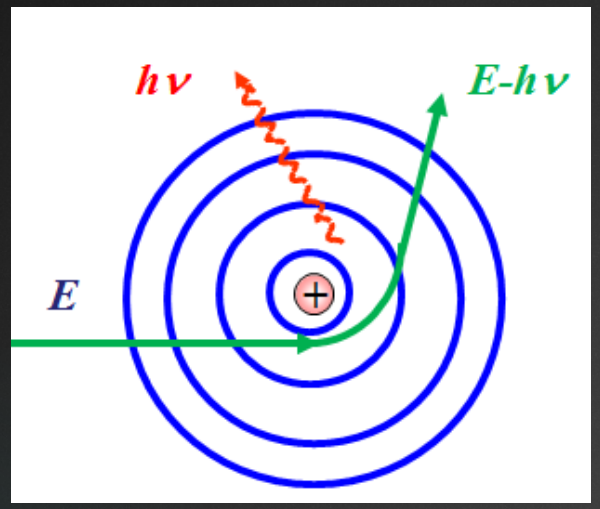
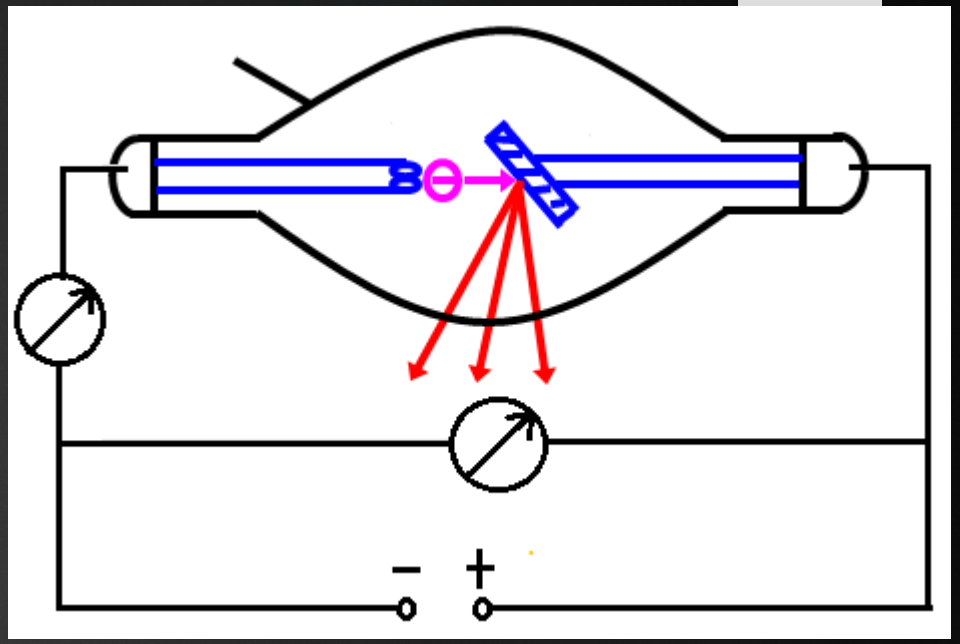
X-ray experiments

Rui Peng

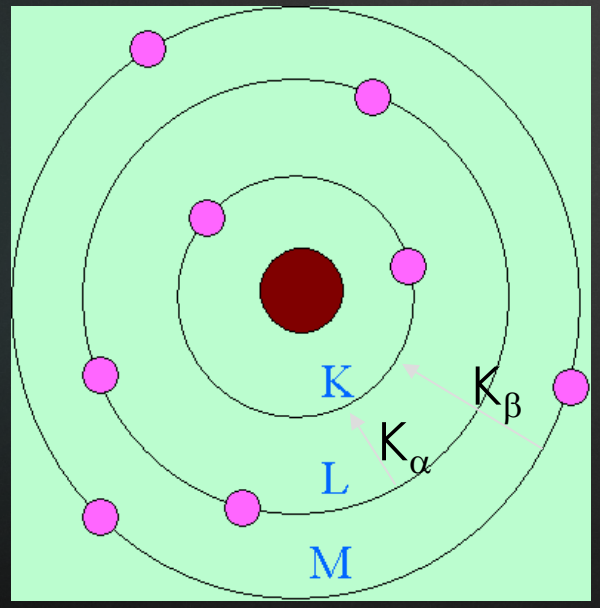
Aim 1:How is X-ray generated?

