

Welcome to 3.091

Lecture 5

September 17, 2004

(266)	109	(269)	110	(272)	111	(277)	112	113
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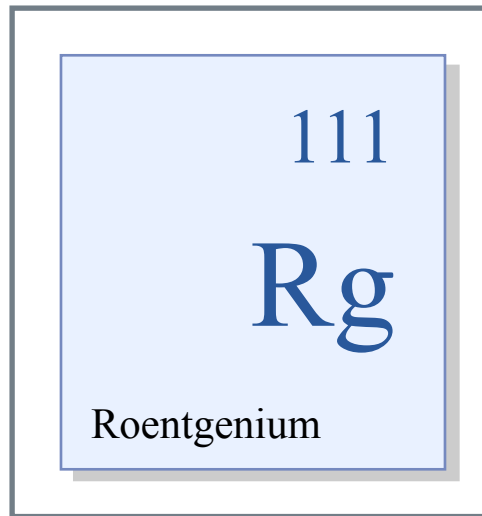


Figure by MIT OCW.

Prism Spectrograph

A.A. Ångström (1853)

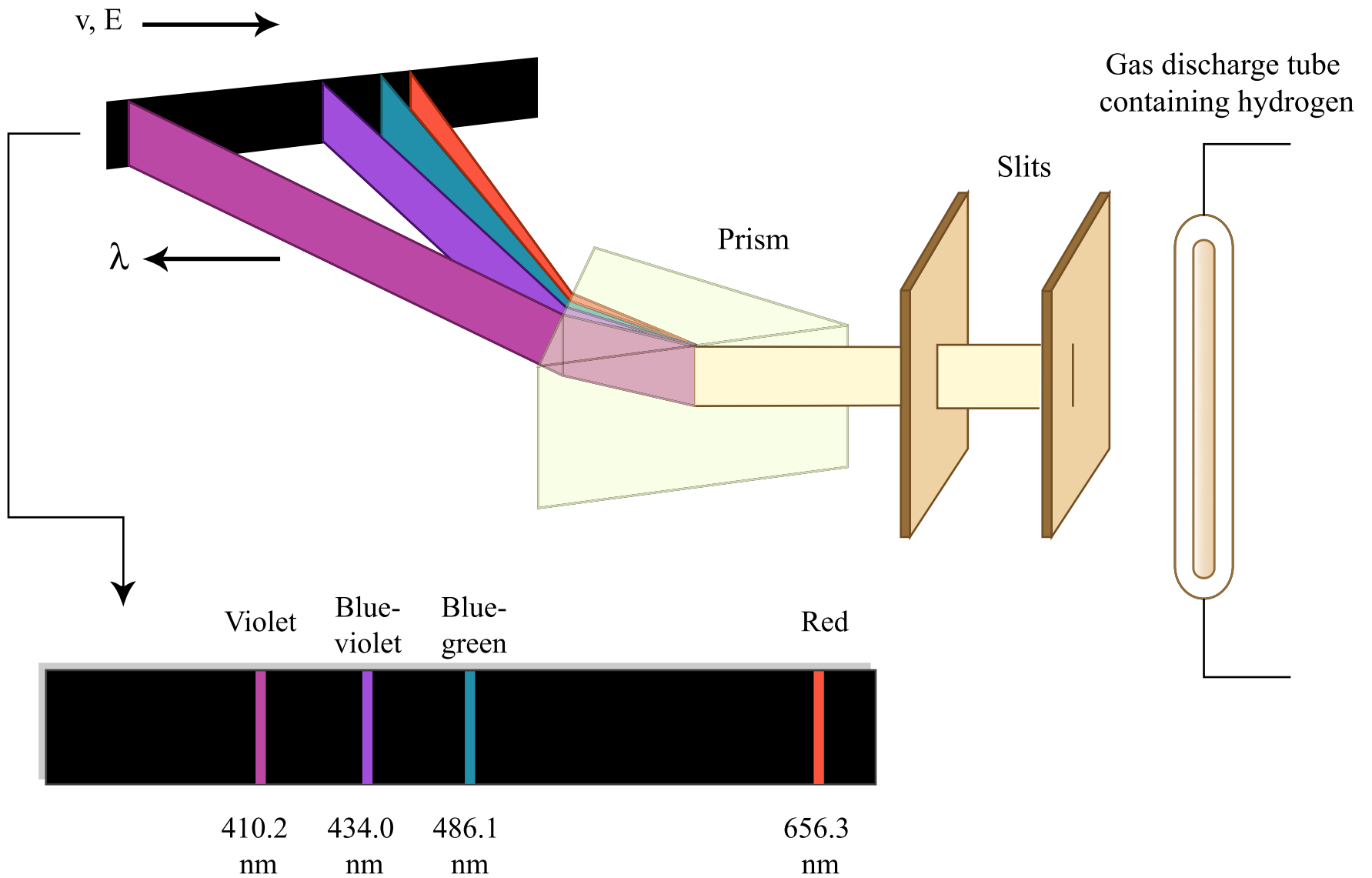
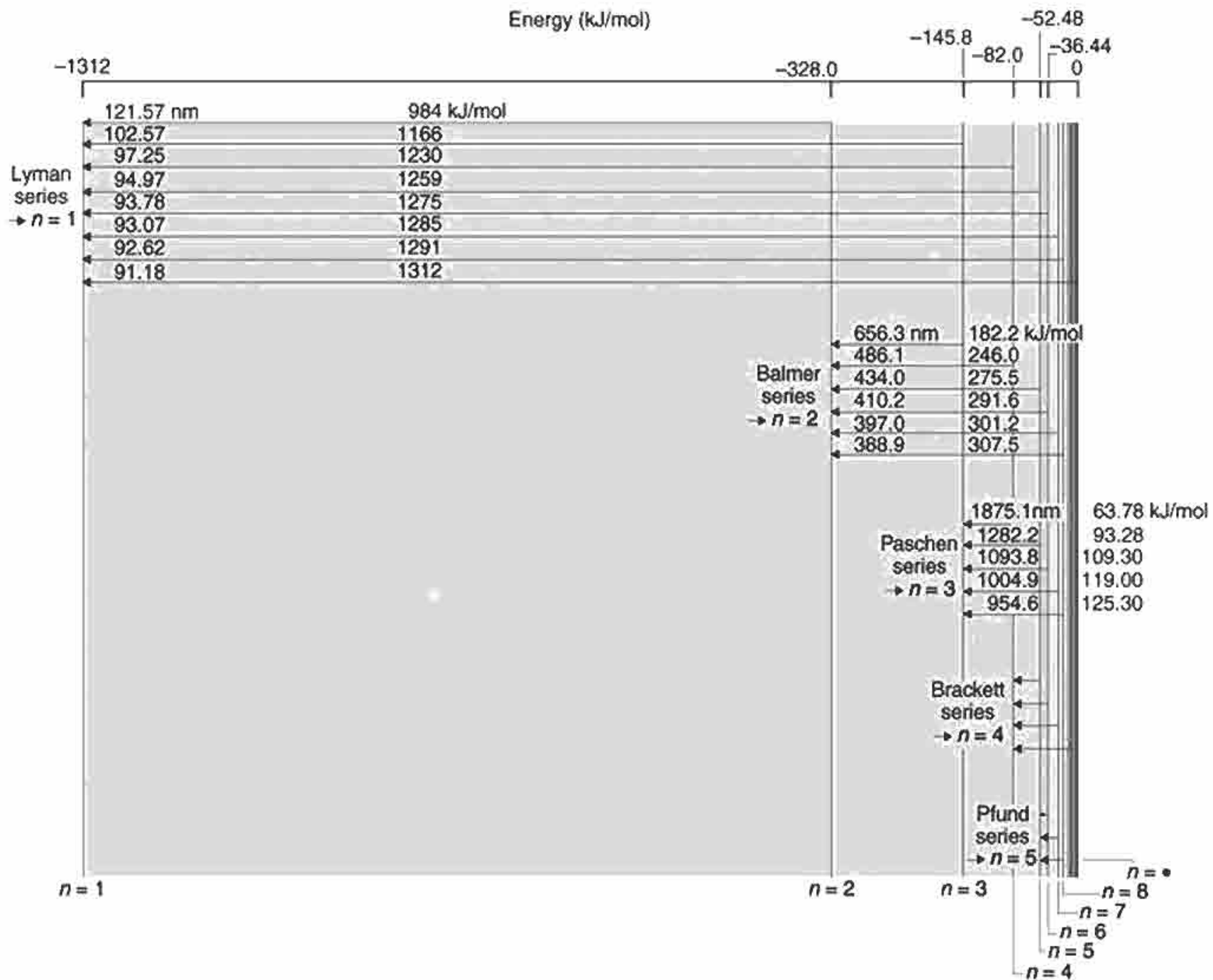


