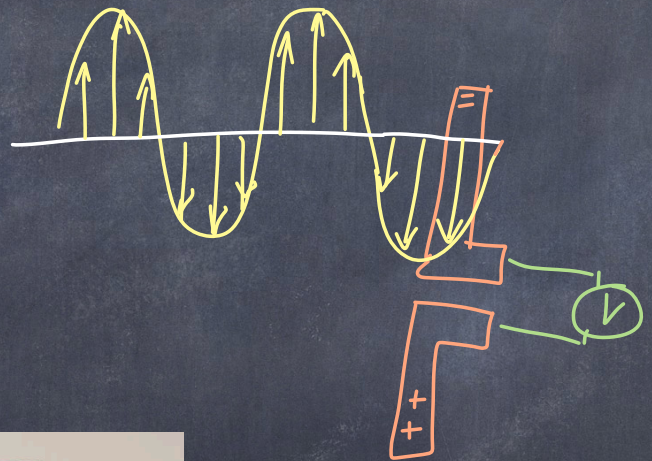
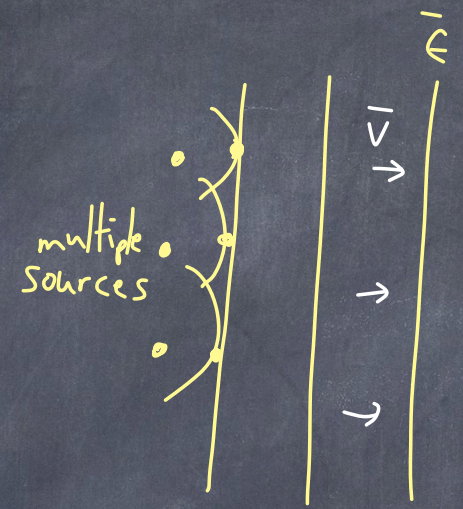


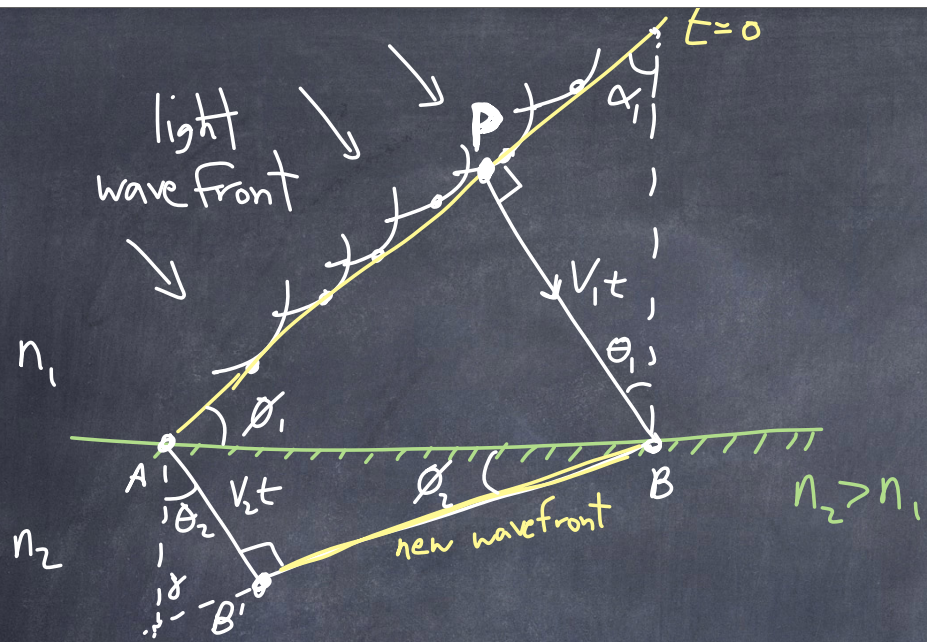
Figure 13.2: Electromagnetic spectrum with rough classification.