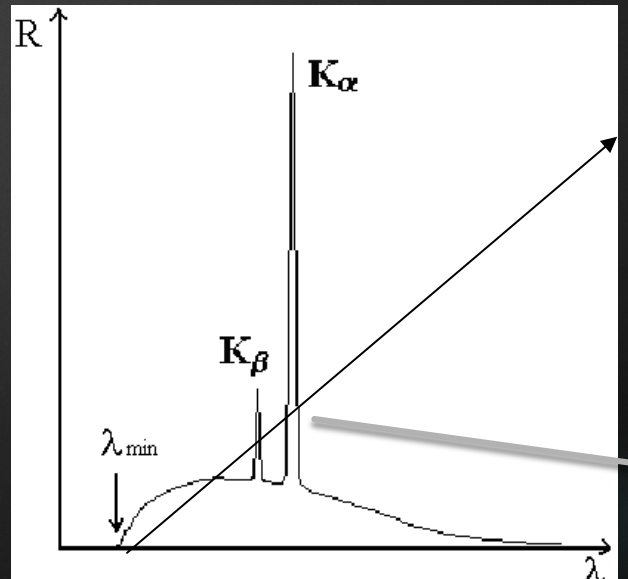
Two types of radiation process:
Bremsstrahlung





Characteristic X-ray radiations

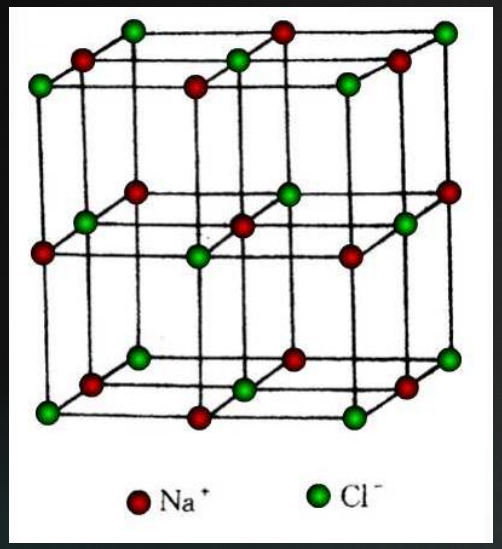


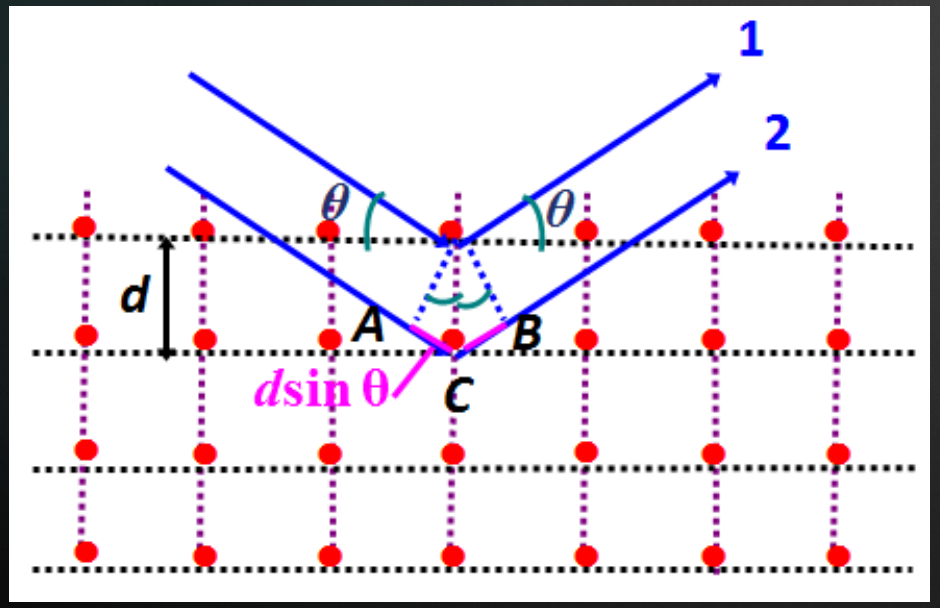


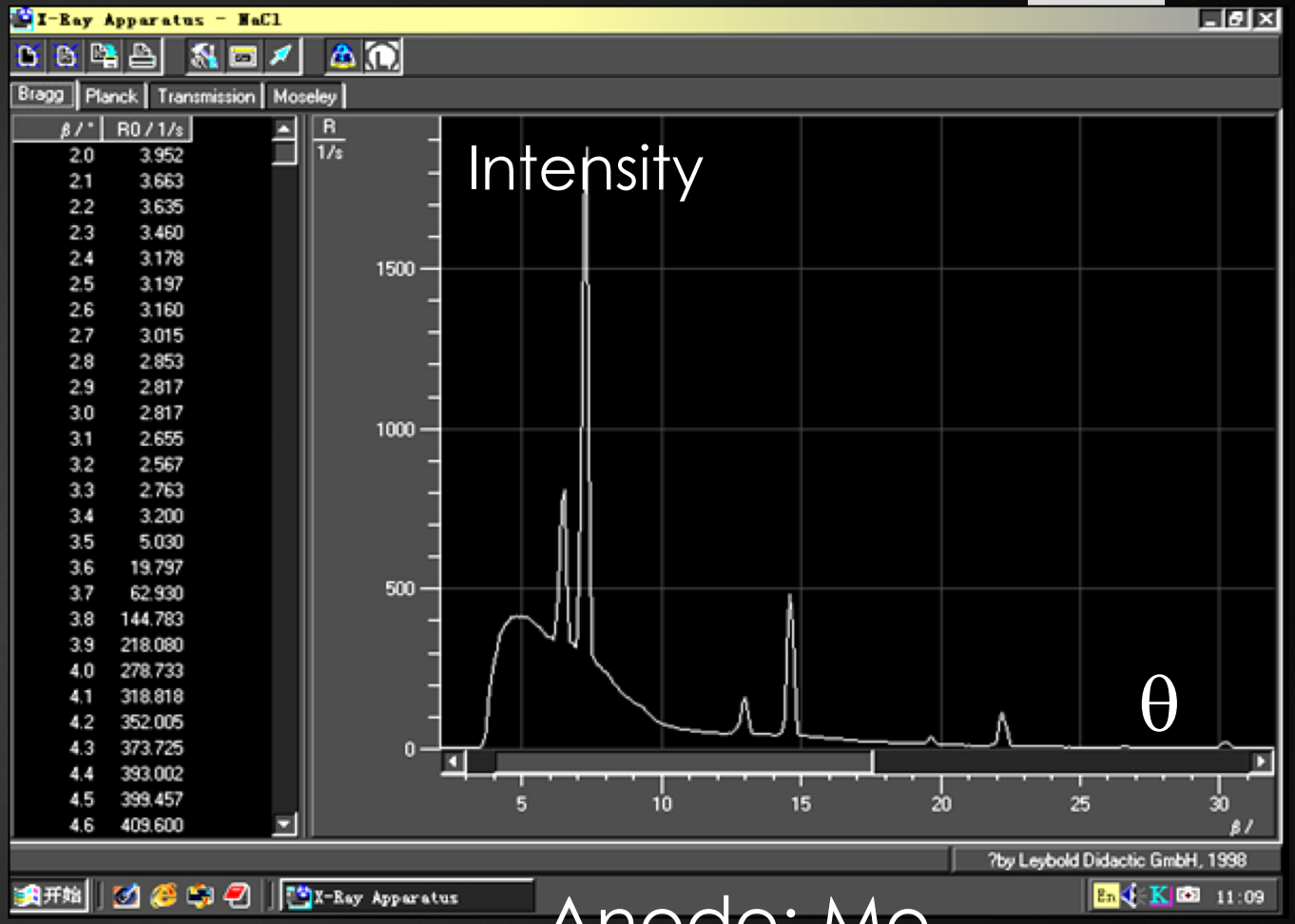
Energy conservation:
$hc/\lambda=\Delta E$
Limit wavelength
$hc/\lambda_{min}=E-0$

Characteristic Energy
~ anode material

Aim 2: X-ray diffraction







Bragg law:

$$2d\sin\theta = k\lambda$$

Anode: Mo

λ1=0.0711nm

λ2=0.0632nm

1. Observe the image of an opaque object on the luminous screen

- U=35kV, I=1mA, 0.8mA, 0.6mA, 0.4mA, 0.2mA, how does the image change?