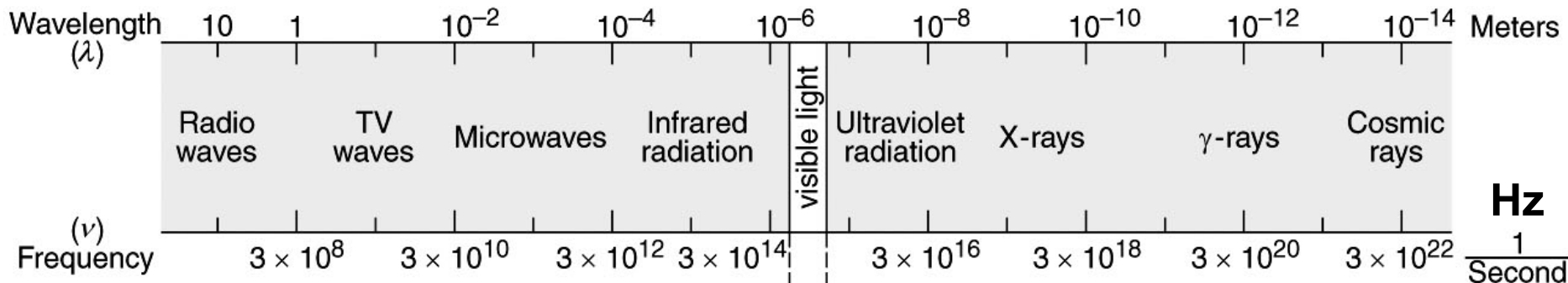
Figure by MIT OCW.



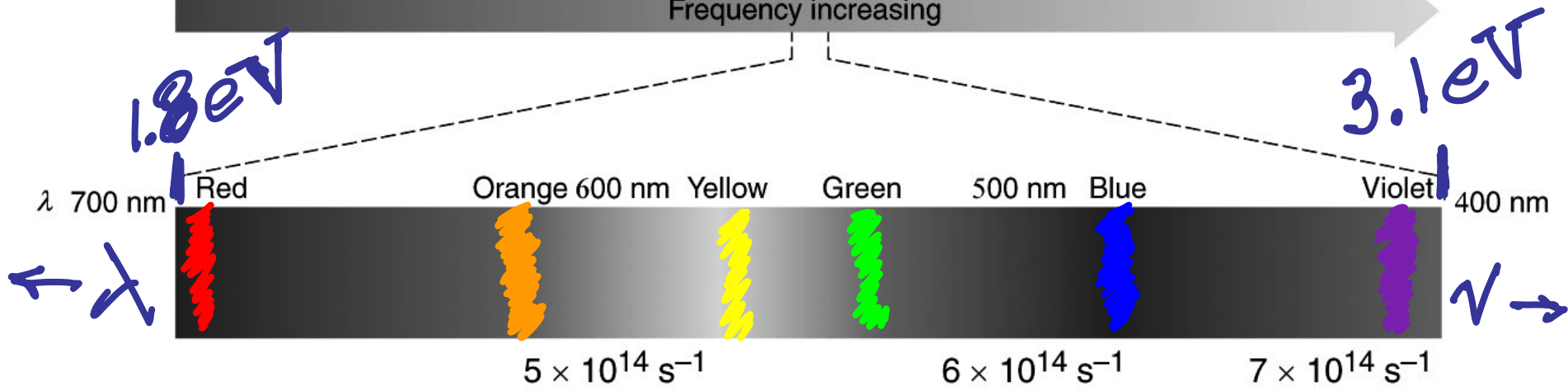
$\leftarrow \lambda$

$E, \nu \rightarrow$

Wavelength increasing \leftarrow



Frequency increasing \rightarrow



Bohr Postulates for the Hydrogen Atom

1. Rutherford atom is correct
2. Classical EM theory not applicable to orbiting e^-
3. Newtonian mechanics applicable to orbiting e^-
4. $E_{\text{electron}} = E_{\text{kinetic}} + E_{\text{potential}}$
5. e^- energy quantized through its angular momentum:
 $L = mvr = nh/2\pi, n = 1, 2, 3, \dots$
6. Planck-Einstein relation applies to e^- transitions:

$$\Delta E = E_f - E_i = h\nu = hc/\lambda$$

$$c = v\lambda$$

Schematic representation of the Stern Gerlach experiment (1921).