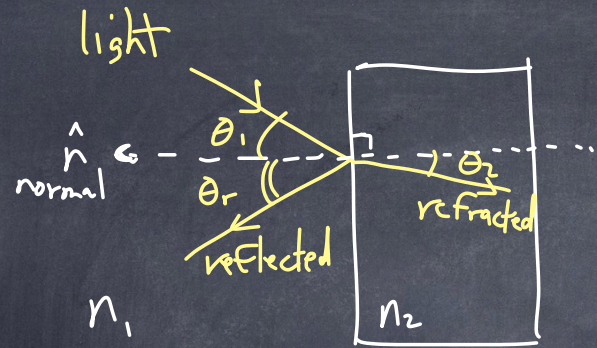


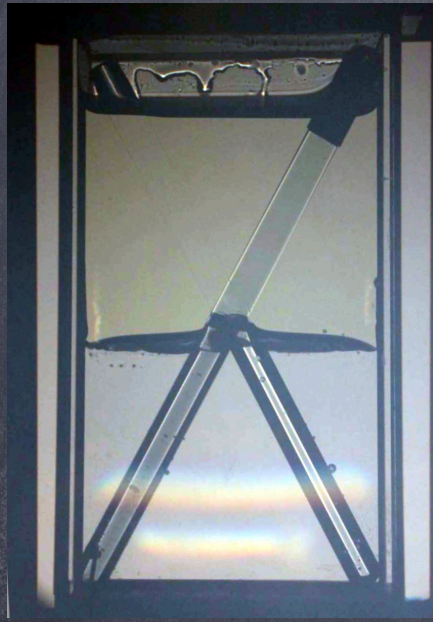


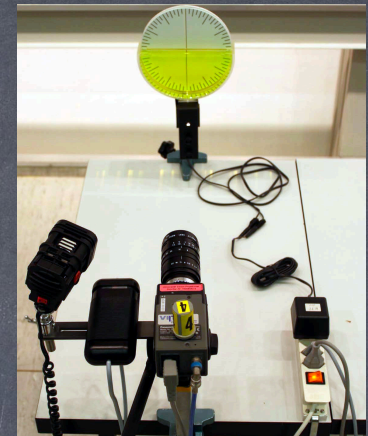
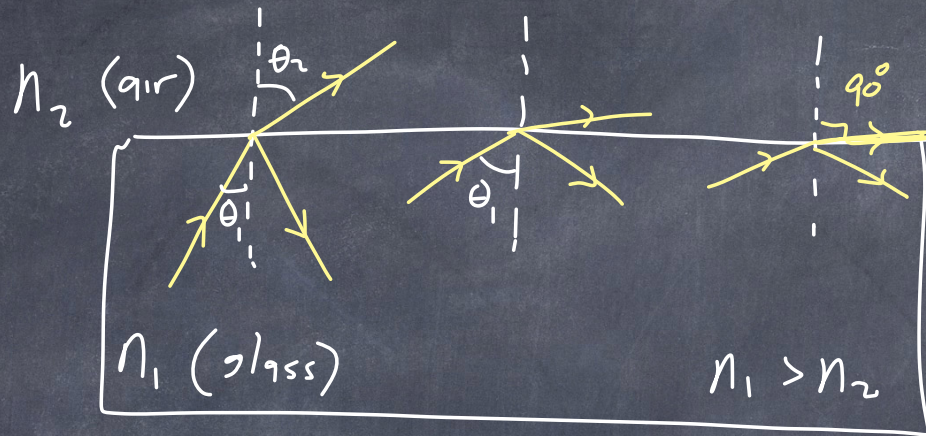