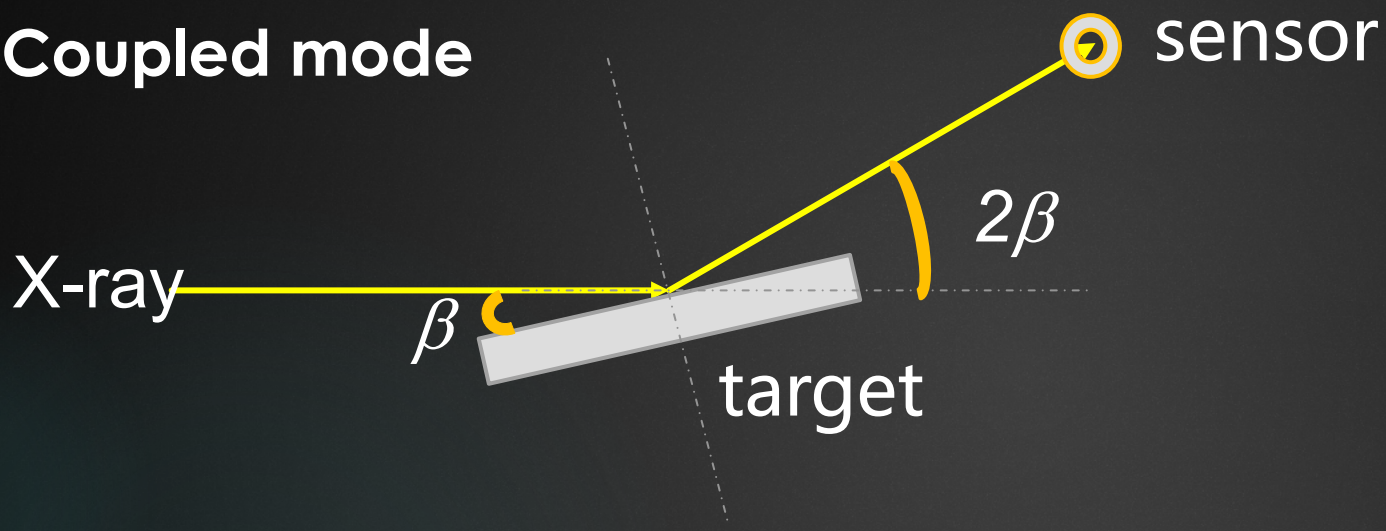
- I=1mA, U=35kV, 30kV, 25kV, 20kV, 17kV, how does the image change?

2. Measure the lattice spacing of the NaCl single crystal

- Attention:
- 1. NaCl crystal is very hygroscopic and fragile!
- 2. Before measurement, do calibrate the zero positon!