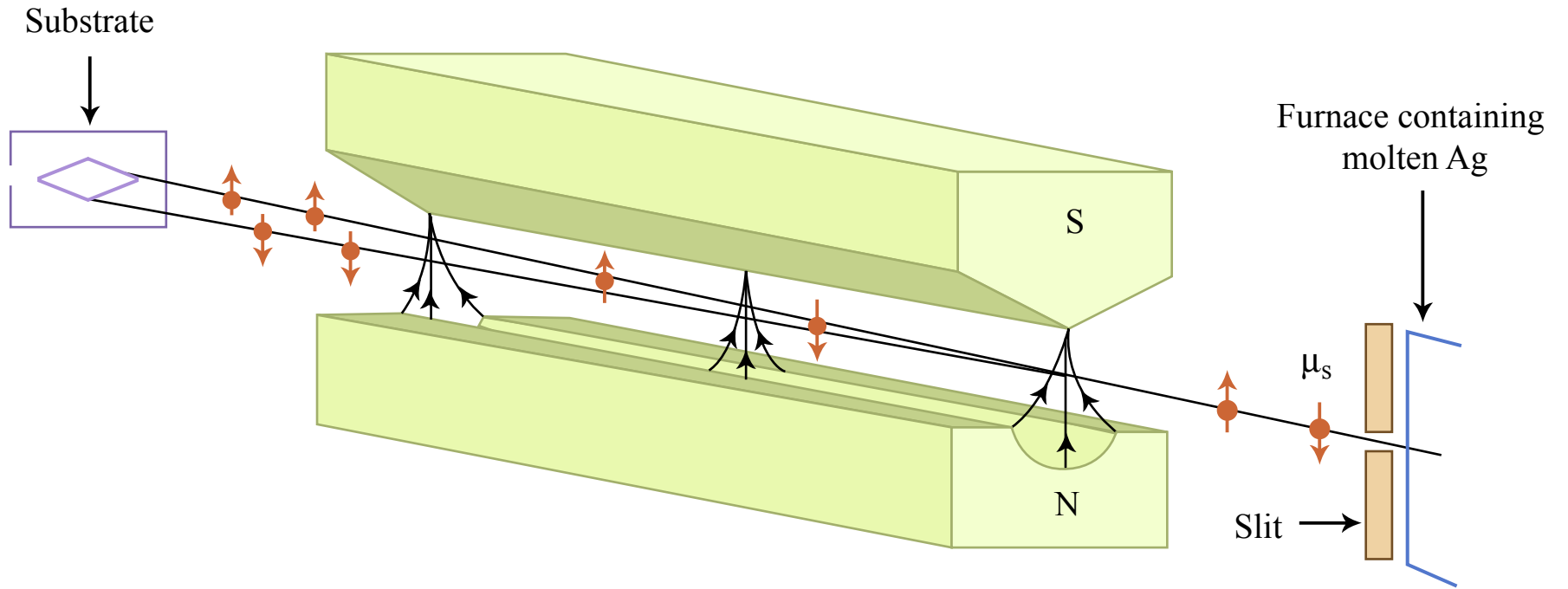


Figure by MIT OCW.

Hindenburg

Image removed due to
copyright concerns.

B 747

Titanic

* 135 ft in dia. × 804 ft long

* 7 million cu ft gas

* 112 tons useful lift

* Helium Control Act  inflated with H₂

Image removed due to copyright concerns.

*** 10 transatlantic flights in 1936:
1002 passengers**

*** cruising speed 78 mph**

*** May 6, 1937 arrival of first flight to US**

Image removed due to copyright concerns.

*** while docking at Lakehurst, NJ**

- * 36 dead of 97 on board
- * aluminum Bluth grand piano melted
- * electrical discharge in vicinity of H₂ leak
- * skin of resin (finished with lacquer dope)
 - + aluminum powder
 - + iron oxide on inside
- ☞ sheets of SOLID ROCKET MOTOR grains
- * end of rigid airships in commercial air transportation

Image removed due to copyright concerns.

- * **US Navy airship filled with helium (1956)**
- * **two-ply cotton envelope
could not withstand gasoline fire**