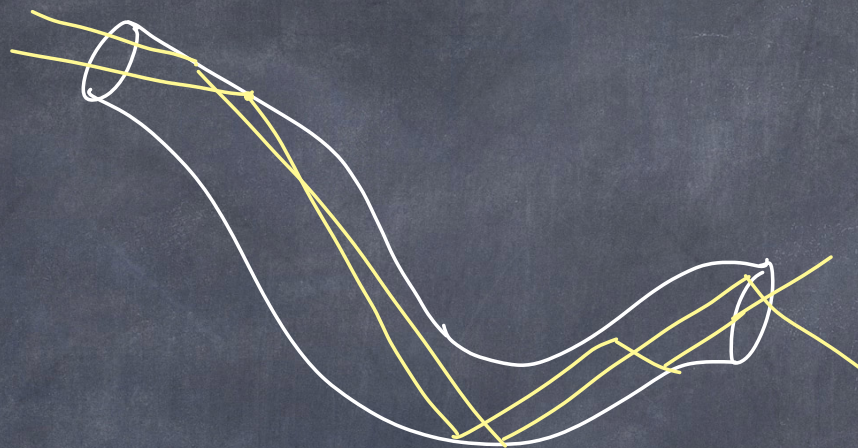


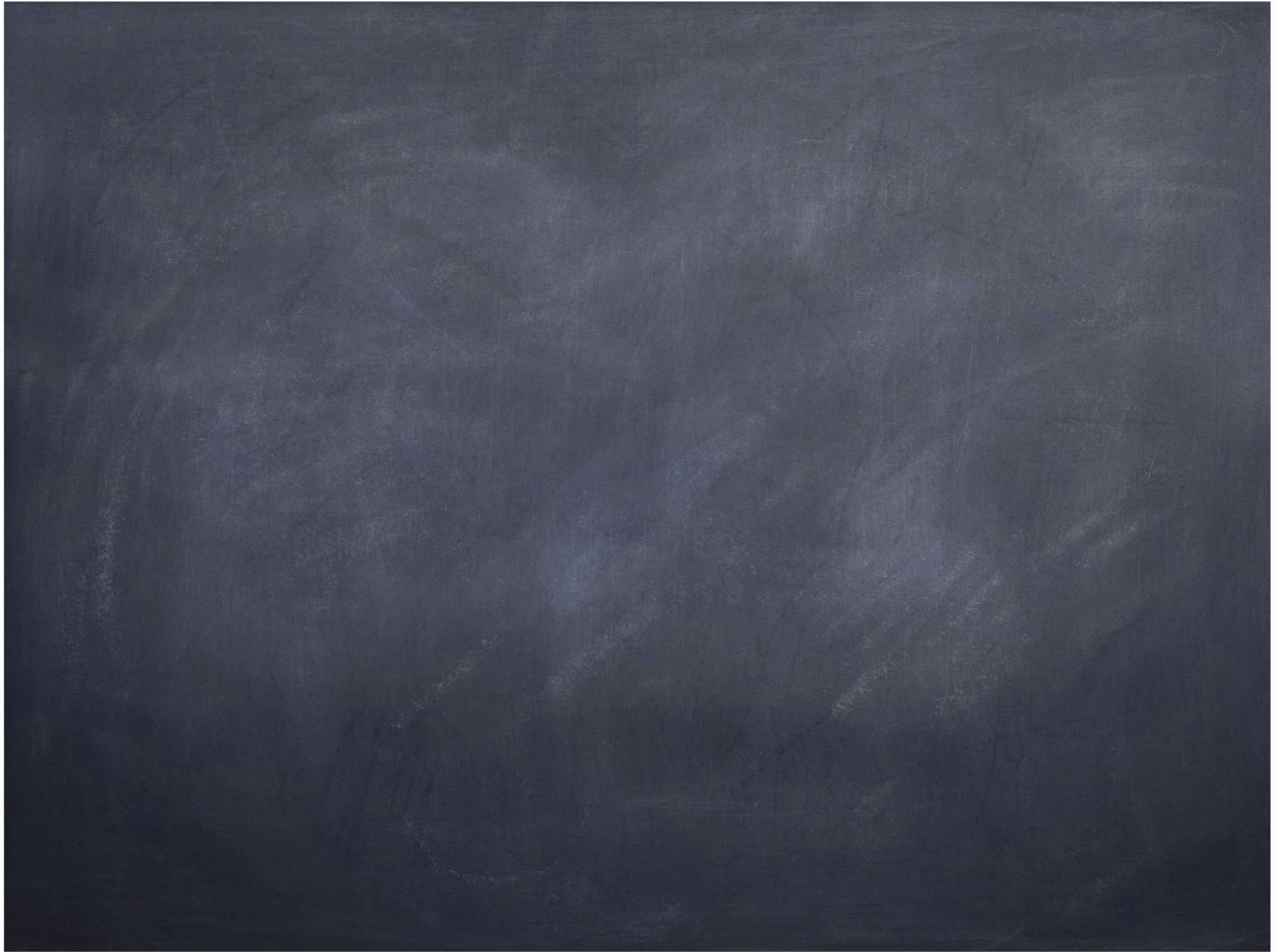


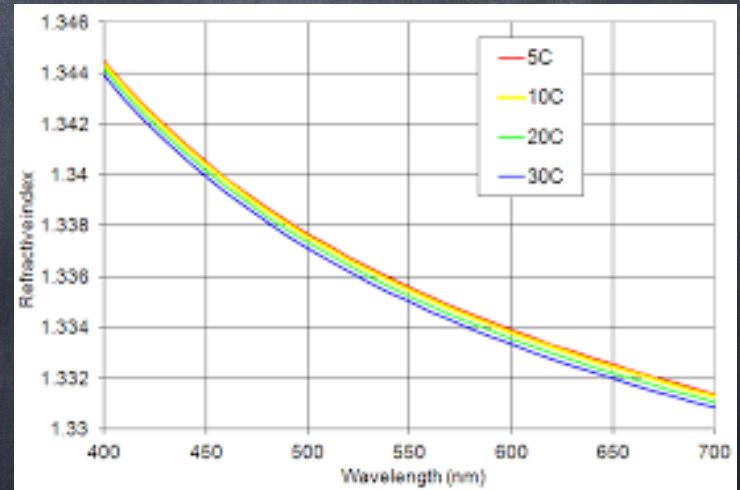
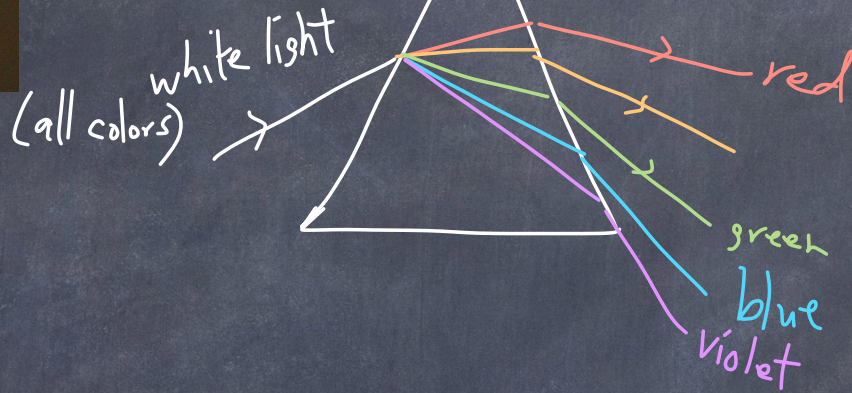