Calibration

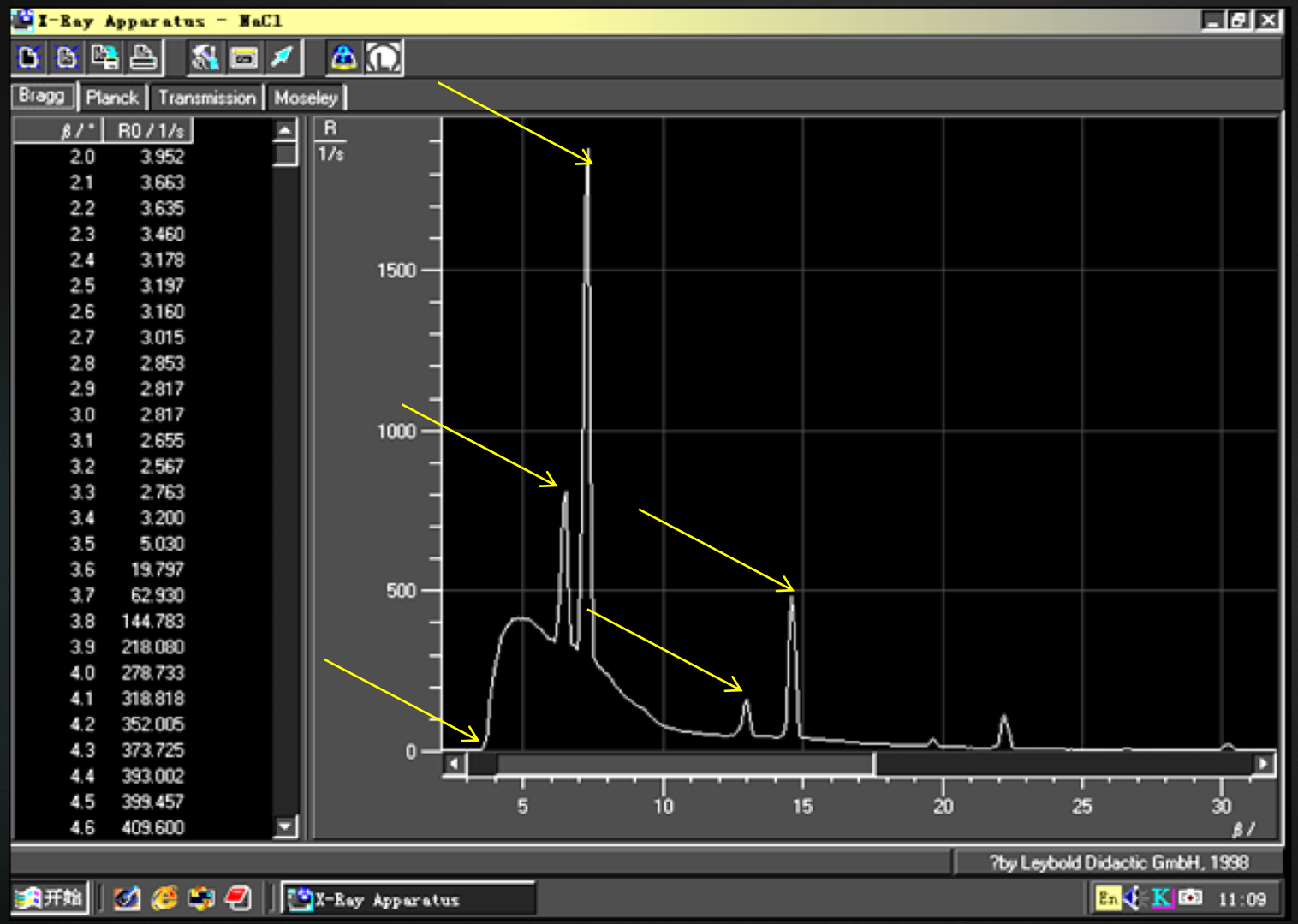
Coupled mode

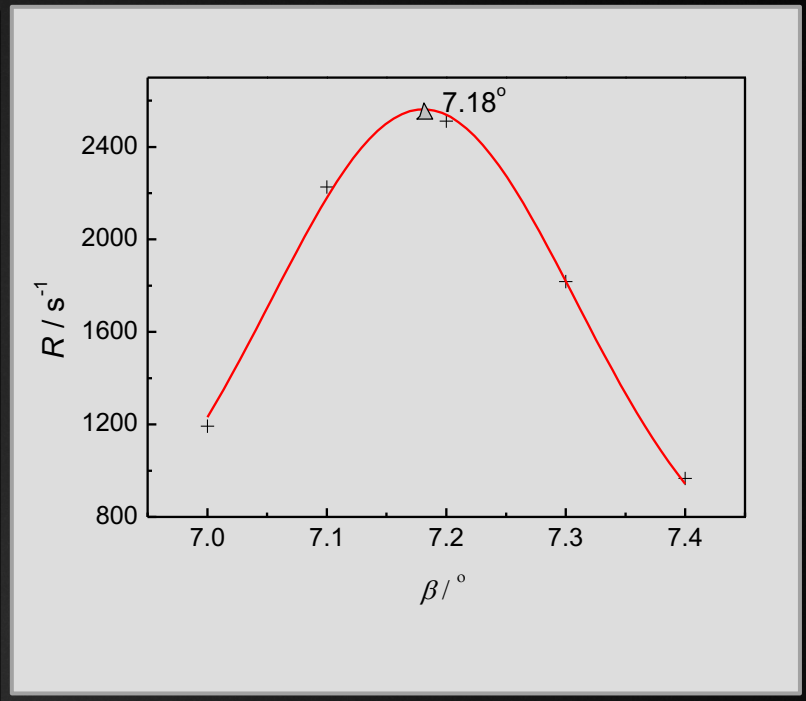


Note: Before setting the zero position, ask me to check whether it's correct.

Data recording and analysis

$$2d\sin\theta = k\lambda$$





- d=
- λmin=
- Is the bragg equation correct?

Announcement

- Three day holiday April.5-April.7
- No class ----Next Friday April.6
- Next class----April. 8 (Sunday)