

EXAMEN : baccalauréat Général – Série S –SVT ou S-SI	SESSION 2014
EPREUVE : Evaluation spécifique de Langue en section européenne	
PHYSIQUE – CHIMIE en langue ANGLAISE	
THEME : ONDES ET MATIERE	Sujet n°08

BLU-RAY DISC

While a DVD uses a 650 nm red laser, Blu-ray Disc uses a 405 nm "blue" laser diode. Note that even though the laser is called "blue", its color is actually in the violet range. The shorter wavelength can be focused on a smaller area, thus enabling it to read information recorded in pits that are less than half the size of those on a DVD, and can consequently be spaced more closely, resulting in a shorter track pitch*, enabling a Blu-ray Disc to hold about five times the amount of information that can be stored on a DVD.

The minimum "spot size" on which a laser can be focused is limited by diffraction (fig 1), and depends on the wavelength of the light. By decreasing the wavelength, the laser beam can be focused to a smaller spot, which effectively allows more information to be stored in the same area. For Blu-ray Disc, the spot size is 580 nm. This allows a reduction of the pit size from 400 nm for DVD to 150 nm for Blu-ray Disc, and of the track pitch from 740 nm to 320 nm.

The lasers are GaN (gallium nitride) laser diodes that produce 405 nm light .Conventional DVDs use 650 nm red lasers, and CDs use 780 nm near-infrared lasers.

*track pitch = espace entre les pistes

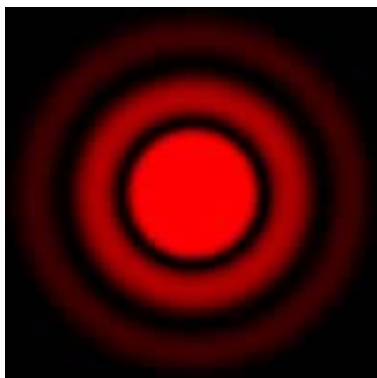
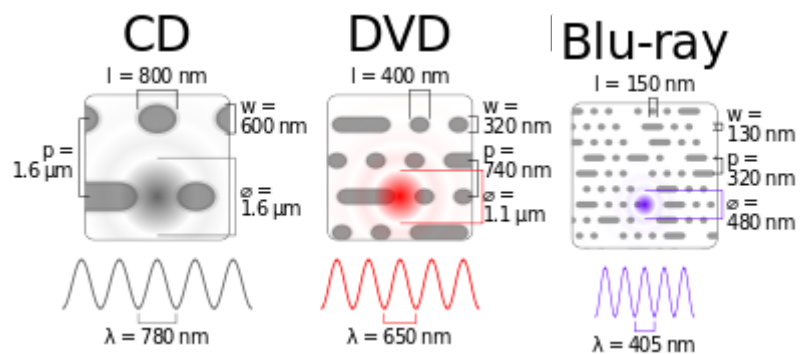


fig 1: A diffraction pattern



p = pitch
w = width
Ø = diameter

fig 2: Comparison of various optical storage media

From <http://en.wikipedia.org>

QUESTIONS

1a. Using information given in the text and fig 2, explain why Blu Ray disc can contain more information than a DVD?

1b. Describe an experiment which allows to observe the diffraction pattern shown in fig 1.

2. "Electromagnetic waves are a part of our daily life". Picking some examples in the whole electromagnetic spectrum, show that it's hard to disagree on this statement.