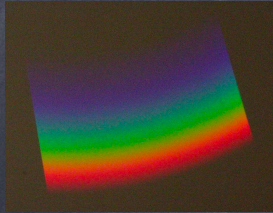


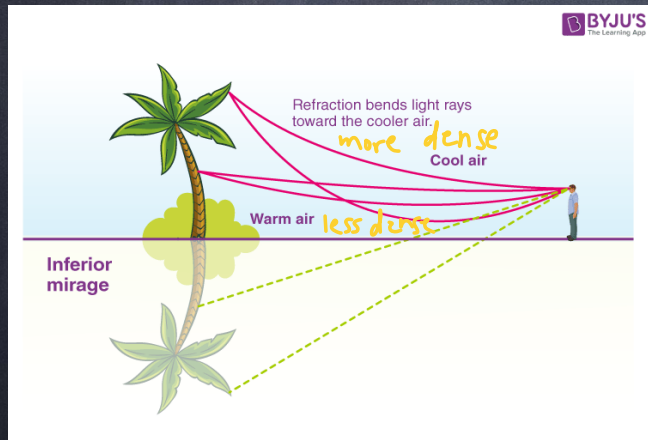
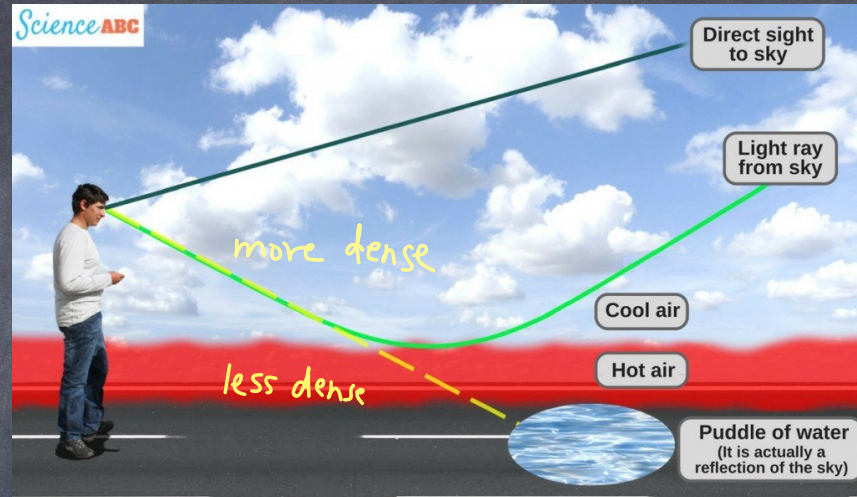
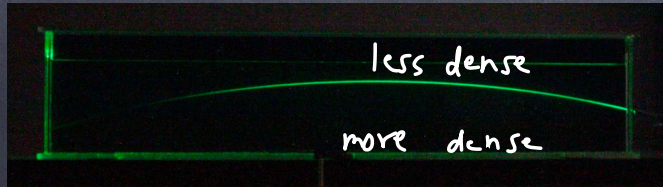


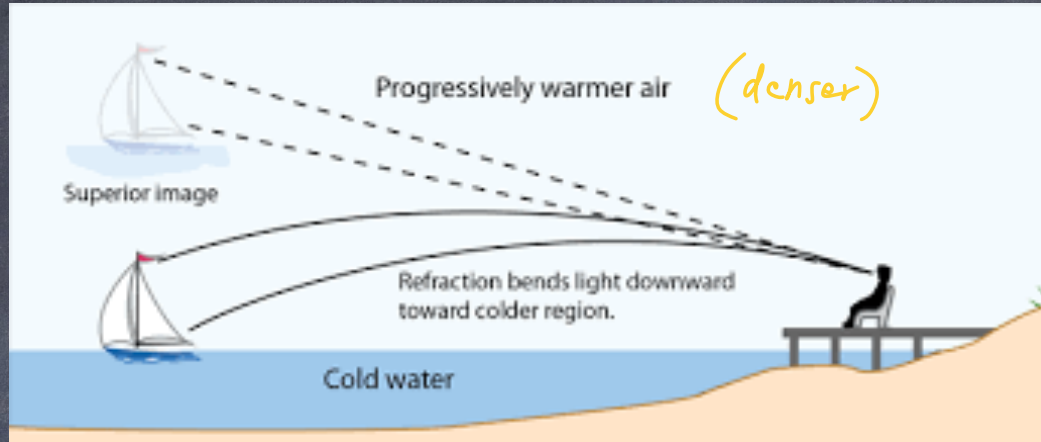
light





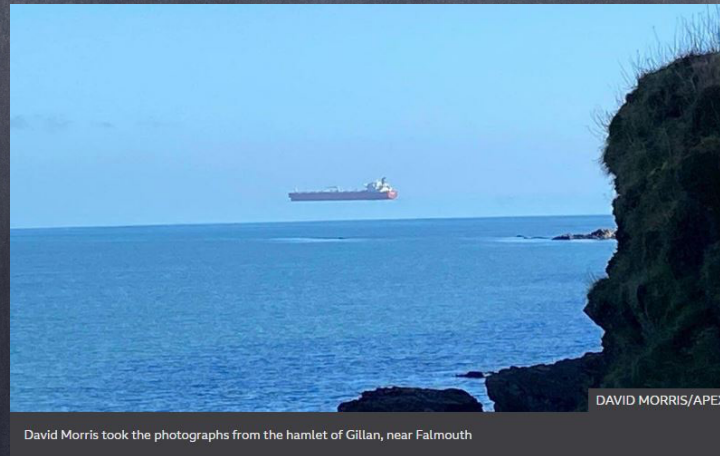




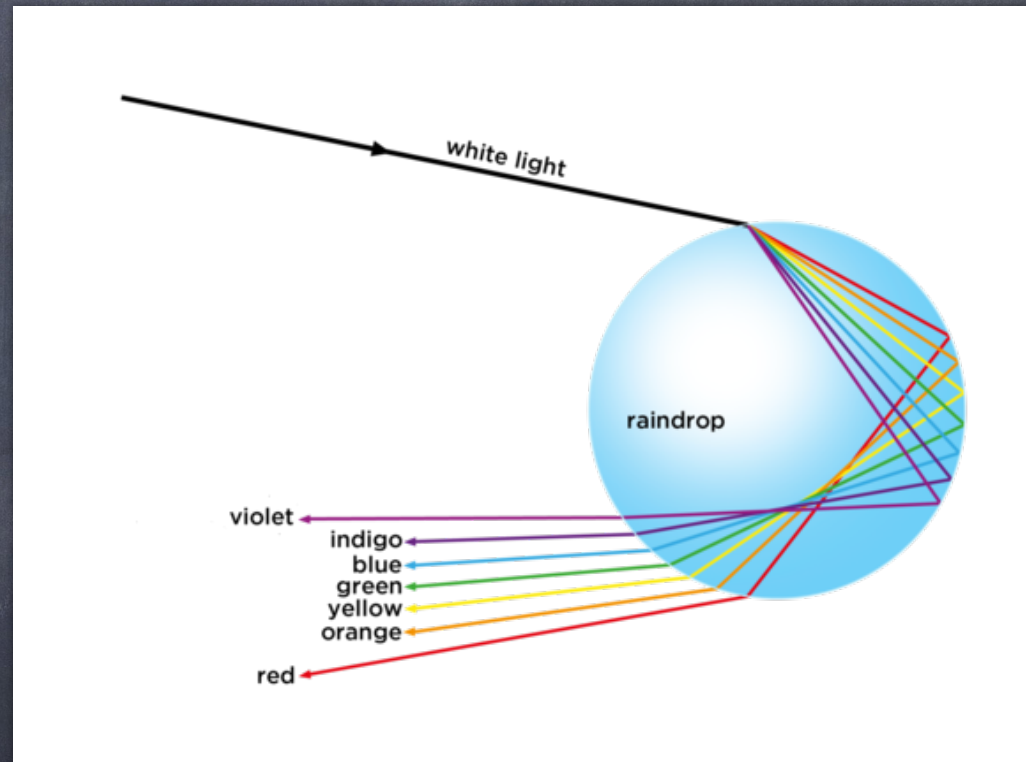
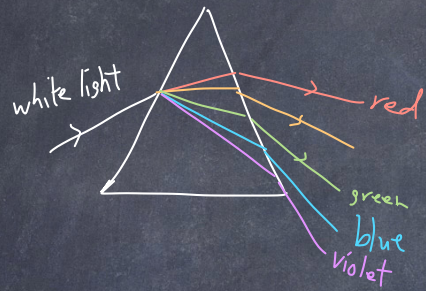


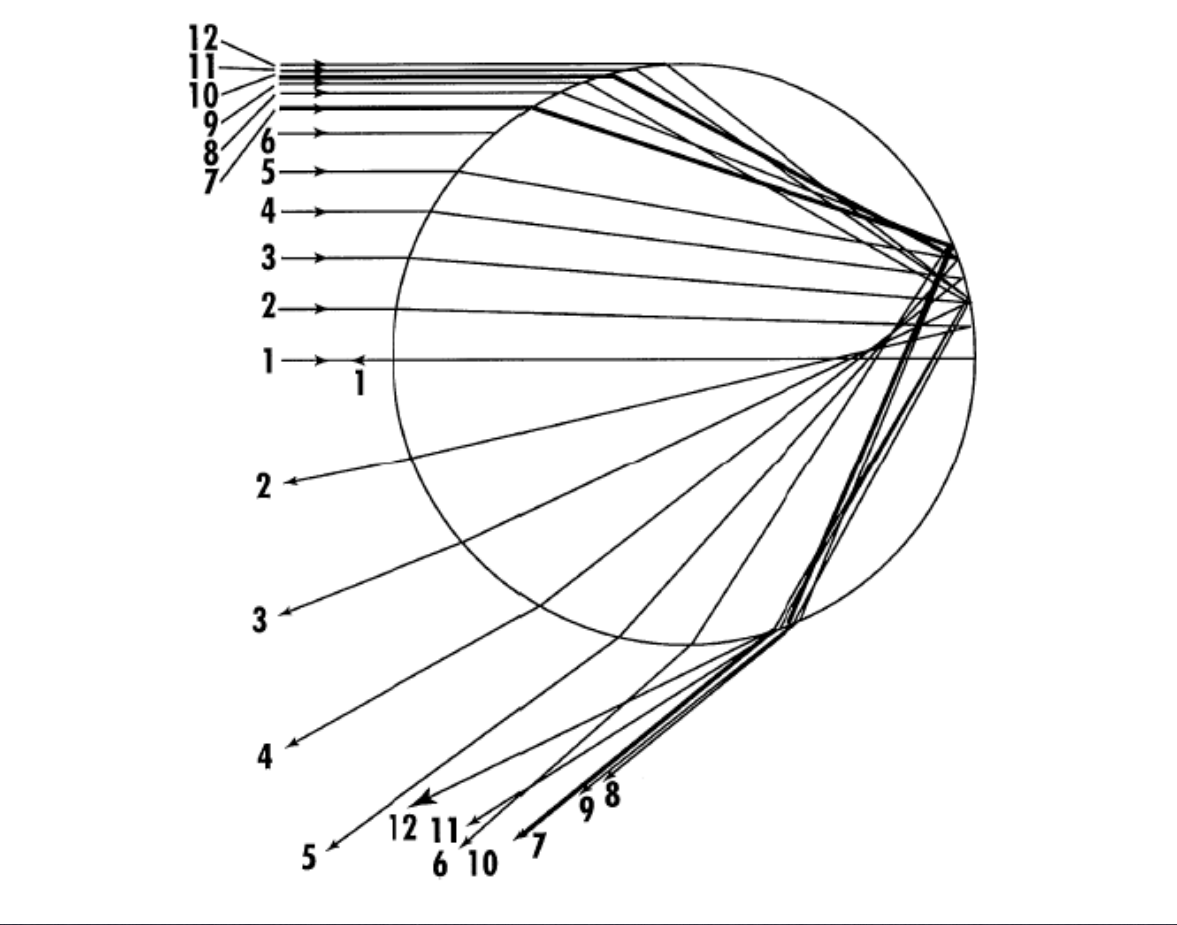
less dense →

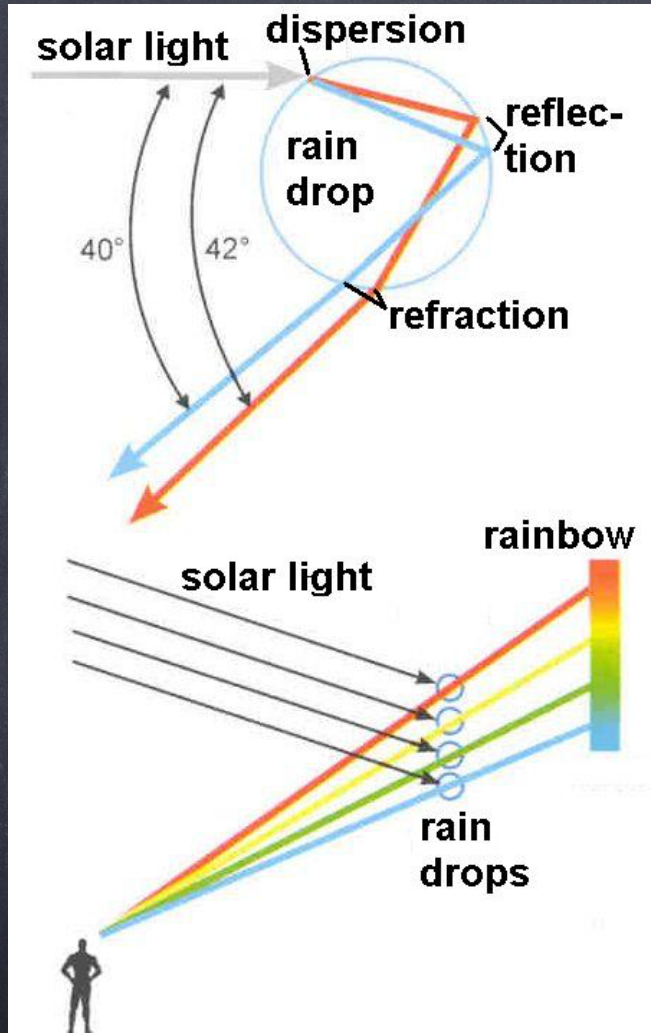
more dense →

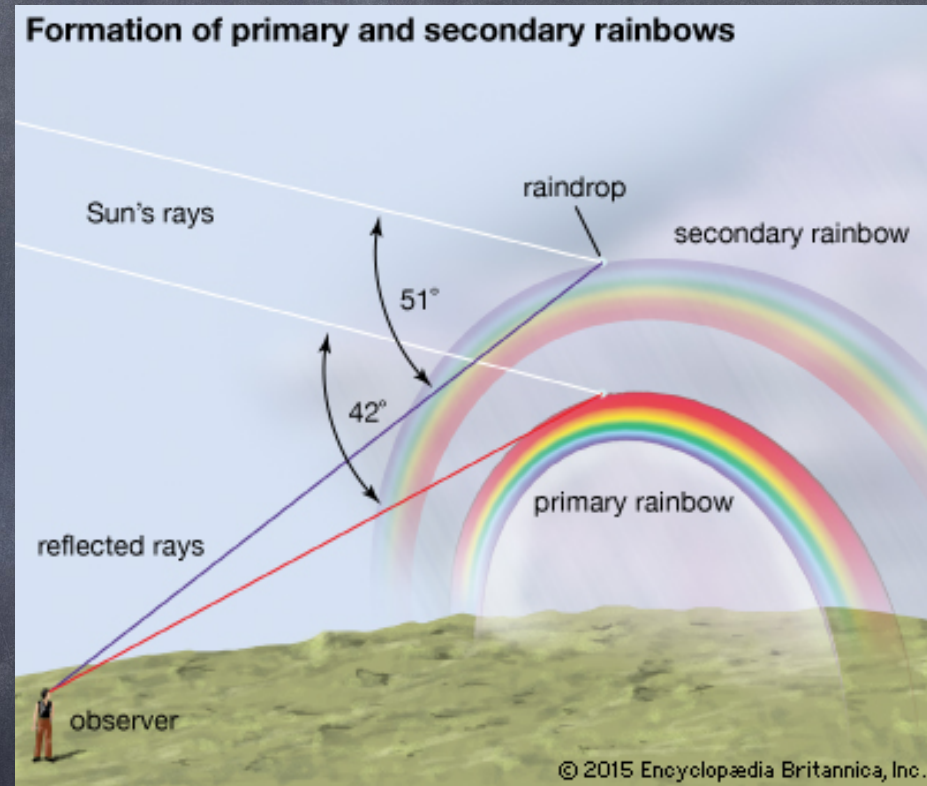
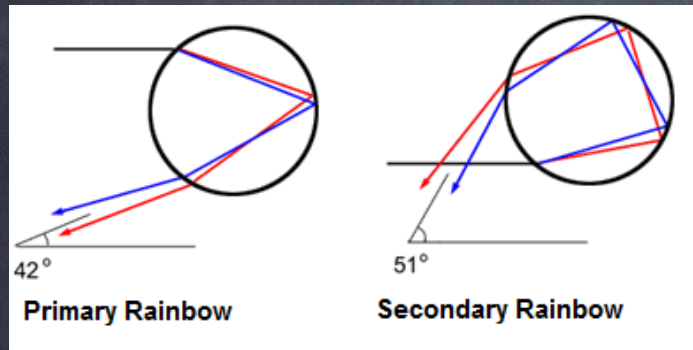
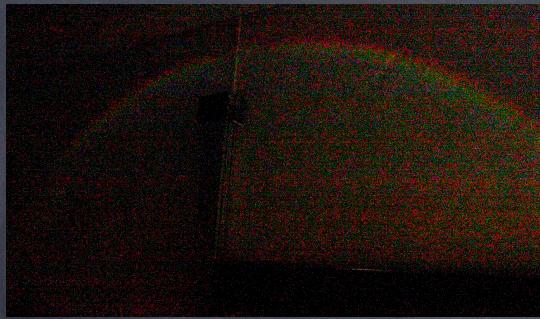


"looming"



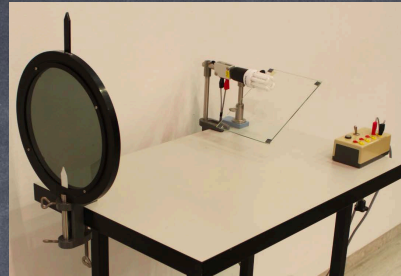




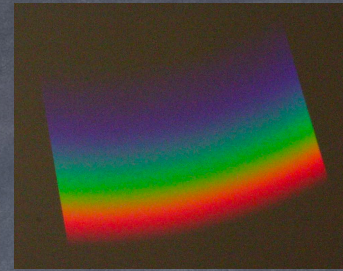




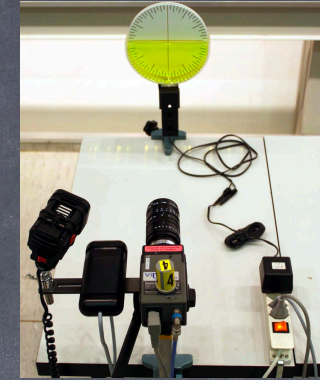
W51



W138



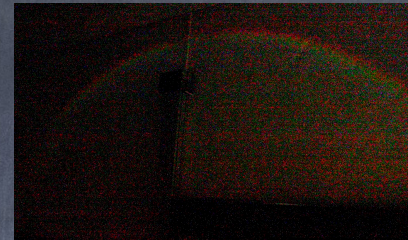
W100



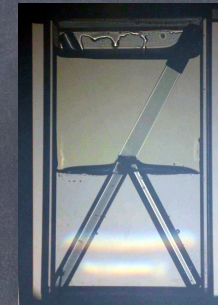
W73



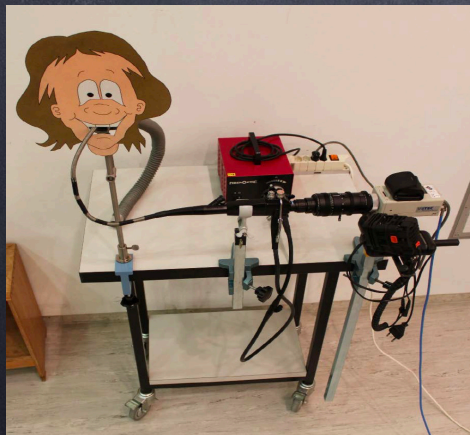
W77



W95



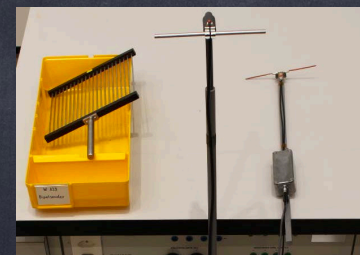
W93



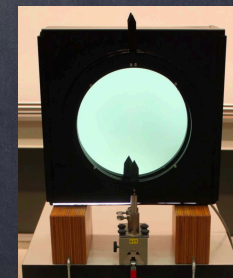
W78



W94



W139



W137